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Record

Volume 31 No. 2



Washington University in St. Louis

Nanotechnology enables low-dose treatment of atherosclerotic plaques

By GWEN ERICSON

In laboratory tests, one very low dose of a drug was enough to have an effect on notoriously tenacious artery-clogging plaques. What kind of drug is that potent?

It's not so much the drug itself as how it was delivered. Fumagillin — a drug that can inhibit the growth of new blood vessels that feed atherosclerotic plaques — was sent directly to the base of plaques by microscopically small spheres called nanoparticles developed by School of Medicine researchers.

"Previously we reported that we can visualize plaques using our nanoparticle technology, but this is the first time we've

demonstrated that the nanoparticles also can deliver a drug to a disease site in a living organism," said Patrick Winter, Ph.D., research assistant professor of medicine. "After a single dose in laboratory rabbits, fumagillin nanoparticles markedly reduced the growth of new blood vessels that feed plaques."

The researchers report their findings in the September issue of the journal *Arteriosclerosis, Thrombosis, and Vascular Biology*. The arti-

cle is now available online.

An atherosclerosis plaque results when a buildup of cholesterol, inflammatory cells and fibrous tissue forms inside an artery. If a plaque ruptures, it can block blood flow to the heart or brain, causing a heart attack or stroke.

While growing, plaques require an influx of nutrients, fats and cells, so they develop their own blood supply — tiny blood vessels that grow within the walls of arteries and penetrate the plaque.

Many believe that cutting off this blood supply could stabilize or reduce plaques. In previous studies, fumagillin proved to be an effective agent for stopping the process that

creates new blood vessels.

Riding on the nanoparticles, fumagillin is carried to the site of new blood vessel formation and stays there thanks to a fellow nanoparticle passenger — a component that fastens the nanoparticles to cells found in newly developing blood vessels. Stuck in this position, the nanoparticle drops its load of fumagillin, concentrating it at the site of the atherosclerotic plaque.

In this study, the single dosage of fumagillin each rabbit received was 50,000 times lower than the total fumagillin dose used in an earlier experiment by another research group — and yet reduced the growth of

See Plaques, Page 4



Winter

Engineer designs system to put wastewater to work

By JASON LUTZ

In the midst of the worldwide energy crisis, WUSTL researchers have continued their work on a microbial fuel cell that generates electricity from wastewater.

Advances in the design of this fuel cell in the past year have increased the power output by a factor of 10 and future designs, already in the minds of the researchers, hope to multiply that power output by 10 times. If that goal can be achieved, the fuel cell could be scaled up for use in food and agricultural industries to generate electrical power — all with the wastewater that today goes right down the drain.

Lars Angenent, Ph.D., assistant professor of chemical engineering and a member of the University's Environmental Engineering Science Program, has devised a continually fed upflow microbial fuel cell (UMFC).

In a paper published in the

online version of *Environmental Science Technology*, Angenent describes how wastewater enters from the bottom of a system and is continuously pumped up through a cylinder filled with granules of activated carbon.

Many previous microbial experiments used closed systems with a single batch of nutrient solution, but because this system is continuously fed from a fresh supply of wastewater, Angenent's UMFC has more applications for industry since wastewater is continually outputted during industrial production.

The organic matter in the wastewater provides food for a diverse group of bacteria that has developed a biofilm (a thick-layered colony of bacteria) on a simple electrode in the anode chamber. An inexpensive U-shaped proton-exchange membrane inside the anode chamber separates the anode from the cathode.

See Wastewater, Page 6



Graduate student Jason He (left) and Lars Angenent, Ph.D., assistant professor of chemical engineering and a member of the University's Environmental Engineering Science Program, work with a version of their microbial fuel cell. The two have developed a new version of the fuel cell that increases the power output by a factor of 10 and are in the planning stages for an even more robust fuel cell.

Area STARS rise in earthquake lab

By JENNIE IVERSON

Pengcheng Wang is one of many STARS.

The Parkway South (St. Louis County) High School senior is one of 61 high-school participants in a novel program for scientifically inclined students.

The 2006 Pfizer-Solutia Partnership of Universities' Students and Teachers as Research Scientists (STARS), a program for gifted high-school students in the area, has once again given high school students and researchers the rare opportunity to work together for an enriching and productive summer.

The program, in its 17th year, pairs students and teachers with research mentors at WUSTL, the University of Missouri-St. Louis, Saint Louis University, the Donald Danforth Plant Science Center and the Missouri Institute of Mental Health. The six-week program culminated July 21 with the high-school students giving oral presentations detailing their summer projects.

Wang, a rising senior at Parkway South, worked under the tutelage of Shirley J. Dyke, Ph.D., the Edward C. Dicke Professor of



Shirley J. Dyke, Ph.D., and Pengcheng Wang work in Dyke's earthquake engineering lab in the Students and Teachers as Research Scientists (STARS) program for gifted high-school students.

Civil Engineering and director of the Structural Control and Earthquake Engineering Laboratory, and said he had an earth-shattering experience.

"I've really enjoyed it," he said. "It's allowed me to get involved in something that I wouldn't normally get to do."

What has truly surprised and delighted him about civil engineering is the blend of science and technical/computer work involved in his research.

He was grateful for computer assistance from Chenyang Lu, Ph.D., assistant professor of com-

See STARS, Page 6

MetroLink's Cross County Extension to open Aug. 26

By ANDY CLENDENNEN

On Aug. 7, Metro made the announcement that nearly everyone has been waiting for: The Cross County Extension is complete and will be open for transit Aug. 26.

Given the anticipation of the eight-mile extension, it would seem that a celebration would be in order, and both the University and Metro are planning to deliver.

The University will host a Grand Opening Celebration from 9:30-11:30 a.m. Aug. 26 in the parking lot just outside Uncas A. Whitaker Hall. Planned activities include a miniature train ride, arts and crafts, music and refreshments.

The first train will leave the Forest Park-DeBaliviere Station at about 11 a.m. and make its way through the alignment.

The ceremony will continue with a sequential ribbon-cutting and brief speeches as the train pulls into each Cross County station. A list of elected

officials and honored guests will then board the first train at their respective stations and make their way to Shrewsbury.

Trains will continue to serve these stations after 12:15 p.m., so many guests can arrive at the celebration via train.

Once at Shrewsbury, the celebration will kick off at 1 p.m. with speeches by some of the area's top government officials, paying special recognition to those who have worked hard to deliver this project to the region.

The day will conclude with Linkfest, from 2-8 p.m. LinkFest will be a family-friendly event that will begin immediately after Metro's Grand Opening Celebration and will end with fireworks.

Linkfest will be in the public green space located just south of the Shrewsbury-Lansdowne I-44 station. Along with live music, refreshments and games, area businesses will have booths with information and samples so

See MetroLink, Page 6

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School of Medicine Update

Tumor wizardry wards off attacks from immune system

BY GWEN ERICSON

Like the fictional wizard Harry Potter, some cancerous tumors seem capable of wrapping themselves in an invisibility cloak.

School of Medicine researchers have found that pancreatic tumors hide from the body's immune surveillance by surrounding themselves with cells that make it hard for the immune system to detect them.

The tumor-protecting cells are white blood cells called regulatory T cells, or T-reg for short. Under ordinary circumstances, T-reg cells inhibit immune components responsible for killing unwanted cells — this allows T-reg cells to help prevent autoimmune reactions.

The scientists discovered that cancerous cells take advantage of T-reg cells' suppressor ability, enlisting them to keep the immune system at bay. Their report appears in the July/August issue of the *Journal of Immunotherapy*.

"Earlier, we found that T-reg cells are much more prevalent in patients with breast cancer and pancreatic cancer than in healthy patients," said David C. Linehan, M.D., associate professor of surgery and a researcher with the Siteman Cancer Center. "The new findings show that tumors are directly responsible for the increase of T-reg cells and can attract T-reg cells to their vicinity. This could be one way for tumors to evade im-



Linehan

mune surveillance."

Linehan said he believes this could explain the failure of many experimental anti-cancer vaccines. Such vaccines are designed to

rev up the immune response to cancer cells so that the immune system can attack tumors. But a tumor shielded with T-reg cells could potentially circumvent the immune system's attack and remain safe.

In mice implanted with pancreatic cancer, the researchers demonstrated that tumor growth caused an increase in T-reg cells in both the blood stream and in lymph nodes leading from the tumors.

When the research team blocked a signaling molecule that pancreatic tumors secrete in abundance, T-reg cells were no longer present in the tumor-draining lymph nodes, suggesting that this signaling molecule, referred to as TGF-beta, has an important role in weaving a tumor's cloak of invisibility.

Such information could lead to a method for blocking tumors from using T-reg cells for protection. Other research by Linehan and colleagues showed that in mice with pancreatic cancer, simply depleting T-reg cells slowed tumor growth and increased sur-

vival time.

"We're looking at several potential ways to interfere with tumor recruitment of T-reg cells," Linehan said. "We'd like to see these findings advance cancer immunotherapy. We want to find a way to actively suppress T-reg

cells and at the same time actively evoke an immune response to tumor-specific antigens."

In collaboration with other researchers at the School of Medicine, Linehan is planning to set up a clinical trial that pairs T-reg depletion with anti-cancer vac-

cine as a therapy for pancreatic cancer patients.

"We're attacking the problem from different angles hoping to translate these findings to our patients," Linehan said. "Right now, no effective treatment exists for pancreatic cancer."



A stitch in time Using a cow's heart, Kory Lavine (left) learns to do sutures from fellow student Andrew Harger at clinic orientation for new third-year students. Other students (from left) are Michelle Moniz, Alistair Kent and Jeffrey Lau.

Susan Dutcher named interim head of genetics department

BY MICHAEL C. PURDY

Susan K. Dutcher, Ph.D., professor of genetics and of cell biology and physiology, has been named interim head of the James S. McDonnell Department of Genetics.

Dutcher succeeds Mark Johnston, Ph.D., professor of genetics, who stepped down after four years as interim chair. Larry J. Shapiro, M.D., executive vice chancellor and dean of the School of Medicine, made the announcement.

"Susan Dutcher is a highly respected geneticist, and we are delighted to tap her skills in assuming this role," Shapiro said. "I'd also like to recognize Mark

Johnston, who did an outstanding job as interim chair, and welcome him back to full-time bench science."

Dutcher's goals as interim head include facilitating opportunities for scientific collaborations within the department and with other departments at the University.

"Genetics is increasingly becoming a universal tool for biomedical research, so I think it's important that we as geneticists work to make the new approaches we're developing available to the

whole university," she said.

Washington University's BioMed 21 initiative, dedicated to transforming biomedical research from bench to bedside, has genetic research as one of its central cores.

Dutcher's laboratory uses the green alga *Chlamydomonas* to learn how information in genes is used to construct cilia, hairlike structures on the surface of the alga's cells. Three years ago, Dutcher conducted a pioneering experiment that used a computerized comparison of three genomes to single out genes likely to contribute to the creation of cilia in *Chlamydomonas*. Her lab's research still includes studies of interesting genes highlighted by the analysis.

Dutcher earned a Ph.D. in genetics from the University of Washington in 1980.

Prior to coming to WUSTL in 1999, she was a professor of molecular, cellular and developmental biology at the University of Colorado.

She won the National Science Foundation's Faculty Award to Women Scientists and Engineers and was a Searle Scholar.

Dutcher is a member of the board of directors of the Genetics Society of America.



Dutcher

Cancer research grants available

Applications are being accepted for the Washington University Institutional Research Grant from the American Cancer Society. The applications are due Sept. 19.

The program provides seed money for new projects initiated by instructors and assistant professors.

The one-year awards are for a maximum of \$20,000 each.

Only junior faculty members who are within six years of their first independent research or faculty appointment are eligible.

For more information and eligibility and application guidelines, go to siteman.wustl.edu/internal.aspx?id=276 or contact Kyle Neeley (neeleky@ccadmin.wustl.edu) or Lee Ratner, M.D., Ph.D., (lratner@im.wustl.edu).

Children's Discovery Institute to grant \$5.3 million per year

BY BETH MILLER

The Children's Discovery Institute has been given the go-ahead to begin research within its four centers after its board approved an ambitious \$5.3 million annual funding proposal.

The institute, launched in January, is a novel collaboration between the School of Medicine and St. Louis Children's Hospital to fund research in four specific areas of childhood disease and accelerate cures.

Since silent fundraising began in November 2004, more than \$103 million of the targeted \$125 million has been raised.

To facilitate research and funding distribution, the board appointed Alan L. Schwartz, Ph.D., M.D., as its executive director, and Jonathan D. Gitlin, M.D., as its scientific director. In addition, it appointed a scientific advisory board made up of six distinguished scientists from Washington University and other nationally renowned institutions.

"This is an extraordinarily exciting time and opportunity for both of our institutions — Washington University and St. Louis Children's Hospital — to galvanize the resources which exist and direct those to discovering the basis and approaches to curing major children's health issues," said Schwartz, the Harriet B. Spoeher Professor of Pediatrics, chair of the School of Medicine Department of Pediatrics and Children's Hospital pediatrician-in-chief.

The \$5.3 million in annual funding will be used to recruit between eight and 10 scientists for the four centers: the McDonnell



Schwartz



Gitlin

Children's Cancer Center; the Children's Center for Musculoskeletal Diseases; the Children's Center for Lung and Respiratory Disorders; and the Children's Center for Congenital Heart Disease.

The advisory board will serve as the financial gatekeeper to research funding for interested scientists. Its six members include four Washington University professors and two from other institutions. Three are Howard Hughes Medical Institute (HHMI) investigators, and three are women.

"We are dealing here with the future of medicine, and the Children's Discovery Institute is an important opportunity to cultivate role models for young scientists," said Gitlin, the Helene B. Roberson Professor of Pediatrics, professor of pathology and immunology and of genetics and director of genetics and genomic medicine at Children's Hospital.

The advisory board members are Susan K. Dutcher, Ph.D., professor and interim head, Department of Genetics, School of Medicine; Sarah C.R. Elgin, Ph.D., HHMI professor of biology, WUSTL; Robert P. Mecham, Ph.D., the Alumni Endowed Professor of Cell Biology and Physiology, School of Medicine; Steven L. Teitelbaum, M.D., the Wilma

and Roswell Messing Professor of Pathology, School of Medicine; Michael J. Welsh, M.D., the Roy J. Carver Professor of Medicine and Cell Biology and HHMI Investigator, University of Iowa; and Huda Y. Zoghbi, M.D., professor of pediatrics, of molecular and human genetics, of neurology and neuroscience and HHMI Investigator, Baylor College of Medicine.

The team approach seeks to bring together scientists across specialties with the belief that this broad spectrum will lead to more creative pathways to finding cures. Children's Hospital President Lee Fetter said he believes this will attract some of the most talented researchers in the world.

"In a few years, scientists are going to hear about this novel approach to doing research at Washington University and think, 'Wow, I want to be a part of this team that's working on collaborative investigations into the genetic basis of childhood disease,'" Fetter said.

As scientific director, Gitlin will chair the advisory board, coordinate each center's investigator teams and otherwise serve as a catalyst for the development of ideas within each of the four centers.

Gitlin expects to present proposals from Washington University faculty to the advisory board for consideration by October, with funding awards to begin in early 2007.

"We're getting closer to realizing our dream," Gitlin said. "What you try to bring to a patient's bedside is hope. It lies within our grasp in the next quarter of this century to rid ourselves of a lot of childhood diseases, and that's the greatest hope as a pediatrician that I have for my patients."

School of Medicine Update

With cochlear implants, earlier use leads to better speech pattern

BY GWEN ERICSON

"Bye-bye, bye-bye," said the 3 1/2-year-old child, born deaf but with a cochlear implant that partially restored hearing nine months earlier. That's the most complex speech the child uttered during a testing session that involved play with a toy train set.

In contrast, a child of the same age who had a cochlear implant 31 months earlier made more sophisticated statements: "OK, now the people goes to stand there with that noise and now — Wool! Wool!" and "OK, the train's coming to get the animals and people."

The testing session was part of research that indicates the earlier a deaf infant or toddler receives a cochlear implant, the better his or her spoken language skills at age 3 1/2.

Johanna Grant Nicholas, Ph.D., research associate professor of otolaryngology at the School of Medicine, and colleague Ann E. Geers, Ph.D., from the Southwestern Medical School at the University of Texas at Dallas, conducted the research.

"Ninety percent of children born deaf are born to hearing parents, and these parents know very little about deafness," Nicholas said. "They don't know how to have a conversation in sign language or teach it to their children. Many of these parents would like their children to learn spoken language."

The researchers tested the spoken language skills of 76 children, all 3 1/2 years old, who had cochlear implants and compared those results to the length of time each child had his or her implant. They found that with increased implant time, children's vocabularies were richer, their sentences longer and more complex and their use of irregular words more frequent. The researchers' work was reported in the June issue of *Ear and Hearing*.

Nicholas said many of the children who received cochlear implants at the youngest ages have nearly the same spoken

language skills as children with normal hearing. The researchers' further studies — not yet published — suggest that by age 4 1/2, children who had cochlear implants very early often have normal speech and potentially can enter kindergarten with their hearing peers.

"Kids with residual hearing can get some help from hearing aids, but cochlear implants give a tremendous hearing advantage over hearing aids — the implants provide more sound information," Nicholas said. "For example, high-frequency sounds are magnified more with cochlear implants, so kids can hear 's' sounds and 'ed' endings better. So they

tend to catch on to plurals and verb tenses faster."

While studies like this and others favor early implantation, the decision for or against cochlear implantation is frequently put off, Nicholas said. Hearing parents often find

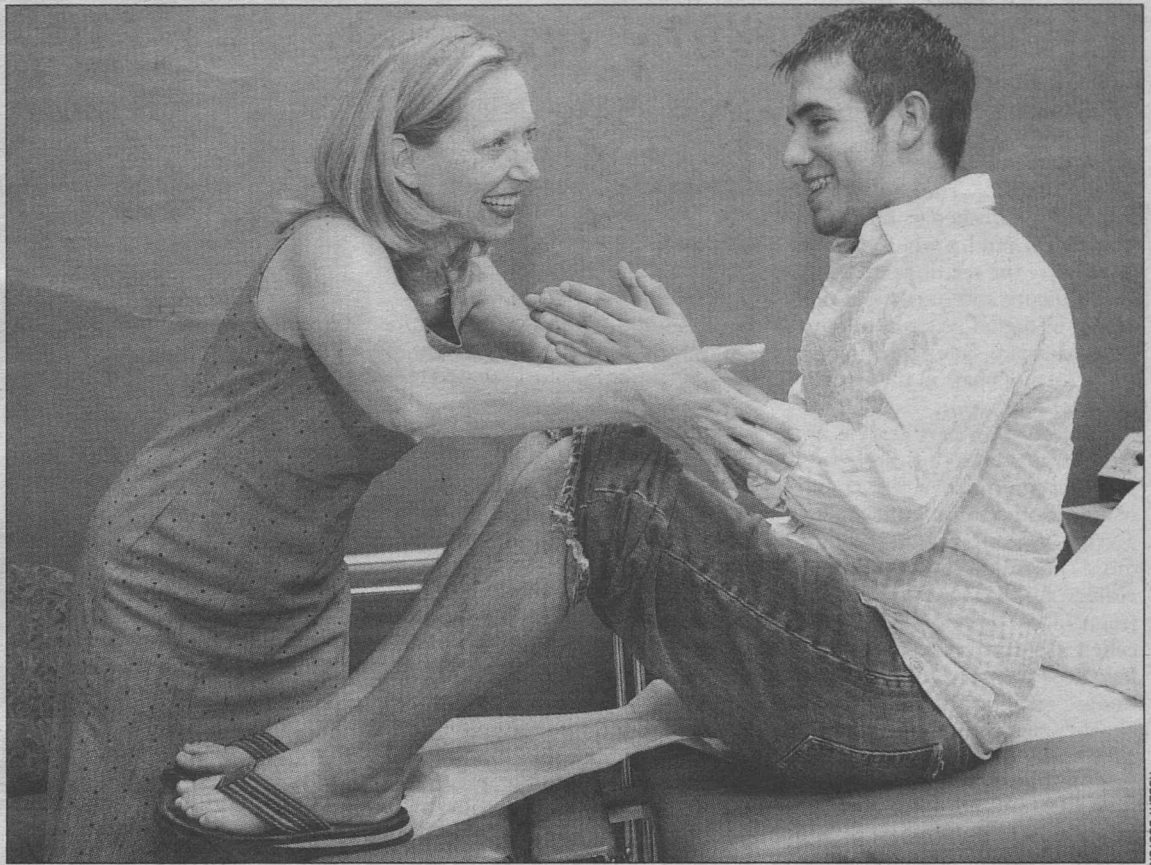
they need time to learn about deafness and potential treatments. Implantation also may be delayed to make certain an infant's deafness has not been misdiagnosed.

Even when deafness is confirmed, the idea of head surgery for their baby makes many parents hesitate. And they may be daunted by the fact that a cochlear implant is forever — the device destroys any residual hearing so that hearing aids are no longer an option.

"Studies like ours are meant to answer parents' questions about cochlear implants," Nicholas said. "Our overall goal is to focus on the best age for implantation. If the window of time for the best outcome is small, we want parents to know that. With the results we've seen so far, we believe that it is best to implant when the child is younger than 24 months if parents want a deaf child to use spoken language at the same level as their hearing peers."



Nicholas



Susan Mackinnon, M.D., the Sydney M. Jr. and Robert H. Shoenberg Professor of Surgery and chief of the Division of Plastic and Reconstructive Surgery, tests Adam Tinnin's resistance to pressure after his tarsal tunnel nerve release surgeries this spring.

Tarsal tunnel surgery helps put 16-year-old back on his feet

BY BETH MILLER

This spring, Adam Tinnin, a normally healthy, active 16-year-old, experienced a viral infection that caused mouth sores, hives, then tingling and numbness in his feet. In a matter of days, he couldn't walk.

Adam and his mother, Stephanie, came to Washington University Medical Center from their home in Sikeston, Mo., to see specialists about his condition. He spent three weeks at St. Louis Children's Hospital and went through dozens of tests, which all showed normal results. Adam, frustrated and distressed, was preparing to return to Sikeston, worried that he might spend the rest of his life in a wheelchair.

"I felt like giving up," Adam said. "I felt that all hope was gone and that I would probably deal with this until somebody knew what was going on."

Susan Mackinnon, M.D., the Sydney M. Jr. and Robert H. Shoenberg Professor of Surgery and chief of the Division of Plastic and Reconstructive Surgery, happened to be having lunch in the doctor's lounge at the hospital

on a day when Adam's case was being discussed. Mackinnon's interest was piqued, and she asked if she could examine Adam. After the examination, Mackinnon was confident she knew what Adam's trouble was — a viral neuropathy with tarsal tunnel syndrome, similar to carpal tunnel syndrome, but in the ankles.

"While tarsal tunnel syndrome is not a rare condition, it is very rare that it becomes so severe that a patient can't walk, especially in someone so young," Mackinnon said.

Tarsal tunnel syndrome, which can be difficult to diagnose, is caused by pressure on the tibial nerve, which follows a long route down the back of the leg to the ankle, where it turns and curls below the inside of the ankle. Sometimes ligaments and other tissues that surround the nerve press on it, causing pain, a burning sensation and tingling on the sole of the foot. In Adam's case, it also prevented him from walking.

Mackinnon performed tarsal tunnel release surgery on Adam's left foot May 1. During the one-hour procedure, she cut the covering over the tibial nerve to re-

lieve the pressure. Everyone has some covering over the nerve, but Adam's was very thick. By the time he had the surgery on his right foot June 9, he had feeling back in his left foot and was able to drive and walk with crutches. The severe pain in his left foot was gone.

By late June, Adam had feeling back in his toes and could walk without assistance. About a month after the second surgery, he returned to his job at UPS and was back to being a normal, healthy teenager.

Adam is now looking forward to starting his junior year of high school and using the experience to fuel his drive to become a physician — with strong leanings toward anesthesiology or plastic surgery. He would also like to attend Washington University as an undergraduate.

"I took for granted what I had before, but when everything was swept out from underneath me I knew then that anything can be taken away from us," Adam said. "I believe Dr. Mackinnon was sent by God into my room that day and I know I will never forget her."

Virgin named head of pathology and immunology

BY MICHAEL C. PURDY

Herbert W. "Skip" Virgin, M.D., Ph.D., has been named head of the Department of Pathology and Immunology at the School of Medicine.

Virgin came to the department in 1990 as an instructor and became a professor in 2002. As the new department head, he becomes the Edward Mallinckrodt Professor of Pathology and Immunology. He succeeds Emil R. Unanue, M.D., who served as head of the department for 21 years.

Larry J. Shapiro, M.D., executive vice chancellor and dean of the School of Medicine, made the announcement.

"Under Emil Unanue's leadership, the Department of Pathology and Immunology has become a world leader in its field, with ci-



Virgin

tation rates for its papers among the highest of all departments at the School of Medicine," Shapiro said. "We are very much looking forward to seeing that tradition continue and expand under the guidance of Skip Virgin."

Virgin's goals include promoting departmental efforts to harness genetic information as a diagnostic tool, a core component of the University's BioMed 21 initiative.

"Our faculty are an amazing group, with the brilliance, energy and drive to transform how we think about disease in a way that significantly benefits the patients

we serve and the students we mentor," Virgin said. "It is a great honor to be asked to serve as head of this historic and very distinguished department."

The department is widely recognized for pioneering work in immunobiology, the study of how basic genetic and molecular mechanisms in the immune system defend against invaders and malfunction in autoimmune conditions like multiple sclerosis and rheumatoid arthritis.

Virgin's research includes studies of how the immune system responds to chronic viral infections.

In 2004, Virgin's group became the first to successfully grow noroviruses in the laboratory.

Norovirus disease is characterized by frequent vomiting and diarrhea over the course of 1-2 days. The accomplishment is helping scientists seek ways to weaken noro-

In 2004, Virgin's group became the first to successfully grow noroviruses in the laboratory.

Norovirus disease is characterized by frequent vomiting and diarrhea over the course of 1-2 days.

The accomplishment is helping scientists seek ways to weaken norovirus for use as a vaccine.

virus for use as a vaccine.

Virgin earned medical and doctoral degrees at Harvard University Medical School in 1985.

Prior to coming to Washington University, he completed a residency in internal medicine at Brigham and Women's Hospital and a postdoctoral fellowship in microbiology and molecular genetics at Harvard.

Virgin became a fellow of the American Association for the Advancement of Science in 2004 and a member of the American Society for Clinical Investigation in 1998. He received the School of Medicine's Outstanding Faculty Mentor Award in 2002 and the Academic Mentorship Award of the Academic Women's Network of Washington University in 2001.

Jonathan Turner awarded Cox professorship

By BARBARA REA

Jonathan S. Turner, Ph.D., has been named the Barbara J. and Jerome R. Cox Jr. Professor of Computer Science in the School of Engineering and Applied Science. The professorship was established by Jerome Cox, Sc.D., and his wife, Barbara, to advance the relationship between theory and practice in the design of digital systems. Jerome Cox is a senior faculty member and a former chair in the same department.

"For over 50 years, Jerry Cox has contributed significantly to teaching and pioneering research in computer science," Chancellor Mark S. Wrighton said. "Now those contributions include providing critical support as a benefactor of the school. This very generous gift from Bobby and Jerry Cox will help continue leading-edge research that will benefit society for generations."

Turner, previously the Henry Edwin Sever Professor of Engineering, has had a distinguished career at the University. He joined in 1983 as assistant professor of computer science, and by 1990 became a full professor. He served as department chair from 1992-97.

His primary research focus has been on the design and analysis of communication networks, with a focus on high-performance routers and switching systems. Currently, Turner has been working on the design of diversified networks. Under his direction, the Applied Research



Jonathan S. Turner, Ph.D., (left) receives the Barbara J. and Jerome R. Cox Jr. Professor of Computer Science medal and a certificate from Chancellor Mark S. Wrighton. The professorship was established to advance the relationship between theory and practice in the design of digital systems.

Laboratory in the computer science department has been a leading contributor to advancing innovations in network technology.

With department colleagues, including Cox and Guru Parulkar, Turner co-founded the start-up company Growth Networks, which was acquired by Cisco Systems in 2000 and became a model for technology transfer initiatives at the University. Turner has been

awarded 30 patents for his work on switching systems.

He has been honored by his profession by being elected a Fellow of the Association for Computing Machinery, as well as the Institute of Electrical and Electronics Engineers (IEEE).

He has received numerous awards from IEEE, and in 2004 the University bestowed upon him the Arthur Holly Compton

Award for Faculty Achievement.

Turner is one of WUSTL's first dual-degree graduates, earning bachelor of science degrees in computer science and electrical engineering; he also earned a B.A. from Oberlin College. While working at Bell Laboratories, he continued with graduate studies at Northwestern University, earning a master's and doctorate, both in computer science.

Cox is a leader in the application of advanced technology for introducing new treatments in biomedical engineering. Like Turner, he is dedicated to the transfer of innovative achievements in the laboratory to biomedical solutions in practice.

With his research team, Cox has developed new computer methods for CT and PET scanners that improve the diagnosis of cancers and cardiovascular disease. His innovations were instrumental in developing early monitors for detecting heart rhythm disturbances.

"Jerry Cox has helped build a department with an international reputation for biomedical computing applications and computer networking," said Gracia-Catalin Roman, Ph.D., chair of the department and the Harold B. and Adelaide G. Welge Professor of Computer Science.

Roman pointed out that in the 1990s Cox was a member of the team that designed and developed new high-speed switching technology. Cox also held the Welge professorship title from 1989-1998.

Cox earned bachelor's, master's, and doctorate degrees in electrical engineering from Massachusetts Institute of Technology.

Notable among his many honors and awards in his field are membership in the National Academy of Science's Institute of Medicine, and as a Fellow of the Acoustical Society of America and of IEEE.

In 2001, he was awarded an honorary doctor of science degree from Washington University.

University Events

Washington University Classic • Integrative Biology

"University Events" lists a portion of the activities taking place Aug. 11-Sept. 7 at Washington University. Visit the Web for expanded calendars for the Hilltop Campus (calendar.wustl.edu) and the School of Medicine (medschool.wustl.edu/calendars.html).

Lectures

Friday, Aug. 11

9:15 a.m. Pediatric Grand Rounds. "Exploring Genomic Medicine Using Integrative Biology." Atul Butte, asst. prof. of medicine, Stanford U. Clopton Aud., 4950 Children's Place. 454-6006.

Friday, Aug. 25

6:30 a.m.-5 p.m. Urology CME Course. "Hands-on Advanced Laparoscopic Urologic Oncology." (Continues 6:30 a.m.-4:30 p.m. Aug. 26.) Cost: \$2,500 including hands-on labs, \$995 for didactic session and live case surgeries only. Eric P. Newman Education Center. To register: 362-6891.

9:15 a.m. Pediatric Grand Rounds.

"Metabolic Reprogramming of the Diseased Heart: A Question of Balance." Jennifer Duncan, instructor in pediatrics. Clopton Aud., 4950 Children's Place. 454-6006.

Wednesday, Aug. 30

Noon. Radiology Lecture. Annual G. Leland Nelson Visiting Professorship and Lecture. "Beyond the Bifurcation: There's More to Carotid Ultrasound than Stenosis." Edward G. Grant, prof. and chairman of radiology, U. of Southern Calif. South Bldg., Scarpellino Aud. 362-2866.

Thursday, Sept. 7

8:30-10:30 a.m. Center for the Application of Information Technology Executive and Management Forum. "Convergence: The Next Frontier." John Johnson, president and chief research officer, Nemertes Research. St. Louis Science Center. For information and to register: 935-5501.

Sports

Friday, Sept. 1

3 p.m. Volleyball vs. Dominican U. Washington University Classic. Athletic Complex. 935-4705.

7:30 p.m. Volleyball vs. U. of Wisc.-Platteville. Washington University Classic. Athletic Complex. 935-4705.

Saturday, Sept. 2

9 a.m. Cross Country. Washington University Early Bird Meet. Francis Field. 935-4705.

10 a.m. Volleyball vs. Wartburg College. Washington University Classic. Athletic Complex. 935-4705.

2:30 p.m. Volleyball vs. III. Wesleyan U. Washington University Classic. Athletic Complex. 935-4705.

Engineering students win prestigious design award

By TONY FITZPATRICK

The WUSTL American Society of Civil Engineering (ASCE) team of undergraduate students recently won the Best Overall Design Award, sponsored by Weyerhaeuser Co., in the National Timber Bridge Design Competition.

The WUSTL design consisted of a longitudinal, vertical-laminated, post-tensioned redwood deck over transverse stringers supported by steel rods suspended from a trapezoidal arch. This entry also placed first in Best Deck Design and first in Most Innovative Design.

The team received cash awards totaling \$1,700 for its efforts, making it the top money-winner in the competition.

Twelve teams of students from universities across the United States matched wits in the competition.

Open to student chapters of ASCE and Forest Products Society, the competition was made

possible by a grant from the U.S. Forest Service through its Wood In Transportation Program.

The Southern Pine Council of the Southern Forest Products Association, Unit Structures LLC, Wood Protection Products Inc. and Weyerhaeuser Co. provided additional financial support.

Each team designed, constructed and tested its bridge on its home campus, then submitted documentation of its activities and results to a panel of judges for review.

Each team was required to post design drawings, test results, and project highlights on the Web.

Dave Brakeman, adjunct professor of civil engineering, advised the team comprised of Kristen Erickson, Mark Hendel, Rob Hooper, Hamilton Hutchinson, Leah Martens, Robert Murphy, Dan Rieck, Steve Resnick and Stephanie Sheppard.

The bridge eventually was used at a nearby farm to traverse a small creek.

Plaques

Nanotechnology may benefit cancer therapy
— from Page 1

new blood vessels in plaques by 60 to 80 percent.

"Fumagillin can have neurocognitive side effects, causing injury to the brain at high doses," Winter said. "The ability of the nanoparticles to concentrate the drug at the disease site allows the dose to be lowered. This could open the door for a lot of drugs that have failed to be approved because they caused too many side effects at a higher dose. It might pay to look at these drugs

again and ask if placing them on these nanoparticles can help them be effective at a lower dose and clinically useful."

The nanoparticles are the invention of Samuel Wickline, M.D., professor of medicine, of biomedical engineering, of physics and of cell biology and physiology, and Gregory Lanza, M.D., Ph.D., associate professor of medicine and biomedical engineering. Both are heart specialists at Barnes-Jewish Hospital.

The microscopic spheres are capable of carrying a variety of components at the same time and can be detected with standard MRI scans, making them useful for imaging disease sites while simultaneously treating them. Using the nanoparticles, a physi-

"This could open the door for a lot of drugs that have failed to be approved because they caused too many side effects at a higher dose. It might pay to look at these drugs again and ask if placing them on these nanoparticles can help them be effective at a lower dose and clinically useful."

PATRICK WINTER

cian can confirm a drug has reached the desired location, measure the amount of drug at the site, and later check to see if the drug has affected the disease.

In the current study, the researchers fed rabbits a high-cholesterol diet for 80 days before treatment with fumagillin

nanoparticles. The diet caused numerous small plaques in the rabbits' aortas, but the plaques were considered to be at an early stage of growth. By demonstrating the utility of the nanoparticles for early intervention of atherosclerosis, the research group would like to alleviate the need

for more invasive treatment of later-stage atherosclerosis.

"We wanted to go after the early stages of the disease when patients don't yet need immediate intervention to prevent serious cardiac problems," Winter said. "We think fumagillin nanoparticles potentially could be incorporated into a protocol that includes lipid-lowering statin drugs or dietary changes."

Next, the research group plans to study the effect of fumagillin nanoparticles in the treatment of cancerous tumors.

Winter said the use of inhibitors of blood vessel growth is a well-accepted therapy for cancer, suggesting that nanotechnology may prove beneficial in cancer therapy.

Researchers find new learning strategy: A size of a mistake makes no difference

By TONY FITZPATRICK

Central to being human is the ability to adapt: we learn from our mistakes. Previous theories of learning have assumed that the size of learning naturally scales with the size of the mistake. But now WUSTL biomedical engineers have shown that people can use alternative strategies: Learning does not necessarily scale proportionally with error.

In so doing, Kurt Thoroughman, Ph.D., assistant professor of biomedical engineering, and graduate student Michael Fine have discovered a learning strategy they call categorical adaptation, in which steps of learning are sensitive to the direction of error, but do not scale proportionally with the size of the error. Eventually, their findings could have an impact in the rehabilitation of people with neurological ailments — such as strokes — by making use of different learning environments.

If you make a movement error in one direction, it makes sense that your next movement would correct toward the opposite direction, in exact proportion to the error. An example would be a pitcher correcting to the right, after missing home plate to the left with a pitch.

"We show that learning does not necessarily scale with error," Thoroughman said. "I think we have uncovered a part of human

adaptation that certainly doesn't do that. We are not claiming that all previous theories are false in the behaviors that were captured. It's just that we have for the first time found a part of human adaptation that clearly does not scale with the size of the error."



Thoroughman

Thoroughman is interested in how humans learn motor skills incrementally, how information from a

single movement can inform the generation of the next movement. He and Fine asked volunteers to make reaching movements while holding the end of a robotic arm. Volunteers were trained for about 40 minutes a day for two days. On each day, subjects were asked to make half-second, 10-centimeter reaching movements, directed away from their bodies.

Subjects learned the baseline task on the first day. On the second day, Thoroughman and Fine tricked volunteers by having the robotic arm push the human hand with a perturbing pulse of force in 20 percent of movements. The pulse pushed subjects from their normal trajectory, either to the right or the left, with three different pulse strengths. Thoroughman and

Fine observed how the pulse altered that trajectory and how subjects corrected, or adapted, in the very next movement.

"The pulse should induce an error in that movement that scales with the size of the pulse," said Thoroughman, who also has appointments in neurobiology and in physical therapy. "And we did see that — big pulse, big error; small pulse, small error. But then we expected, just as previous theories would predict, that the adaptation in the next movement would also scale with the size of the force pulse."

"But it didn't — the adaptation countered the direction of the pulse but was flat with respect to the size of the pulse."

The results were published in the August issue of the *Journal of Neurophysiology*.

Thoroughman said the discovery raises interesting new questions in motor learning and neurophysiology and eventually could have an impact on physical therapy protocols.

"By changing environments in a specific way and by not providing the same environment all of the time, we can change the way that people learn," he said. "We're hopeful that this kind of technology can help in neurological rehabilitation so that stroke patients, for instance, could better relearn movements and reduce recovery time."

WUSTL community featured in film about Gateway Arch

By NEIL SCHOENHERR

The University is well-known for its researchers, academics, Nobel Prize winners, poet laureates and — movie stars?

That's right. Seven WUSTL faculty and staff members will be featured in the new documentary film *The Gateway Arch: A Reflection of America*.

Narrated by St. Louis-born Academy Award winner Kevin Kline, the film will play for one night only — 7:30 p.m. Aug. 19 at the Fox Theatre.

Produced by Civil Pictures, the filmmakers who created an award-winning documentary on the 1904 World's Fair, *The Gateway Arch* is the first major film about the Arch in nearly 40 years.

It tells the complete story of the Arch — from Thomas Jefferson, Lewis and Clark and the pioneers, to the monument's design, completion and symbolism.

The story is told through interviews with historians, architects and construction workers and includes rare images compiled from archives across the country.

"I have become a real fan of Civil Pictures and their mission of preserving history through film," said Steve Givens, assistant vice chancellor and assistant to the chancellor. Givens is featured in the film and also co-composed and performed two pieces of music. "So it was an honor and a real pleasure to be part of this important project. I hope it has a

long life and will serve as a great reminder of the importance of St. Louis to the rest of the country and of the Gateway Arch to the history of St. Louis. This is a story that deserved to be told well."

Other WUSTL faculty members interviewed in the film are Paul J. Donnelly, FAIA, PE, the Rebecca and John Voyles Chair of Architecture in the Sam Fox School of Design & Visual Arts; Wayne Fields, Ph.D., the Lynne Cooper Harvey Distinguished Professor of English and director of American Culture Studies;

William H. Gass, Ph.D., the David May Distinguished University Professor Emeritus in the Humanities in Arts & Sciences; Peter Kastor, Ph.D., assistant professor of history and of American Culture Studies, both in Arts & Sciences;

Robert J. Moore, adjunct professor in University College; and Eric Mumford, Ph.D., associate professor and director of the Urban Design Program in the School of Architecture.

"What I tried to stress was the value of beauty and ambition in the production and placement of public art, whether it is pure object or a bridge or a highway design or a park bench," Gass said. "Quality is costly in the short term and of infinite value in the long."

General admission tickets are \$9 and are available at the Fox box office or online at metrotix.com. For more information, go online to civilpictures.com.

Sports



The above symbol recently was unveiled for use with all Bears athletics. It will be used in tandem with the University's official logo on print and electronic communications.

WUSTL rolls out new symbol for athletics

Director of Athletics John Schael recently unveiled a new symbol and design for all Bears athletics.

The new symbol features an updated, more realistic Bear mascot and a sharp new typeface that highlight the University's red and green colors.

The symbol was designed by St. Louis-based Jim Ward Design, which has designed symbols for the University of Missouri-Columbia and Maryville University athletic departments.

The symbol was developed by an internal team of athletics and public affairs representatives who worked with coaches and staff to create the new look.

This marks the third athletic symbol that has been created since WUSTL started using the Bears mascot in 1926.

The scowling bear with the sailor cap served as the athletic symbol for 40 years until the second bear symbol was introduced in 1995.

Bears finish sixth in power rankings

The National Collegiate Scouting Association (NCSA) announced its fourth annual Collegiate Power Rankings, and WUSTL finished sixth for the second straight year on the list of the top academic and athletic colleges and universities in the country at the NCAA Division I, II and III levels.

The University finished fourth in the Division III rankings and first in the University Athletic Association.

Williams College ranked first in the overall standings with Amherst College, Middlebury College, Duke University and Stanford University rounding out the top five.

"We are very pleased with the NCSA standings that were released," said John Schael, WUSTL's director of athletics.

"However, the two most important measurements for the success of our athletic programs are the quality of experience enjoyed by our student-athletes and our fit

within the Washington University community."

The University garnered seven UAA championships and sent seven teams to their respective NCAA tournaments in 2005-06. The Red and Green had five top-10 finishes at NCAAAs: women's cross country (third), volleyball (fifth), women's swimming and diving (fifth), men's swimming and diving (sixth) and women's basketball (ninth).

The Bears also placed 17th in men's and women's tennis, 26th in softball, 31st in women's indoor track and field, 32nd in men's indoor track and field and 35th in baseball.

The NCSA matches and introduces college coaches to qualified student-athletes through education, technology and relationships with the coaching community. NCSA's Collegiate Power Rankings were developed to encourage student-athletes to take a comprehensive approach to choosing a school based on its overall merits.

Colleges and universities are given a ranking based on academics, athletics, and student-athlete graduation rates enabling student-athletes to obtain a true picture of the most complete and well-rounded schools.

NCSA's power rankings are calculated for every school at the NCAA Division I, II and III level by averaging the *U.S. News & World Report* ranking, the U.S. Sports Academy Directors Cup rank and the NCAA Student-Athlete Graduation Rate of each school.

The U.S. Sports Academy Directors Cup ranking evaluates the strengths of NCAA athletic departments, while the *U.S. News & World Report* ranking recognizes institutions of academic excellence. The student-athlete graduation rates are based on those provided by the NCAA.

The University ranked seventh in the final Division III Directors' Cup rankings, 11th in the U.S.

News & World Report rankings and 21st among Division I, II and III institutions for student-athlete graduation rates.

Former hoopster Jeffries signs pro deal in Chile

2003 graduate Chris Jeffries has signed a pro basketball contract with Provincial Osorno in Chile's Dimayor's League. The season started Aug. 4.

Jeffries is fresh off his third season playing professional basketball overseas. He averaged 9.8 points, 4.6 rebounds and 2.3 steals in eight games with Sabadell in the Spanish Basketball League. Jeffries also had a five-game stint in Luxembourg, averaging 43.4 points, 13.0 rebounds and 6.2 assists in six games for the Bascharage Hedgehogs.

In 2005, Jeffries averaged a league-best 27.0 points for Anastasia in Uruguay. He began his professional career in 2004, averaging a league-best 26.3 points, 10.3 rebounds and 3.0 steals per game for Burger King Limerick in Ireland. In 64 career games playing professional basketball, Jeffries has averaged 25.9 points per game.

Men's swimming, diving nabs nation's top GPA

For the second straight semester, the men's swimming and diving team registered the top team grade-point average in the NCAA — this time including men's Division I, II and III — for the Spring 2006 term, as announced by the College Swimming Coaches Association of America.

The men also tallied the top GPA in NCAA Division III for the Fall 2005 semester. The men combined for a 3.64 GPA in the spring, up from its 3.49 mark in the fall semester.

Sweet Briar College (3.76, NCAA Division III) and Wheeling Jesuit University (3.71, NCAA Division II) were the only women's



Setter Kara Liefer had 1,324 assists last year, an average of 11.82 per game, in helping the volleyball team to a 35-2 record overall and an 11-1 mark in University Athletic Association play. The squad finished fifth nationally, helping the school in the power rankings.

programs to register a higher team GPA. WUSTL's women amassed a 3.42 GPA, which ranks No. 22 in Division III. The Bears enjoyed plenty of success in the pool in 2005-06 with program-best NCAA finishes for the women (fifth place) and men (sixth).

Moreover, seniors Michael Slavik (50-yard freestyle) and Eric Triebe (200-yard freestyle) won the first two individual national championships in WUSTL swimming (men's and women's) history.

University Libraries detail changes for fall semester

The University Libraries are making several technology and service changes to expand service, improve security and address environmental and budgetary issues. These changes affect campus libraries except for those serving the School of Law, George Warren Brown School of Social Work and the School of Medicine.

The most immediately noticeable change is that individuals must log on to use a library computer. The first time a student, faculty or staff member uses a library computer, he or she must go through a setup process that may take a few minutes. Subsequent logons will go faster.

Requiring a logon helps protect the computer network and is a necessary part of giving individuals an important new benefit: temporary storage space on the library server.

To improve the security for individuals' identities, the Libraries no longer use Social Security numbers as identifiers for access to library resources, and are instead using student and employee ID numbers.

In response to requests by library users, the Microsoft Office software suite — Word, PowerPoint, Excel and Access — has been installed on all public-access computers. Previously these programs were available only on selected computers.

Instant messaging is now available for communicating with library staff.

After Oct. 20, printing in campus libraries will cost 8 cents per sheet for single-sided printing, 12 cents per sheet for double-sided printing and more for color printing, for people who pay by Campus Card.

People paying in cash or by copycard will pay the same rate for printing as for photocopying: 12.5 cents per page. These charges are similar to what peer institutions charge.

The 2001 introduction of e-reserves gave students online access to reserve reading, which has been a great convenience. Librarians believed students would read materials online or print them in their rooms. Instead many students chose to print their reserve materials free at the Libraries.

In addition, the number of electronic journals and books provided online has exploded. Between e-reserves and other e-resources, printing in the Libraries quadrupled in just four years.

"To continue to support free printing would require us to buy fewer books and journals," said Shirley K. Baker, vice chancellor for information technology and dean of University Libraries.

"Adding to the collections available to our students and faculty has to take priority over providing free copying of existing texts, which can be read online or downloaded."

A survey of libraries at peer institutions showed none of them offer free printing. The Libraries' new charges will partially offset the paper, toner, equipment and service costs. The goal is not to make a profit or break even but to bring costs to a manageable level.

The Libraries expect the new policy to have a welcome environmental benefit. Other academic libraries report that on-site printing dropped 50 percent or more when they began charging for printing.

Some people may still print library materials on their own printers, but others will read materials online. With a charge in place, most library users become more selective about how much printing they do. Any reduction in printing reduces waste.

The Libraries expect that, in light of the printing charges, some faculty may make a few changes to their reserve materials. For instance, PowerPoint presentations can be configured so multiple images appear on each page.

Course packets might be created and sold in the bookstore, replacing some e-reserve materials, if the faculty member feels this is more cost-effective for students.

Students who do high-volume printing may find it economical to print at a fast-copy company.

The Oct. 20 date for beginning charging will give faculty time to consider their options as they prepare for the spring semester.

More information about these changes is available at library.wustl.edu/printing.



A map shows the new stations and routes of the completed Cross County Extension project. The eight-mile stretch of rails will open to the public Aug. 26.

MetroLink

Preview for people with disabilities is Aug. 15
— from Page 1

people can get a taste of the new attractions reachable by riding MetroLink.

The MetroLink trains on the Cross County alignment will be free from 12:15-10 p.m. Aug. 26 and from 10 a.m.-4 p.m. Aug. 27, with full-fare

service beginning Aug. 28.

Metro will also host "Everyone Can Ride" day from 1-6 p.m. Aug. 15. That will be an orientation day for members of the ADA community. Persons with disabilities and organizations who serve this audience are invited to visit the new MetroLink stations along the Cross County alignment.

Metro personnel will be available to identify the accessible entrances and explain how to use the system from these new locations.

The MetroLink trains on the Cross County alignment will be free from 12:15-10 p.m. Aug. 26 and from 10 a.m.-4 p.m. Aug. 27, with full-fare service beginning Aug. 28.

STARS

'Unique' program allows for hands-on experience
— from Page 1

puter science and engineering, and his students.

His research in Dyke's lab has been a smaller portion of a larger project, one that involves demonstrating the efficacy of wireless sensors in structural health monitoring of buildings.

The wireless sensors, about a square inch in size, are attached to the sides of buildings to monitor the force of sway when shaking, similar to an earthquake, occurs.

The sensors are then transmitted to a computer program that translates the random units read by the sensors into units useful for the engineers and computer programmers.

The computer sends a message to magnetorheological dampers, or MR dampers, that are within the building's structure to dampen the effect of the swaying on the structure.

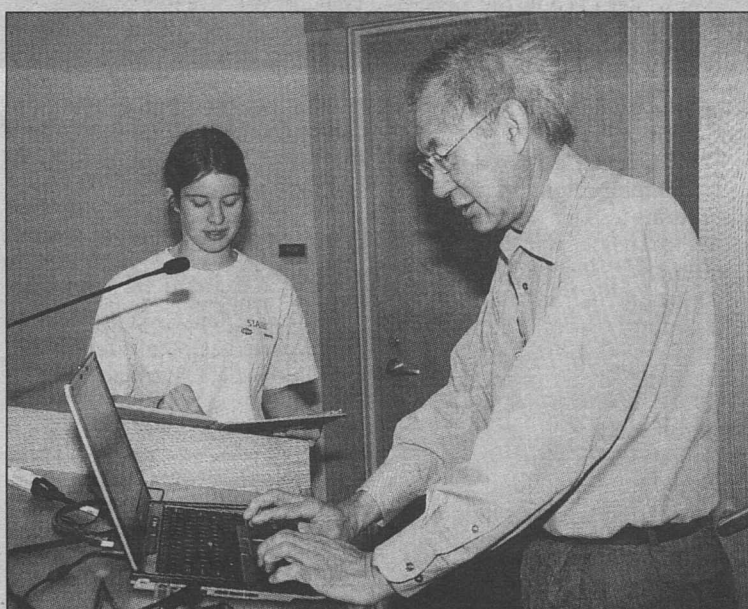
MR dampers act like shock absorbers for a building.

Filled with a fluid that includes suspended iron particles, the MR dampers lessen the shaking by becoming solid when an electrical current (turned on by the computer, which has been alerted to the swaying by the sensors) is run through the MR dampers, aligning all of the iron particles.

Dyke was the first civil engineer to demonstrate the use of MR damper technology for structural health monitoring and protection of buildings during seismic movement.

Last year's STARS student in Dyke's laboratory also worked on the wireless sensors.

Wang has been continuing and amplifying the knowledge about the efficacy of wireless sensors versus wired sensors for structural health monitoring.



Rebecca Rivard, a senior at Clayton High School, observes Frank C.P. Yin, M.D., Ph.D., as he prepares a lecture for some 60 STARS students and their mentors July 5 at the Whitaker Auditorium.

Wireless sensors are much less expensive than wired sensors, and considerably more flexible and convenient.

"It's been a new experience," Wang said. "In our different high-school science labs, you can examine each experiment and figure out what went wrong. In research, it's a lot tougher. Sometimes, you have no idea what is wrong."

That sort of real-world knowledge about how scientific research is conducted allows each high-school student to truly experience the world of science.

"This program is unique because students are introduced to hands-on opportunities to address real-world problems, exposing them to basic research, creativity and the struggles of discovery," said Ken Mares, of the University of Missouri-St. Louis, who directs the STARS program.

As a result of their summer experiences, many STARS students are considering careers in medicine, science and technology.

Wang, like Robert Frost, pre-

fers the road less traveled by — perhaps a math or aerospace engineering degree is in his future. "Pengcheng has been an outstanding contributor to the research team this summer and his involvement made it possible to complete the project on time," Dyke said.

"It is clear that the STARS program is beneficial not only to the student researchers, but also to the University and department."

In the current science education climate, allowing students to experience basic science research and then to encourage the pursuit of scientific careers is crucial.

In fact, students who have participated in the STARS program in years past often come back to work with their specific researcher, or other researchers that they had an opportunity to meet through the program.

Wang is not sure where he'll be attending college, but he knows that he will no longer have a shaky understanding of civil engineering, MR dampers and wireless sensors for structural health monitoring, thanks to the STARS program.

Wastewater

Scaleable system could provide for 900 homes
— from Page 1

As the bacteria feed on the organic material in the wastewater they release electrons to the anodic electrode. These electrons then move to the cathodic electrode via a copper wire. The formed protons are transferred through the membrane toward the cathode where they react with electrons and oxygen to form water.

This is the second design of the UMFC. Last year, Angenent's design used a cathode on top of the anode. This time, using the U-shaped design, the surface area was increased. He reduced the distance between the anode and cathode, which helped reduce power loss due to resistance.

These two changes are largely responsible for the boost in power by a magnitude of 10 times from a maximum of 3 watts per cubic meter of solution last year to a maximum of 29 w/m³ today.

Sustained power in the system can average 20 watts per cubic meter — enough to run a small light bulb.

Angenent and his doctoral student Jason He are exploring other anode-cathode shapes, surface areas, and distances to both increase power and reduce the resistance in the system so that less power is lost as it runs. Angenent says that for the UMFC to be economical he needs "two more breakthroughs," but he doesn't know what they are yet.

The economic viability level for this microbial fuel cell is around 160 watts per cubic meter of solution and the goal of increasing the power output by 10 times would double that level to around 300. If that can happen, this microbial fuel cell system would be a proof of concept with far-reaching applications in the food and agricultural industries.

Because this experiment uses

common and inexpensive materials, and wastewater is plentiful in industry, a scaleable version of this system at one food producer could one day generate enough power for 900 American single-family households.

A clean and renewable energy source — all with what's already just going down the drain.

Record

Founded in 1905
Washington University community news

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Associate Editor Andy Clendennen

Assistant Editor Neil Schoenherr

Medical News Editor Beth Miller

Calendar Coordinator Genevieve Posey

Print Production Carl Jacobs

Online Production Genevieve Posey

News & Comments

(314) 935-6603

Campus Box 1070

recordeditor@wustl.edu

Medical News

(314) 286-0119

Campus Box 8508

millerbe@wustl.edu

Calendar Submissions

Fax: (314) 935-4259

Campus Box 1070

recordcalendar@wustl.edu

Record (USPS 600-430; ISSN 1043-0520), Volume 31, Number 2/Aug. 11, 2006. Published for the faculty, staff and friends of Washington University. Produced weekly during the school year, except school holidays, and monthly during June, July and August by the Office of Public Affairs, Washington University, Campus Box 1070, One Brookings Drive, St. Louis, MO 63130. Periodicals postage paid at St. Louis, MO.

Where to send address changes

Postmaster and nonemployees: Record, Washington University, Campus Box 1070, One Brookings Drive, St. Louis, MO 63130.

Employees: Office of Human Resources, Washington University, Campus Box 1184, One Brookings Drive, St. Louis, MO 63130.

Notables

Of note

Laura Rosenbury, J.D., associate professor of law, was named by the student body as the 2006 Professor of the Year in recognition of her outstanding teaching abilities. ...

J. William Harbour, M.D., associate professor of ophthalmology and visual sciences, has received a four-year, \$1,522,291 grant from the National Eye Institute for research titled "The Role of RB in the Retina & Other Tissues." ...

Eduardo A. Groisman, Ph.D., professor of molecular microbiol-

ogy, has received a five-year, \$1,417,500 grant from the National Institute of Allergy and Infectious Diseases for research titled "Regulation of Salmonella Virulence by the PhoP Protein." ...

Peter A. Crawford, M.D., Ph.D., instructor in medicine, has received a five-year, \$599,956 grant from the National Institute of Diabetes and Digestive and Kidney Diseases for research titled "Gnotobiotic Mouse Models/Microbial Regulation of Intestinal Injury." ...

Washington University School of Medicine has received a two-year, \$539,923 grant from the Robert Wood Johnson Foundation for the communications and dissemin-

ation plan for the Advancing Diabetes Self-Management initiative. ...

Victoria J. Fraser, M.D., professor of medicine, has received a five-year, \$500,000 grant from the Barnes-Jewish Hospital Foundation for the Multidisciplinary Clinical Research Career Development program. ...

Thaddeus S. Stappenbeck, M.D., Ph.D., assistant professor of pathology and immunology, has received a three-year, \$429,000 grant from the Crohn's and Colitis Foundations of America for research titled "Cellular and Molecular Factors of the Epithelial Stem Cell Niche That Mediate the Colonic Mucosal Injury Response." ...

William F. Stenson, M.D., professor of medicine, has received a three-year, \$429,000 grant from the Crohn's and Colitis Foundations of America for research titled "Increased Expression of Indomamine 2-3 Dioxygenase Diminishes the Severity of TNBS Colitis." ...

Marco Colonna, M.D., professor of pathology and immunology, has received a two-year, \$419,198 grant from the National Institute of Allergy and Infectious Diseases for research titled "Nectins in Tumor Immunosurveillance." ...

David M. Holtzman, M.D., the Andrew B. and Gretchen P. Jones Professor of Neurology, has received a three-year, \$375,000 grant from the Blanchette Hooker Rockefeller Fund for Alzheimer's Disease research. ...

Kimberly Norwood, J.D., professor of law and associate professor of African and African American Studies, recently co-chaired the "Sweet 16" annual meeting of the Midwestern People of Color Legal Scholarship Conference Inc. Norwood led a panel discussion during that meeting, titled "Freeing Your Mind: Should We Encourage the Expression of a Broader Range of Views Within Communities of Color?"

Danforth to co-chair education committee

Chancellor Emeritus William H. Danforth and attorney Frankie M. Freeman were recently named to lead a five-member panel to report to the state and the community on conflicting ideas about next steps for the St. Louis Public Schools.

Missouri Commissioner of Education D. Kent King said the committee would have no decision-making authority, but King said he believes it could provide opportunities for less emotional discussion and consideration of the challenges ahead.

King also said the committee's

efforts would not deal with the recent change of leadership. He said he wants the group to recommend the role of the state, as well as look at fundamental questions, such as the financial strength of the district and the future of the Voluntary Interdistrict Transfer Program.

Joining Danforth and Freeman on the committee are Michael Middleton, deputy chancellor of the University of Missouri-Columbia, lawyer Ned Lemkemeier and Donald Suggs, publisher of the *St. Louis American*.

Clouse receives distinguished educator recognition

Ray E. Clouse, M.D., received the Distinguished Educator Award from the American Gastroenterological Association in Los Angeles recently during the its Digestive Disease Week, the largest international conference devoted to the science and practice of gastroenterology.

Clouse, professor of medicine and of psychiatry and assistant director of fellowship training for the Division of Gastroenterology, has been at the University for 30 years. After earning his medical

degree from Indiana University School of Medicine in 1976, he moved to St. Louis as an internal medicine intern, then resident and gastroenterology fellow prior to his appointment as an instructor.

This is not his first award for teaching excellence. Clouse received WUSTL's first Internal Medicine Leadership Award for Clinical Care in 1999 and, in 2000, he received the first David H. Alpers Teacher of the Year Award in gastroenterology.

Campus Authors

Robert E. Morrell, Ph.D., professor emeritus of Asian and Near Eastern Languages and Literatures and **Sachiko Kaneko Morrell**, retired East Asian Studies head librarian in Arts & Sciences

Zen Sanctuary of Purple Robes: Japan's Tokeiji Convent Since 1285

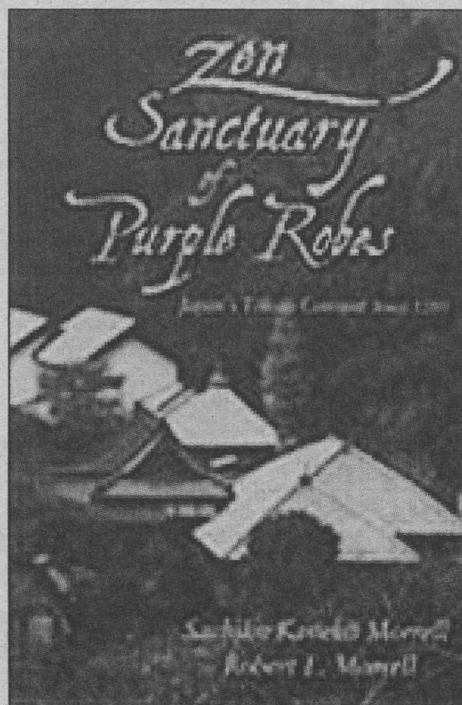
(State University of New York-Albany Press, July 2006)

Two longtime members of the University's East Asian studies community have published a book tracing the history of a Japanese Zen convent through seven centuries.

The book, "Zen Sanctuary of Purple Robes: Japan's Tokeiji Convent Since 1285 (Albany: State University of New York Press, July 2006), is co-authored by Sachiko Kaneko Morrell, retired East Asian Studies head librarian, and Robert E. Morrell, Ph.D., professor emeritus of Asian and Near Eastern Languages and Literatures in Arts & Sciences.

The authors' research examines the affairs of the Rinzaï Zen convent founded in 1285 by nun Kakusan Shido after the death of her husband, Hojo Tokimune, the Kamakura regent noted for having repelled the Mongol invasions.

The book explores the nuns' Zen practice; Abbess Yodo's imperial lineage with nuns in purple robes; Hideyori's 7-year-old daughter spared by Tokugawa Ieyasu at the Battle for Osaka Castle (1615) and later to become the convent's 20th abbess, Tenshu (1608-1645); Tokeiji as "divorce temple" (enkiridera) during the mid-Edo period and a favorite topic of senryu satiri-



cal verse; the convent's gradual decline as functioning nunnery; its continued survival during the early Meiji persecution of Buddhism; and its current prosperity.

The work includes translations, charts, illustrations, bibliographies, and indices.

Within the historical overview, the authors emphasize the convent's "inclusivist" Rinzaï Zen

practice in tandem with the nearby Engakuji Temple. The rationale for this "inclusivism" is the continuing acceptance of the doctrine of "Skillful Means" (hoben) as expressed in the Lotus Sutra — a notion repudiated or radically reinterpreted by most of the Kamakura "reformers."

In support of this contention, the authors include a complete translation of the Mirror for Women (Tsumakagami) by Kakusan's contemporary, Muju Ichien.

"This is engaged scholarship," says Edwin Cranston, Ph.D., a professor of Japanese literature at Harvard University.

"This cultural history of the famous Tokeiji Convent is rich in detail and generous in providing translations of the prose and poetry speaking to both its Rinzaï Zen cult and its popular reputation as a sanctuary for women escaping from abusive marriages."

— Gerry Everding

Henson promoted to associate VC for alumni & development

By BARBARA REA

Pamella A. Henson has been promoted to associate vice chancellor for alumni & development programs, announced David T. Blasingame, executive vice chancellor for alumni & development programs.

In 2005, she was promoted to assistant vice chancellor for alumni & development programs, charged with supervising the alumni and development programs for Hilltop Campus schools and serving as chief deputy to Richard J. Luze, interim associate vice chancellor and director of the national councils.

In her new role, Henson will continue to direct the Hilltop Campus schools' development programs, and she has assumed responsibility for the offices of alumni relations, annual giving, parent programs, international programs and development communications.

"Pam's excellent work has earned her the opportunity to un-

dertake this new role," Blasingame said.

"She is an exceptional administrator who has made, over her 13 years with Washington University, outstanding contributions in each of her assignments.

She is held in high regard by her colleagues, volunteers and donors with whom she has worked.

"I am thankful Pam has agreed to assume these additional responsibilities."

Luze, who has served as interim chief for these departments since September 2004, has returned to his role as assistant vice chancellor and executive director for the national councils.

"I am extraordinarily grateful for Rich's leadership as interim associate vice chancellor," Blasingame said.

"He has done a truly outstanding job in this important position, providing steady leadership and moving our programs forward during the transition period."



Henson

Ortstadt named associate VC for technology, info systems

Andy Ortstadt has joined the University in the new position of associate vice chancellor for technology and information systems, effective July 17, announced John E. Klein, J.D., executive vice chancellor for administration.

The new role is important to continuing the University's efforts to provide a superior infrastructure to support the University's teaching, research and scholarship, according to Klein.

Ortstadt will coordinate the development and implementation of strategic and tactical plans for information technology and communications for the University to help assure that the University provides state-of-the-art, accessi-

ble, efficient and secure systems, services and support for faculty, staff and students.

To accomplish this, Ortstadt will work closely and collaboratively with the vice chancellor for technology, the assistant vice chancellors for computing and communications and for network technology services and the University's vice chancellor and chief financial officer.

Additional collaborations will be with the School of Medicine's associate vice chancellor and chief financial officer, the Arts & Sciences' associate vice chancellor and associate dean, and the business managers and IT organizations of the various schools and the CFU.

Obituaries

Osver, 93, well-known painter

Arthur Osver, an internationally recognized painter and a longtime professor of art, died Monday, July 24, 2006 at Barnes Jewish Extended Care in Clayton, Mo. He was 93.

Born in Chicago, Osver attended Northwestern University and the Art Institute of Chicago, where he met his future wife, the painter Ernestine Betsberg. The couple lived in Paris, Rome and New York before arriving at Washington University in 1960.

Though retired since 1981,

Osver remained a fixture on the St. Louis arts scene, known for colorful, rhythmic abstractions that combined intricate structures with gestural spontaneity. His work is included in many prestigious collections, including the Metropolitan Museum of Art, the Museum of Modern Art and the Whitney Museum of American Art, all in New York.

Osver is survived by Betsberg and a brother, Sam Osver of California. A memorial service is planned for 3 p.m. Sunday, Oct. 22, in Graham Chapel.

Weldon, 77, retired professor

Clarance S. Weldon, M.D., retired professor of cardiothoracic surgery at the School of Medicine, died Monday, July 17, 2006 of renal failure in San Francisco. He was 77.

Weldon joined the University in 1968 as professor and head of the Division of Cardiothoracic Surgery, where he remained for 20 years, with special interests in congenital heart disease and pediatric heart surgery.

He was also chief of cardio-

thoracic surgery at Barnes and St. Louis Children's hospitals.

Throughout his career, Weldon wrote or co-wrote numerous papers and contributed to surgical texts.

Weldon was married to Virginia V. Weldon, M.D., for 23 years until 1985.

He is survived by his daughters, Ann Weldon Doyle of San Francisco and Susan Weldon Erlinger of St. Charles, Mo., and two grandchildren.

Washington People

For L. Lewis Wall, M.D., D.Phil., professor of obstetrics and gynecology, understanding the origin and nature of human beings is essential to placing his own life and work in a greater social context.

As a boy, he dreamed of unearthing long-lost pharaohs in the land of Tutankhamun, and this love of discovery initially led him to the field of anthropology.

After completing a bachelor's degree in anthropology and history from the University of Kansas in 1972, Wall earned a doctoral degree in social anthropology as a Rhodes Scholar at Oxford University.

But he began to rethink his path in life while living and working as an anthropologist in a mud hut in northern Nigeria on a Fulbright Fellowship: He decided that the world needed doctors more than it needed anthropologists.

The medical field was a familiar one. His father worked as a physician while Wall was growing up in a suburb of Kansas City, Kan., in the 1950s. Back then, Wall was certain of two things: He definitely didn't want to become a physician, and he certainly didn't want to have anything to do with



L. Lewis Wall, M.D., D.Phil., with fistula patients at Evangel Hospital, Jos, Nigeria. African women marry young, and many are unable to deliver their babies safely because their birth canals are not fully developed. During obstructed labor they may develop a fistula, an abnormal opening between the bladder and vagina that develops because their pelvis tissue has been crushed. Wall has traveled to Africa many times to perform surgery to repair the fistulas.

By DIANE DUKE WILLIAMS

Caring for the outcasts

Lewis Wall takes his reconstructive surgery techniques to Third World countries

obstetrics/gynecology, his father's specialty.

But his experience in Africa changed that.

He returned to the United States and graduated from the University of Kansas School of Medicine in 1983.

While completing pre-med studies at the University of Kansas, he met Helen Pratt, an exchange student from England, who would become his wife.

When it came time to choose a specialty, Wall liked obstetrics and gynecology best.

"My father was very gracious about my decision," Wall says with a laugh. "He didn't make me salt the crow before I ate it."

Wall then completed a residency at Duke University School of Medicine and became fascinated by urogynecology, the sub-specialty that treats women who have urinary or fecal incontinence and prolapse (bulging) of the vagina, bladder and/or uterus.

"I was interested in urogynecology because it was a new frontier," he says. "There was a pioneering aspect to it, and the diagnostic technologies were kind of mysterious and fascinating."

He also knew that surgical repair of these problems could have a huge impact on women's lives.

After fellowships in female urology and urodynamics at St. George's Hospital Medical School in London and St. Mary's Hospital for Women and Children in Manchester, England, Wall served for several years on the faculties of

Duke University Medical Center and Emory University School of Medicine.

In 1994, Tom Elkins, M.D., head of the Department of Obstetrics and Gynecology at Louisiana State University (LSU) Medical Center, recruited Wall because of his African expertise. Elkins and Wall shared an interest in

facilities for these women.

"This is a desperate problem that has almost no resources devoted to it because people in the Western world are unaware that it exists," Wall says. "In Third World countries, there are probably 3 million women with unrepaired fistulas, and there are somewhere between 30,000 and 130,000 new cases each year in Africa alone."

In 1995, Wall established the Worldwide Fistula Fund (WFF), a foundation to raise money for fistula repair and for construction of

"Whether you realize it or not, you have, in Dr. Wall, a real treasure. His imposing academic credentials have given us entry into the highest levels of international policy, yet he is completely willing to work in hospitals where there is occasional electricity and where we re-use paper surgical gowns until they fall to pieces."

STEVEN ARROWSMITH

helping women in Africa who are injured during childbirth. Elkins also wanted Wall to develop a fellowship program at LSU.

In Africa, where girls often marry as young as 14, many girls are unable to deliver their babies safely because their birth canals are not fully developed.

The treatment for obstructed labor is a Caesarean section, but this care is not available in many parts of Africa. Instead, the young women who survive may be in labor for five or six days and deliver a stillborn baby.

They also may develop a fistula, an abnormal opening between the bladder and vagina that develops because their pelvis tissue has been crushed during obstructed labor. Fistulas cause women to lose bladder and sometimes bowel control.

Wall had seen the miserable lives of African women with fistulas. Many are divorced by their husbands, cast out by their families and must eke out a meager living without any marketable skills.

Fistulas can be repaired with an inexpensive surgery that costs about \$300. During his five years at LSU, Wall made many trips to Ghana, Nigeria and Ethiopia to work with African doctors repairing fistulas and trying to raise awareness of the need for clinical

clinical facilities that would provide these services. To date, the WFF has helped support and build a number of fistula centers in Africa. It also has provided money for training, facilities, patient care and supplies and to help raise awareness of the problem.

Steven Arrowsmith, M.D., vice president for international program development for the WFF, said he has great admiration for Wall, citing his combined expertise in urogynecology and anthropology and his tireless work on behalf of poor women in the developing world.

"While the faculty and staff at Washington University know Dr. Wall from hospital rounds or from lecture halls, I know him from cramped bush taxis and smelly hospital wards in some of the world's poorest places," Arrowsmith says.

"Whether you realize it or not, you have, in Dr. Wall, a real treasure. His imposing academic credentials have given us entry into the highest levels of international policy, yet he is completely willing to work in hospitals where there is occasional electricity and where we re-use paper surgical gowns until they fall to pieces."

Wall, who joined the WUSTL faculty in 2002, still travels to Africa a few times a year and has set up programs between the

Ghana and WUSTL medical schools to exchange faculty and residents.

At the medical school, Wall divides his time between seeing patients with urogynecology problems, doing surgery, training residents and lecturing to second- and third-year medical students.

David Mutch, M.D., the Ira C. and Judith Gall Professor of Obstetrics and Gynecology, met Wall in 1984 when they were both training at Duke, and calls him a great friend. "He is perhaps one of the most ethical individuals that I know," Mutch says. "He also truly embodies the academic physician in that he holds true to the tripartite mission of patient care, research and teaching."

Wall also has a joint appointment in the Department of Anthropology and teaches "Anthropological Perspectives on the Fetus."

Wall says he has to combine medicine with anthropology. "I think I realized a long time ago that medicine only exists and only works in a worthwhile fashion if you take into account the historical and social context," he says. "You've got to see the bigger picture."

James Schreiber, M.D., professor of obstetrics and gynecology and the former head of the Department of Obstetrics and Gynecology who recruited Wall to WUSTL, says Wall is a true academician. "He has studied the difficulties that women's health faces in Africa, and most importantly, he has done something about it. He brings honor to himself, to the medical profession and to the University."

L. Lewis Wall

Education: Master's degree in bioethics, Monash University, Victoria, Australia, 2001; medical degree, University of Kansas School of Medicine, 1983; doctorate in social anthropology, Oxford University, 1983; bachelor's degree in anthropology and history, University of Kansas, Lawrence, 1972

Family: Wife, Helen, community volunteer and award-winning seamstress; son, Jimmy, senior at California Lutheran University; son, Tom, freshman at Washington University and president of the WUSTL Juggling Club

Hobbies: Reading, traveling, fine wine, jazz



The Walls (from left), son Tom, Lewis, Helen, son Jimmy and family dog Sandy, relax in their Creve Coeur, Mo., home.