

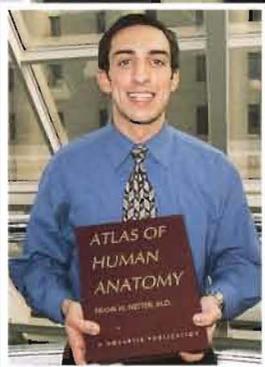
# Outlook

Washington University School of Medicine

Spring 1999



**Magnetic Surgery • Roundworm Genome • Division Celebrates**



**Student Scholars:** Fourth-year medical student Jennifer M. Quartarolo, above right, received the Steven Dresler Prize at the annual student awards luncheon in January for her commitment to promoting social good, civil rights and civil liberties through action and volunteerism. She is pictured with Patricia Dresler, wife of Steven, a former assistant professor of pathology, who died in 1989. Shawyon Shadman, photo inset, a second-year student, received the Kehar S. Chouke-George F. Gill Prize in Anatomy for demonstrating superior scholarship in anatomy. The two were among 31 medical students recognized. Other awardees were: S. Andrew Josephson, Maria C. Dans, Jennifer M. Dunn, Rebecca B. Hoover, Sarah C. Jost, Shefali A. Gandhi, Maryam Afkarian, Allen B. Mendez, Kenneth C. Cummings, Sandra E. Klein, Deepu S. Nair, Shana L. Birnbaum, Carla R. Ainsworth, Roy A. Clarke, Esi M. Morgan Dewitt, Alan E. Harzman, Linda A. Cheng, Albert J. Yoo, Kristin M. Foley, Rebecca S. Hunt, Ginny L. Ryan, Gretchen A. Champion, Heather M. MacLennan, Jeffrey P. Simons, William A. Frisella, David C. Miller, Joseph P. Lee, Alix L. Rosenstein and Melanie D. Everitt.

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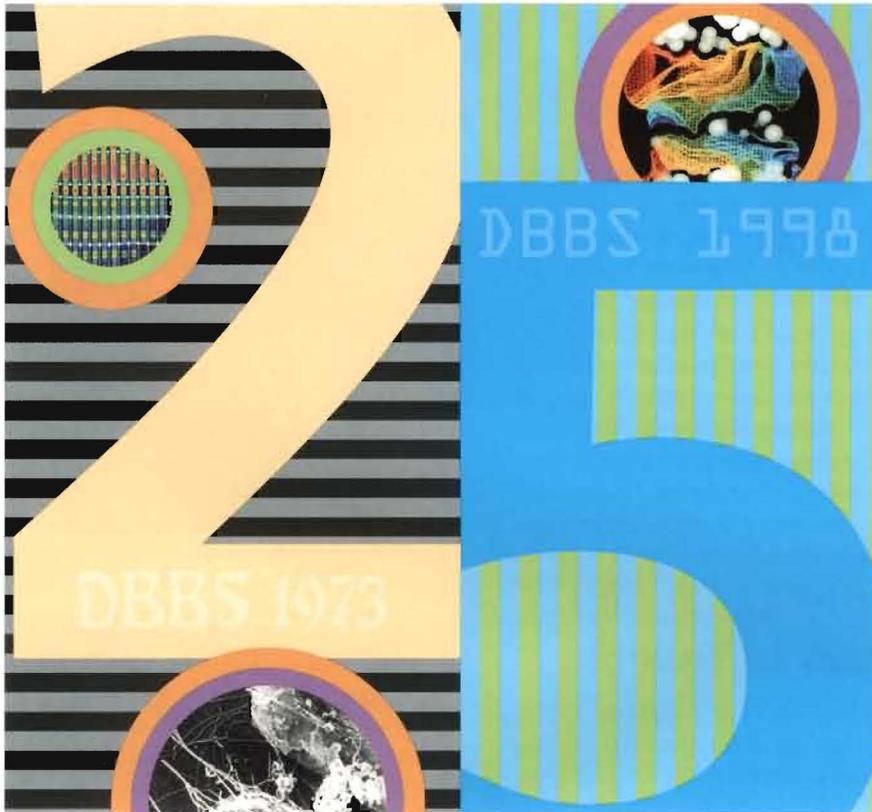
C I R C U L A T I O N

# Outlook

Washington University School of Medicine



Page 20 Better brain surgery



Page 16 Celebrating graduate education

## THE COVER

In December, School of Medicine researchers and their British collaborators announced that they had sequenced the DNA of the tiny roundworm, *C. elegans*, shown in blue and greatly magnified on the cover. The background colors reflect the order of the genetic information that comes out of the sequencing machine as it appears on a computer monitor. For more on what this achievement may mean to advancing treatment of human disease and aiding human development, please turn to page 12.



Page 8 A chance to cry

## FEATURES

**To cry out loud ..... 8**  
A double-lung transplant breathes new life into an infant from Quebec, Canada, who never had the capacity to cry.

**Eye of the worm ..... 12**  
Scientists for the first time have spelled out the genetic instructions for a complete animal that has characteristics similar to humans.

**DBBS' 25th anniversary.. 16**  
Alumni, faculty and current students reflect on the groundbreaking influence of the Division of Biology and Biomedical Sciences.

**Magnetic navigation ..... 20**  
Neurosurgeons here perform the world's first magnetic brain surgery — a new way of manipulating surgical tools within the brain that promises to be minimally invasive.

## DEPARTMENTS

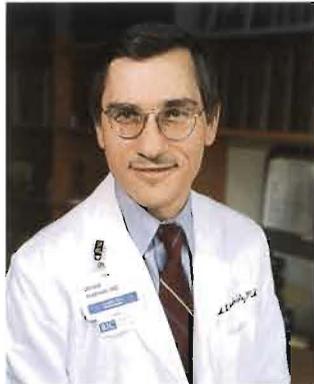
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## Andriole leads urology division

**G**ERALD L. Andriole, MD, has been appointed chief of the division of urology.

Andriole has been a faculty member in the Department of Surgery's urology division since 1985. He is an internationally known urologic oncologist, specializing in prostate cancer and a noncancerous condition called prostatic hyperplasia.

As director of the Prostate Study Center at Barnes-Jewish West County Hospital since 1990, Andriole has performed more than 30 trials of new medications and devices for the treatment of urological diseases. His funding from the



Gerald L. Andriole, MD

National Institutes of Health to study cancer screening and benign prostatic enlargement totals more than \$14 million.

He leads the St. Louis portion of a National Cancer Institute study known as the Prostate, Lung, Colorectal and Ovarian Cancer Screening Trial. This

large-scale study will determine whether widespread use of certain cancer-screening tests can save lives.

Andriole succeeds William J. Catalona, who is focusing on his research and treating patients with prostate cancer and other urologic conditions. ●

## Flance Professorship goes to Trulock

**E**LBERT P. Trulock III, MD, professor of medicine, has been named the first Rosemary and I. Jerome Flance Professor of Pulmonary Medicine.

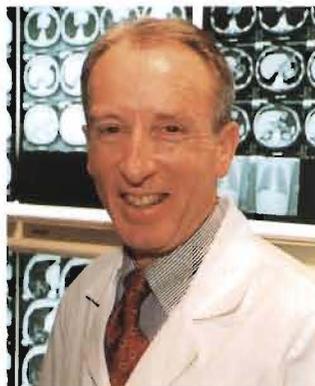
The endowed professorship, which supports research in the division of pulmonary and critical care medicine, is funded largely by a gift from the estate of the late Sam J. Golman. Golman was a St. Louis-area businessman and a longtime supporter of Washington University Medical Center institutions.

The professorship recognizes I. Jerome Flance, MD, clinical professor of medicine, and his wife, Rosemary. Trulock is nationally known for his expertise in managing patients who receive lung transplants and patients who undergo lung volume reduction surgery. He is medical director of the lung transplantation program and the pulmonary bronchoscopy service at Barnes-Jewish Hospital. He also conducts clinical research on surgery

outcomes, drug therapy and clinical follow-up of patients who receive lung transplants.

Jerome Flance has been a member of the School of Medicine faculty for 53 years, and remains active in clinical practice and in the affairs of the School of Medicine.

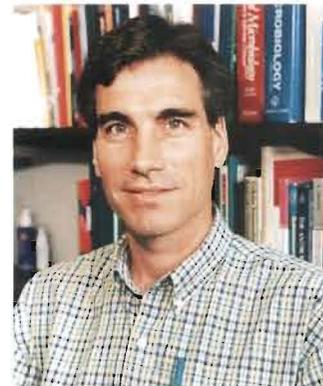
Rosemary Flance, a graduate of the University of Chicago, is an active supporter of the University's William Greenleaf Eliot Society and other community agencies. ●



Elbert P. Trulock III, MD

## St. Geme earns Squibb Award

**J**OSEPH W. St. Geme III, MD, associate professor of pediatrics and director of the division of pediatric infectious diseases, received the 1998 Squibb Award from the Infectious Disease Society of America.



Joseph W. St. Geme III, MD

This award recognizes outstanding achievement in an area of infectious diseases by a fellow or member of the organization who is 45 years old or younger. The award is based on overall achievement, not a single study.

St. Geme, also associate professor of molecular microbiology, was recognized for his continuing research on the genetic and molecular basis of virulence by *Haemophilus influenzae*. This bacterium initiates infection by colonizing the upper respiratory tract, where it may hide inside epithelial cells for months. St. Geme has identified a series of proteins that enables the organism to interact with these cells, and his work has laid the foundation for development of vaccines to prevent middle ear and other respiratory tract infections caused by *H. influenzae*.

A physician at St. Louis Children's Hospital, St. Geme also teaches microbiology and infectious diseases to preclinical students at the medical school. ●

## Cornelius advances to associate dean

**L**YNN A. Cornelius, MD, assistant professor of dermatology, has been named associate dean for faculty affairs.

In her new position, Cornelius will work with department heads to ensure that junior faculty receive appropriate mentoring and the reviews that are essential for long-term professional development.

She also will collaborate with department heads to provide senior faculty with elective opportunities to improve mentoring skills, develop strategies and accountability measures to increase diversity at all faculty levels, and assure equitable compensation policies that sustain outstanding researchers, clinicians



*Lynn A. Cornelius, MD*

and teachers. In addition, she will maintain and distribute University and School of Medicine policies, oversee orientation events for new faculty members, initiate forums on faculty development, and address issues of faculty concern.

Cornelius is a member of the American Academy of Dermatology and the Society for Investigative Dermatology. She is vice chairman of the

Missouri Chapter of the Dermatology Foundation and currently has grants from the National Institutes of Health, the Barnes-Jewish Hospital Foundation and the Dermatology Foundation. ●

## Sadler receives Dameshek Prize

**J**EVAN Sadler, MD, PhD, professor of medicine and biochemistry and molecular biophysics, received the 1998 William Dameshek Prize from the American Society of Hematology in December.

Sadler also is a Howard Hughes Medical Investigator and an attending physician at Barnes-Jewish Hospital. He is being recognized for outstanding contributions to hematology, especially his investigations of two proteins that help maintain a healthy blood flow. His studies may lead to better treatments for hemophilia and other blood disorders.



*J. Evan Sadler, MD, PhD*

One of the proteins, von Willebrand factor (VWF), stabilizes blood clotting factor VIII so that blood can clot. Sadler has shown that a common bleeding disorder, von Willebrand disease, results from an error in the gene that encodes VWF. The resulting abnormal protein tends to stay trapped inside cells so that too little is available in the bloodstream to interact with factor VIII.

The second protein is thrombin, which regulates inhibitors and activators of blood clotting. He has used X-ray crystallography and other methods to determine how thrombin interacts with proteins such as thrombomodulin, an anticoagulant. ●

## Nephrology society honors Klahr

**S**AULO Klahr, MD, the John E. and Adaline Simon Professor of Medicine, received the 1998 John P. Peters Award from the American Society of Nephrology (ASN). Klahr, who also serves as director of research and scientific affairs for Barnes-Jewish Hospital, was presented with a bronze medal and an honorarium in October.

During the 1970s, Klahr investigated obstructive uropathy, which results in damage to the kidney due to blockage of urine flow. This research led to unexpected insights into the mechanisms of kidney failure resulting from urinary tract



*Saulo Klahr, MD*

obstruction. By the mid-1980s, Klahr and colleagues had defined the responses of the kidney to obstruction of the ureters, the tubes that carry urine from the kidneys to the bladder. This work revealed that kidney cells undergo an inflammatory response to urinary tract blockage, a more complex reaction than previously had been thought to occur.

More recently, Klahr has used the tools of molecular biology to study the regulation of chemical messengers and enzymes that are important for normal kidney function and the development of kidney disease. ●

## Hats off to the Helena Hatch Center

**F**OR tirelessly working to improve the lives of women with HIV and their children, and reducing the rate of HIV transmission from mother to child, the Helena Hatch Special Care Center for Women with HIV was recently recognized by the Zeta Sigma Chapter of Sigma Gamma Rho Sorority, Inc., in St. Louis.

The center, which is a program of the School of Medicine, received the Dr. George Washington Carver Distinguished Service Award for Excellence in Health for Women and Children from the sorority. It was one of six St. Louis individuals and organizations recognized in January by the African-American alumni sorority.

Of the award, Rebecca Bathon, program coordinator for the Helena Hatch Center, says: "I feel that it was very important for us to be recognized by the African-American community. By doing so, they acknowledge that there is a huge problem — probably a state of emergency within the African-American community — with HIV transmission. I took that opportunity, standing before this group of professional black leaders, to challenge them to help us through this crisis. It meant a lot to me that people see this issue and that they recognize an institution like Washington University for doing its job and playing a role in this epidemic."

The center, which takes a comprehensive approach to health care by providing patients access to social workers and nutritionists as well as doctors and medication, cares for HIV-infected women of all races and ages within St. Louis city and county, East St. Louis, IL and throughout southern Missouri to the Missouri-Arkansas border. The

center was launched in 1995; since early 1996, none of the 62 infants born to women undergoing treatment has tested HIV-positive.

"Of the women who are enrolled in our care and who are HIV positive and pregnant, we have seen no transmission of HIV from mother to child," says Bathon. To date, the center has enrolled 337 women; some 260 remain active.

Bathon says the care may come to a halt this fall, however, when funding for the five-year-old center runs out.

"Right now we are doing a lot of grant writing and working with other agencies to help sustain the program," Bathon says, adding that funding ceases Sept. 30. "We don't know what the center will look like at that time, but we hope some instrumental pieces will be retained."

In addition to the clinic on the Medical Campus, the center has a peer outreach program that provides community education on how to prevent HIV; soon it will begin having "house parties," to which women invite family, friends and neighbors into their homes to learn more about HIV/AIDS in a relaxed atmosphere. The center's adolescent program — called HEY (Health and Education for Youth) — also has grown substantially since its inception in 1997. HEY provides medical care, case management, support groups and social activities for HIV-positive youth ages 13 to 21.



*The Helena Hatch Special Care Center for Women was recently recognized by the St. Louis chapter of Sigma Gamma Rho Sorority.*

HEY is part of Project ARK (AIDS/HIV Resources for Kids), a cooperative network of St. Louis physicians who provide primary care for children and infants with HIV.

Bathon says the psychosocial support offered at the center is critical in getting women to return regularly for medical care. Housing, insurance, food, child care — all are issues that must be addressed for the majority of women the center serves. According to an annual demographic survey conducted by the center, 76 percent of patients are African-American women between the ages of 20 and 29. Most have children, are single, unemployed and poor.

"We still have that commitment to the community to help prevent HIV," says Bathon. "The (HIV/AIDS) epidemic continues to grow in the African-American population; if we go away there will be a lot of women who will not receive care."

Sigma Gamma Rho, which has been in existence since 1922, has been involved with the Helena Hatch Center for nearly four years since adopting it as one of its philanthropies. The sorority also recognized Project ARK for Excellence in Health for Children. ●



## Mini-Medical School:

**A chance to learn about medical education and medical science**

**H**AVE you ever wondered what it is like to attend medical school? Would you like to learn the latest information about diagnosis and treatment of heart disease, cancer, diabetes and other diseases? The School of Medicine is offering you that opportunity.

In March, the medical school launched "Discovering Medical Science," a mini-medical school, which is open to University supporters, employees and the general public. It is held in the evenings, once a week for eight weeks, on the Medical Campus. Enrollment will be limited, but the program will likely be offered more than once a year.

Medical school professors will teach the sessions, which will

include lectures on various diseases in addition to some hands-on training. Attendees will learn operating room protocol and practice suturing techniques, tour the Genome Sequencing Center and guide minimally invasive surgical instruments using laparoscopic simulation.

Information will be presented in an easy-to-understand informal style, and there will be no exams. Students will be able to talk with faculty after lectures, and refreshments will be provided.

There is a \$35 fee to attend the mini-medical school, which is being funded by an educational grant from Pfizer Inc. For more information or to receive a registration form, call 362-9858. ●

### COURSE SCHEDULE

**March 23** – Medical School Today; Detecting and Treating Diabetes

**March 30** – Diagnosis and Treatment of Common Cancers

**April 6** – Genetics: The Human Genome Project

**April 13** – High-Tech Surgery Techniques

**April 20** – Infectious Diseases

**April 27** – Treatments for Stroke and Spinal Cord Injury

**May 4** – Medical Ethics; Health Care Finance

**May 11** – Diagnosing and Treating Heart Disease

## A smart way to access medical records

**T**HE School of Medicine and a company called Site-C have developed a "WOMENS CARD" that provides doctors at

computers with quick access to patients' medical records. The smart card, which looks like a credit card, is being tested by pregnant

women, though researchers say

it could be adapted to other patient populations.

"What sets this card apart is that the information is stored on a Web server," says Gilad A. Gross, MD, who is heading the study. "Therefore you can provide unlimited amounts of data, such as lab tests, ultrasound images and medications the patient is taking."

Gross presented this adaptation of smart-card technology in January at the annual meeting of the Society for Maternal-Fetal Medicine in San

Francisco. He is an assistant professor of obstetrics and gynecology at the School of Medicine and director of obstetrics at Barnes-Jewish Hospital.

The study involves 250 pregnant

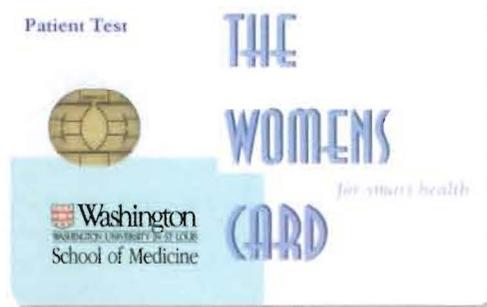
women, half of whom will receive WOMENS CARDS during visits to the hospital's obstetrics clinic. The study will determine whether the card makes it easier and quicker for doctors to access patients' medical records and make informed treatment decisions.

The card contains a computer chip, which summarizes the patient's

medical record — general information about the patient, medications, allergies, medical problem and, lab results. Every time the patient visits the clinic, new information is added.

The information isn't limited to the amount that can be stored on a patient's card because authorized doctors have their own WOMENS CARDS. By inserting these into a card reader and entering a personal identification number (PIN), they can access their patients' complete medical records from a Web server maintained by Site-C. Such a system is much more secure than paper records, which could be read by anyone or even removed from a doctor's office, Gross says.

The cards are inexpensive to make — each one costs less than \$20 — and card readers are less than \$75. Therefore, the WOMENS CARD could be adapted to other patient populations, such as infants and children. ●



*The smart card provides physicians quick access to patients' medical records.*

## Alzheimer's disease can creep quietly, silently into the brain

**T**HE changes in the brain that characterize Alzheimer's disease begin long before people develop clinical symptoms such as memory loss, a new study suggests.

"To develop truly effective therapies, we must learn how to stop the brain lesions before they accumulate and interfere with mental function," says John C. Morris, MD, the Harvey A. and Dorismae Hacker Friedman Professor of Neurology at the School of Medicine.

The U.S. Census Bureau projects that 79 million Americans will be 65 or older by 2050 and that almost 18 million Americans will be 85 or older. Alzheimer's disease currently affects 4 million Americans.

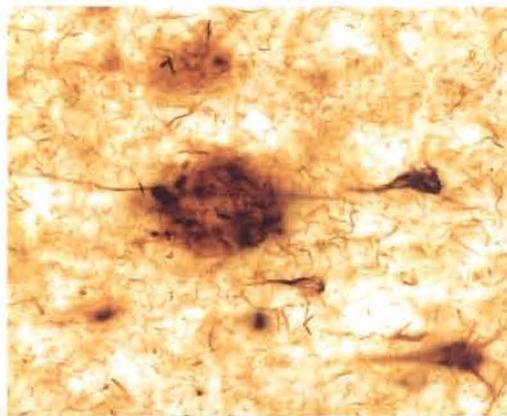
Morris and lead author Joseph L. Price, PhD, professor of anatomy and neurobiology, presented their evidence for preclinical Alzheimer's disease in the March issue of *Annals of Neurology*.

Their study was possible because the medical school's Alzheimer's Disease Research Center, which Morris co-directs, has monitored both healthy individuals and people with Alzheimer's since

1984. The center also developed a sensitive diagnostic tool — the Clinical Dementia Rating (CDR) scale — that can distinguish healthy aging from even the very early stages of dementia. Through careful clinical assessments, researchers determined the mental status of each member of the study. Then Price examined brain tissue from the same people after death. He looked for two signs of brain disease: beta-amyloid plaques and neurofibrillary tangles. Beta-amyloid forms when a large brain protein separates in the wrong place. A tangle is a nerve cell containing twisted and knotted filaments. These filaments contain an abnormal form of a protein called tau.

All of the healthy and demented subjects — a total of 62 — had at least a few tangles in the brain.

Price found no amyloid plaques in most of the healthy subjects; however, amyloid plaques were abundant in the brains of the people diagnosed with Alzheimer's disease. Price even found numerous plaques



*The dark round structure in the center of the image is an amyloid plaque. A tangled nerve cell can be seen below it.*

in the brains of the 15 people who had displayed only the mildest symptoms of dementia.

The researchers' most important finding was that seven of the 39 subjects with no clinically detectable dementia had both plaques and an unhealthy dose of tangles. "Even with our very sensitive detection methods, we could find no evidence of dementia symptoms in these seven subjects," Morris says. "So we think they had preclinical Alzheimer's disease." ●

## Some women survive longer taking chemotherapy and radiation

**I**N a landmark study involving researchers from the School of Medicine, women with locally advanced cervical cancer were shown to benefit from taking chemotherapeutic drugs while receiving radiation therapy.

Perry W. Grigsby, MD, professor of radiology at the School of Medicine's Mallinckrodt Institute of Radiology, and David G. Mutch, MD, associate professor of obstetrics and gynecology and director of the division of gynecologic oncology, participated in the study.

The national study by the Radiation Therapy Oncology Group (RTOG) is one of three studies that will be reported in the April 15 issue

of the *New England Journal of Medicine*. The RTOG study was led by researchers at The University of Texas M.D. Anderson Cancer Center in collaboration with Washington University investigators and several others.

The RTOG study examined whether the addition of two chemotherapy drugs to a seven-week regimen of radiation treatment affected the survival of women who had locally advanced cervical cancer.

All of the 386 women evaluated received daily radiation to the pelvis and abdomen that reached the lymph nodes, where cervical cancer tends to spread. Half of the women in the study also received the drugs

cisplatin and 5-fluorouracil during at least the first and fourth weeks of radiation treatment. About 100 of the volunteers were treated at the School of Medicine.

The RTOG study showed that 73 percent of the women who received chemotherapy and radiation treatment survived for at least five years, whereas those given only radiation treatment had a 58 percent five-year survival rate.

Mutch says the results of this study and the other four provide a gynecologic milestone. "For the first time, we've been able to demonstrate a survival advantage by adding a therapeutic treatment," he says. ●

## Blood is safe: Supply and cost will determine future use

**T**HE United States blood supply is safer now than ever, with the risk of infection from tainted blood falling to levels so low they are almost impossible to measure, according to a two-part review article appearing in the February 11 and 18 issues of the *New England Journal of Medicine*. Investigators surveyed 120 recent studies on blood safety and transfusion.

Lead author Lawrence T. Goodnough, MD, professor of medicine and pathology at the School of Medicine and director of transfusion services at Barnes-Jewish Hospital, says the risk of HIV transmission in blood products today is somewhere between one in 600,000 and one in 1 million.

The same trends are evident with hepatitis and other viral agents, he adds. Goodnough and co-investigators report that more rigorous screening and better testing have further decreased the risk of hepatitis to less than one in 60,000.

The authors estimate that of the 12 million blood transfusions each year in the United States, only a handful of patients will contract viral infections, and, among those, the risk of death is less than one in 1 million.

Over the last 10 years, the nation's blood supply has barely been adequate to meet the demand. In 1997, the last year for which statistics are available, blood centers collected approximately 12.5 million units of blood — 1 million fewer units than were donated a decade earlier. The authors cite a national survey from 1993 indicating that 46 percent of the population in the United States between 18 and 65 years of age had given blood at some time, but the same survey found that only 5.4 percent had donated in that year.

In spite of those facts, the authors believe current supplies may

be adequate if health centers practice better blood transfusion strategies. Goodnough and colleagues estimate that some hospitals, including Barnes-Jewish Hospital, could reduce their use of blood products by up to 50 percent by systematically looking at the reasons for blood transfusions.

Goodnough and colleagues also reviewed various blood conservation strategies available to meet future needs. They recommend a blood conservation technique called acute normovolemic hemodilution, which involves removing up to four units of blood at the time of surgery. That blood is replaced with salt water to maintain the volume of fluid circulating in the bloodstream. Then, if

bleeding occurs, the surgical team transfuses the patient's own blood which, because it is fresh and has never left the operating room, carries essentially no risk. Goodnough has demonstrated the safety and effectiveness of hemodilution in several studies.

The authors point out that blood conservation strategies can save money and provide important inventory sources of blood for patients who require massive transfusions.

"The way we use blood is not going to be driven by perceptions of blood safety. The way we use and conserve blood in the future will be determined by the available blood supply and the costs involved," Goodnough says. ●

## A decade of NIH support



In the last decade, the School of Medicine's support from the National Institutes of Health has more than doubled. In 1998, the School of Medicine received \$189 million and achieved fourth place among all U.S. medical schools in NIH funding. In addition, Barnes-Jewish Hospital received \$13.7 million in NIH support and Central Institute for the Deaf received \$644,795.



# To cry out loud

by Candace O'Connor

PHOTOS BY STEVE KOHLER  
AND BOB BOSTON

## Pediatric lung transplant program provides a new chance at life for infants and children

### EARLY JANUARY 1999: **A baby in need**

**A**nthony Chicoine is three months old, a beautiful baby with bright eyes and an angelic, heart-stealing smile. If he were not lying in a crib in the Neonatal Intensive Care Unit at St. Louis Children's Hospital, a stranger could almost mistake him for a healthy baby. Except for one thing — he does not cry.

"I think he knows it would be too difficult for him," says his mother, Annie Lachance, sadly.

Anthony was born on Sept. 16, 1998 — pink and full term — at a small hospital in Beauce, Quebec. Soon physicians noticed that his breathing was a bit rapid. Stumped, they transferred him to a major medical center, the Centre Hospitalier Université Laval, where specialists performed a lung biopsy. They sent a sample to Aaron Hamvas, MD, a neonatologist at St. Louis Children's Hospital.

Hamvas' verdict stunned Lachance and Anthony's father, Philippe



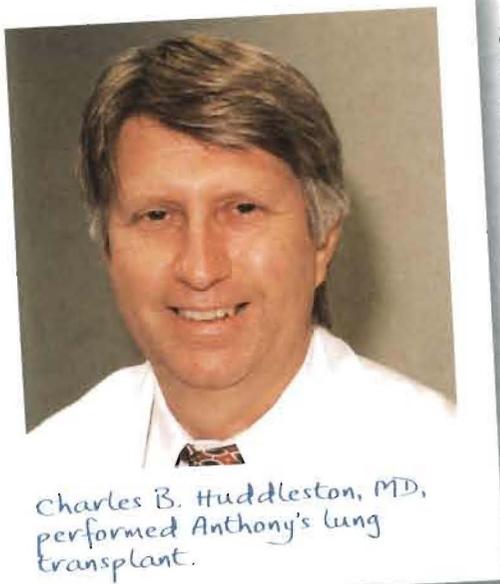
*Annie Lachance with her son,  
Anthony.*

Chicoine, both sales representatives for a security system company. Anthony had a genetic disorder, surfactant protein B deficiency. Without surfactant, doctors told them, air sacs within Anthony's lungs would begin to collapse; his body would try to compensate by producing other proteins that would build up inside his lungs.

There is no cure for the disorder, and gene therapy is on the distant horizon. Unless he had a lung transplant, Anthony faced certain death — within months.

Anthony's deficiency is rare — only two or three children are born with it each year in the United States. But Charles B. Huddleston, MD, is well-acquainted with the disorder. As chief of pediatric cardiothoracic surgery at St. Louis Children's Hospital, he and his colleague, Eric N. Mendeloff, MD, assistant professor of surgery, have performed hundreds of lung transplants: on children with cystic fibrosis or a lung disease linked to a congenital heart defect; on those receiving new lobes from living adult donors; and on 20 to 25 infants — like Anthony — born with a surfactant deficiency.

The lung transplant program at St. Louis Children's hospital, established in July 1990, has an extraordinary record of achievement. It is the largest pediatric transplant program in the world; in fact, St. Louis Children's Hospital surgeons have performed some 40 percent of all lung transplants ever done on children worldwide. One special area of expertise is infant lung transplantation, which takes place at only two other centers in the United States: USC and Children's Hospital of Philadelphia.



*Charles B. Huddleston, MD, performed Anthony's lung transplant.*

precisely the same size lungs, he requests a range — usually up to three times the size of the patient — with the intention of trimming too-large lungs. Then everyone begins the agonizing wait until donor organs become available.

"The families have the most underestimated challenge," says Huddleston, associate professor of cardiothoracic surgery. "Not only do they need to care for their sick child, but they have to uproot, sometimes give up their jobs, move to St. Louis and spend up to nine months waiting for the surgery."

They also confront a very uncertain future. Even if their child receives a transplant and survives, he or she faces anti-rejection medication and frequent doctor visits. It is an ongoing battle that takes a financial and emotional toll on families. Still, most parents decide to do

Once he decides that a baby is a good candidate, Huddleston enters the name on a national list, organized by blood type and body size. Since there is little likelihood of finding a donor with pre-

everything possible to save their child.

With all its attendant uncertainties, is a transplant finally worthwhile? This Christmas, Huddleston's department held a reunion for transplant kids and their families. His own children came, too, and mingled with the patients.

"If you looked around the room, you couldn't tell which children had transplants and which didn't. They do sports and attend regular schools; some are even old enough to go to college," he says.

That is just the kind of future that Annie and Philippe want for their son. Leaving family members more than 1,000 miles away, they came to St. Louis in mid-December, hoping to give Anthony a second chance at life.

## MID-JANUARY 1999: Finding donor lungs

Death is never far removed from lung transplantation. Nine children out of 40 on the Children's Hospital transplant list died last year waiting for a donor. A few die during or after surgery; others do well, then suddenly — despite the best medical treatment — fall victim to chronic organ failure.

And even when the transplant succeeds, death is a necessary precursor to this life-saving procedure.



*Michael J. Moulton, MD, carries the cooler containing the donor lungs.*

Somewhere in the United States a child dies, usually under tragic circumstances, and the devastated family summons the strength

to donate the organs of their child to another child in need.

Late in the evening on Jan. 14, Huddleston receives a phone call from Mid-America Transplant Services (MTS), the St. Louis-based organization that coordinates organ procurement for this region. A baby has died in North Carolina. Can he use these lungs to transplant the first child on the list?

That child is Anthony, who is now more desperate than ever. Just two days shy of four months old, he weighs only 11 pounds — and has trouble gaining weight, with the energy it takes just to breathe. His need for supplemental oxygen is increasing almost daily; without surgery, he soon will be placed on a ventilator.

“He is deteriorating slowly,” says Huddleston. “If he got some sort of viral infection tonight, I would expect him to be dead by next week.”

Despite this urgency, the donor organs must still be a good match. Huddleston evaluates the donor’s chest X-ray, blood oxygen level, medical history, parents’ drug and HIV status. More information will follow later. But he has to base his decision on that early data — and in this case, the verdict is “yes.”

At 2 a.m., a Sabreliner jet takes off from the Spirit of St. Louis Airport, with Michael Moulton, MD, chief resident in cardiothoracic surgery, and an MTS coordinator on board. During his 18 months as a fellow, Moulton has performed some 40 organ harvests, so he knows what to do. He brings surgical loupes and a baby-size bronchoscope to look down the donor’s airway. The coordi-



Joanne Donnelly places the donor lungs in ice and water.

nator has ice bags, a cooler and special lung-flushing solution.

As soon as Moulton fastens his seatbelt, he is sound asleep. Two hours later, he wakes up for the landing and ambu-

lance ride to the hospital, where a surgical team from UCLA medical center is already waiting. It will remove the child’s liver, kidney and small bowel — a longer procedure — before Moulton can begin.

When his turn comes, he works in tandem with a surgeon from Alabama who will take home the child’s heart. Moulton administers drugs: Heparin, an anti-coagulant; and Prostaglandin, to dilate the pulmonary arteries. He clamps the aorta, flushes the lungs and finally removes them. The most crucial step is dividing the heart’s left atrium to capture the tiny pulmonary veins they need

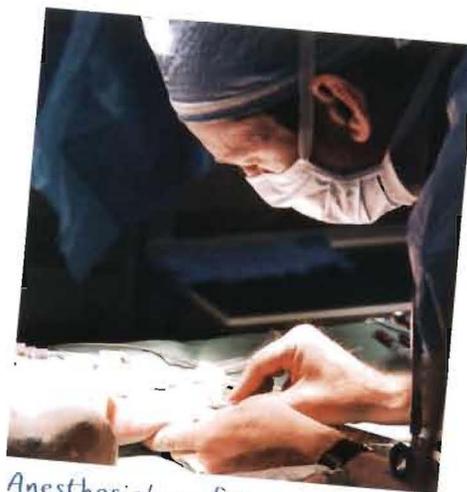
for the transplant surgery.

Two hours after his arrival, he is finished; the lungs are bagged, packed in ice and safely inside the cooler. Sirens blaring, an ambulance rushes Moulton and the coordinator back to the airport. They fly back to St. Louis, where a helicopter stands ready to make the eight-minute trip to the landing pad on the Children’s Hospital roof.

Moulton, a father of two, says such harvest procedures bother him. “But once the tragedy has happened, I don’t have any problem trying to see that something good comes out of it,” he says. “As a surgeon, you feel a special responsibility, because you really want to make things come out perfectly, for the donor’s sake and for the recipient.”



Anthony is dwarfed by the large operating room table.



Anesthesiology fellow, Tom Cox, draws blood to prepare Anthony’s bloodwork.

EARLY MORNING  
JANUARY 15:

## Anthony’s transplant surgery

By the time Moulton returns to St. Louis, Anthony’s surgery is two hours old. The 10-member team has completed its initial work: administering anesthesia; getting tubes and lines in place; readying the heart-lung

machine that will breathe for Anthony during his operation. Every step is carefully orchestrated. The baby must be ready to receive his new lungs the moment they arrive.

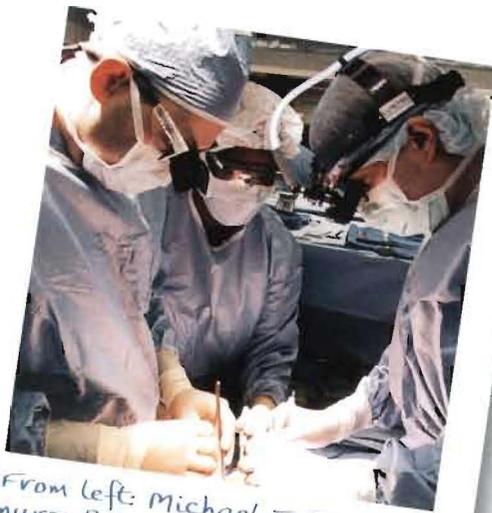
Though alert and energetic, Huddleston has not had a restful night. He has been up, off and on, getting reports on the state of the donor lungs and on Moulton's timetable.

Annie Lachance also has been awake. The hospital paged her late in the evening, and she spent the night at Anthony's side. Tearfully, she relinquished him at 7:15 a.m.; Philippe, back in Quebec, hoped to fly in for the surgery, but weather has delayed him. So she sits alone in a private room, apart from parents whose children are undergoing less risky procedures.

Anthony, doll-like on the big operating room table, has all but disappeared under blue drapes that cover his legs, arms and head. Only a square of skin is visible: his tiny chest, now orange from a coating of disinfectant. Under three giant lights, Huddleston makes a serpentine incision across Anthony's breast.

Hamvas, associate professor of pediatrics, stops by to watch the procedure and collect the old lungs, which he will take away for further study. Anthony's surfactant deficiency is unusual; his gene mutation does not express itself as severely as others with the disorder.

The operating room phone rings at 9:45 a.m.: The helicopter has arrived. Anthony goes on bypass, and the removal of his lungs proceeds quickly. Cooler in hand, Moulton races in, and nurse Joanne Donnelly, a 25-year operating room veteran, snaps open the container.



From left: Michael J. Moulton, nurse Pat Holloway, and Charles B. Huddleston.

She puts the pink, mottled lungs in a large pan of ice and water. Pat Holloway, RN, will work with Moulton at a back table — removing the trachea, esophagus and aorta; dividing the lungs, pulmonary artery and bronchus —

to prepare the lungs for transplant.

By 10:20 a.m., Huddleston has both lungs out, and Anthony is stable. Moulton switches over to the operating table and assists Huddleston with the transplant. Jane Quernheim, RN, is also at the table; Jill Guzy, RN, and Ann Wingbermuehle, RN, circulate nearby, while Sally Leach operates the heart-lung machine. The temperature of the room has dropped sharply; cold keeps the donor organs fresh.

But Huddleston doesn't seem to notice. There's a surprise with the new lungs: They are bigger than the donor hospital had indicated, and he has to cut them down to fit. Painstakingly, he sews them in, stitching the bronchus, pulmonary arteries and pulmonary veins. It is a long, difficult process, but by 1:30 p.m. — six hours after surgery began — the new lungs are in and inflated. Huddleston, visibly drained, closes Anthony's chest.

The surgery went well, he says, but the baby's oxygen level is a little low. It doesn't pay to be too jubilant; only the coming days, especially the first 24 hours, will tell whether the transplant is successful. He leaves the room to speak to Annie Lachance.

## FEBRUARY 17: Going home

The days following surgery are a mixture of hope and minor setbacks. Anthony comes off the ventilator one day — and goes back on it the next. But the oxygen level quickly corrects itself, his breathing tube is removed, and he finally moves out of intensive care onto the hospital ward.

On February 17, one month after his surgery, Anthony — now 14 pounds, 7 ounces — is released to his parents' apartment at the Ronald McDonald House. The family must stay in St. Louis until April to make twice-weekly hospital visits.

After that, they and their son will be free to return home to Quebec.

And his future? "It's hard to know," says Huddleston, "because we haven't been doing this in infants very long. Our oldest transplant patient from this age group is only 6 years old.

But the children who survive the transplant have all done well, so I think his prognosis is quite good."

Soon, up in Quebec, there will be one more baby who has a chance to cry. ●



Parents Annie Lachance and Philippe Chicoine celebrate Anthony's release from the hospital.

# Eye of the worm

After eight years of snipping and sequencing, scientists and their British collaborators have

It's Dec. 10, 1998, and Bob Waterston is in Washington, DC, at the National Academy of Sciences doing something he dislikes — taking credit for an enormous achievement. As cameras whirl and reporters scribble, he tells how his team and its British colleagues obtained the first genetic blueprint for an animal by determining the order of the 97 million letters in the DNA of a tiny roundworm. *The New York Times* calculated that, if printed in ordinary type, the sequence would sprawl over 2,748 pages.



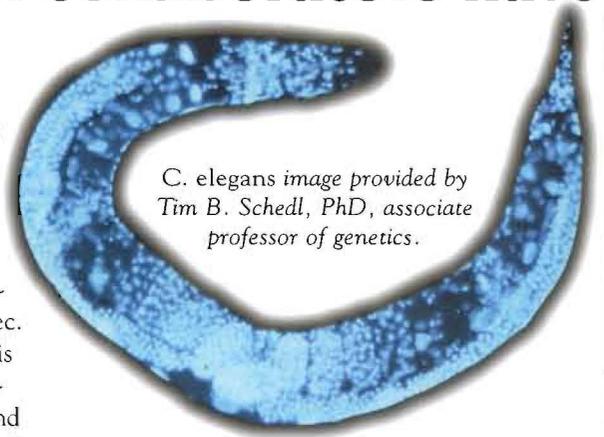
Robert H. Waterston, MD, PhD

by Linda Sage

"This is a watershed event in the history of biology," said Harold Varmus, MD, director of the National Institutes of Health, who also spoke at the press conference marking publication of the team's paper in the Dec. 11 issue of *Science*. "Unveiling this blueprint is giving us the first picture of what it is like to understand a multicellular, complex organism."

Although *Caenorhabditis elegans* is only 1 millimeter long — three of them could be lined up on the letter "I" — it shares many features with other animals. The worm has a nervous system, digests food, has sex and grows old, and 40 percent of its genes are similar to those of humans. "We have provided biologists with a powerful new tool to experiment with and learn how genomes function," Waterston says. "We'll be able to ask — and answer — questions we could never even think about before." A genome is all of the DNA in an organism's chromosomes. Some of it makes up genes, while the rest regulates genes or has unknown functions.

Robert H. Waterston, MD, PhD, directs the School of Medicine's Genome Sequencing Center and is



*C. elegans* image provided by Tim B. Schedl, PhD, associate professor of genetics.

the James S. McDonnell Professor and head of genetics. His group sequenced the worm genome in collaboration with the Sanger Centre in Cambridgeshire, England. Communicating by phone, e-mail and transatlantic visits, the two teams worked as one. They released their findings daily and persuaded the National Institutes of Health to adopt an immediate-release policy for all federally funded sequencing projects. "The commitment of these groups to make their sequence data available to the research community right from the start is admirable," says Francis Collins, MD, director of the National Human Genome Research Institute, which gave about \$35 million to fund the worm project. "It typifies the spirit of the Human Genome Project."

Now that a catalog of genes is in hand — 19,099 protein-coding genes and about 800 genes with other functions were found in the worm's DNA — scientists can find out how these genes work together. They hope to learn how a one-celled fertilized egg grows into an animal, how aging occurs, and how groups of genes conspire to cause disease. About 80 percent of known human disease genes have counterparts in the worm, so *C. elegans* studies



Jennifer Burkhardt prepares to load DNA sequencing machines.

# The Human Genome Project

g and piecing back together, Washington University  
ve decoded the first instruction book for an animal

should reveal how these genes are supposed to function. Such work already has revealed how certain genes contribute to Alzheimer's disease, how some cancer genes work and how the body rids itself of surplus or damaged cells.

The most surprising findings from the worm genome were the large number of genes — about one-fourth as many as in humans — and the organization of the animal's chromosomes. "The DNA in the middle holds critical genes that seem to be protected from evolution," Waterston explains. "The ends can be thought of as gene nurseries and graveyards where genes are rapidly formed or lost."

## Out of the compost heap

**W**aterston got involved with the worm as a postdoctoral fellow at the Medical Research Council Laboratory of Molecular Biology in Cambridge, England, home of geneticist Sydney Brenner, PhD. In the 1960s, Brenner had moved *C. elegans* from the compost heap to the petri dish, realizing that scientists could learn much from this simple, transparent animal. Fascinated with the exquisite order of proteins in muscle

cells, Waterston began to explore muscle defects in worm mutants.

Joining the School of Medicine in 1976, he continued to study *C. elegans*, whose muscles are surprisingly similar to those of humans. In 1985, he began to collaborate with John E. Sulston, PhD, and Alan R. Coulson, PhD, who had started to create a physical map of the worm's DNA. At a Cold Spring Harbor meeting in 1989, Coulson, Sulston and Waterston pinned together six long pieces of paper, each corresponding to a *C. elegans* chromosome. Their impressive map persuaded influential geneticists that it was time to spell out the details of the DNA sequence.

In August 1990, Waterston received a grant from the newly created National Center for Human Genome Research — now the National Human Genome Research Institute. Sulston, now director of the Sanger Centre, received funding from Britain's Medical Research Council and through the NIH grant.

"Several people told us we were crazy even to contemplate this project," Waterston recalls. If every letter in the genetic code were 1mm wide, the longest contiguous sequence anyone had obtained by 1990 would stretch the length of a couple of football fields. But the

worm genome would stretch from St. Louis to Columbia MO.

During the first year, the St. Louis group sequenced 40,000 of the worm's 97 million nucleotide base pairs — enough on the 1mm scale, to reach from the start line to the finish line of a 40-meter track. But by the last day of 1995, the collaborators were ahead of schedule, having determined the order of 29.7 million bases.

## Onto the production line

**A**bout 100 people eventually worked on the St. Louis portion of the project, constantly pushing the technology forward. The center's Technology Development Core, headed by Elaine Mardis, PhD, research assistant professor of genetics, designed equipment to take over repetitious tasks. For example, the core invented a plaque picker to transfer bacteria containing worm DNA into culture tubes, where they reproduced to provide enough DNA for analysis. The plaque picker's "eye" — a high-resolution camera — images all of the bacterial plaques on an agar plate and stores their locations in its computer. The robot then jabs a piece of polypropylene tubing into a



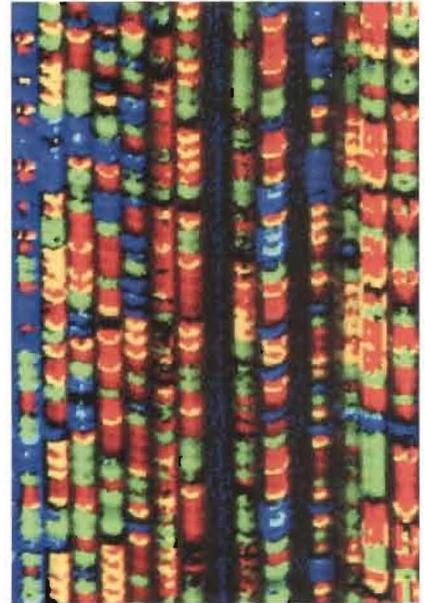
From left: Mark Ames, Amanda Abbott and Rachel Maupin in the Genome Sequencing Center. Ames picks up DNA clones while Abbott and Maupin isolate the DNA from the clones.

software to speed up sequencing. The group designed a tool that takes data off the sequencing machines and decides which stretches are good enough for analysis. Another reassembles portions of sequence, while a third decides which regions need more data and orders the necessary pieces of DNA. The group also maintains the center's 300-computer network, working through the night so as not to disrupt the daily shifts.

Head technologist Tony Favello has kept the center running since the earliest worm days, ordering supplies, keeping equipment in shape and tracking the use of research funds. Early on, he even found time to finish 2 million bases of worm DNA. But at the top of his list is keeping the center's employees — nearly 300 by now — equipped with the things they need during the 5:30 a.m. to midnight shifts. "The bottom line is to make sure they can do their jobs and are happy doing them," says Favello, who makes sure the candy jar is always full.

Skilled employees, automated production and custom-made software have greatly advanced DNA sequencing. If the collaborators were to begin the worm genome today, they could sequence it in less than nine months.

This success has jump-started the sequencing of the three feet of



Sequencing begins by tagging each of the four chemical building blocks, called nucleotides, with the colors green, red, blue and yellow.

plaque, moves over, and cuts off the tubing into a tube of growth medium.

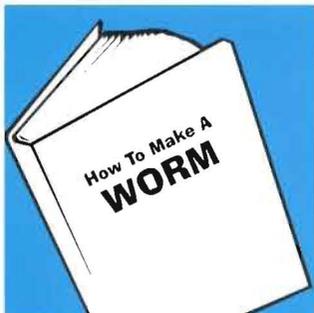
The center's Informatics Core, headed by LaDeana Hillier, research scientist in genetics, developed

## How to sequence a worm

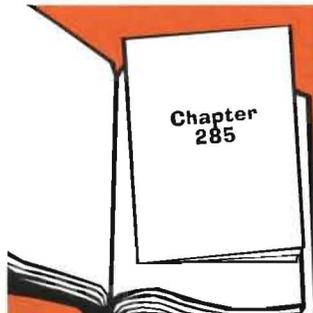
DNA is a long molecule that looks like two strands of beads wound around each other. The beads come in four different "colors," and, in genes, their sequence spells out the blueprint for a particular protein. The sequence of beads within a gene specifies the sequence of the protein's building blocks, which are amino acids. Because three beads correspond to one amino acid, there are more than enough permutations of beads to make code words for the 20 amino acids that are commonly found in proteins.

The "beads" are chemical building blocks called nucleotides, and the four "colors" are adenine (A), thymine (T), cytosine (C) and guanine (G). Because A always pairs with T and C pairs with G, the sequences of the two strands are complementary. The paired nucleotides are known as base pairs.

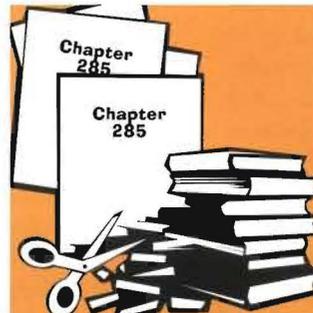
The *C. elegans* DNA came from libraries of worm DNA collected by Alan Coulson, PhD, at the Sanger Centre in Cambridgeshire, England. Each piece was inserted into the bacterium *E. coli*. The Washington University researchers allowed the bacterial colonies to multiply so they could



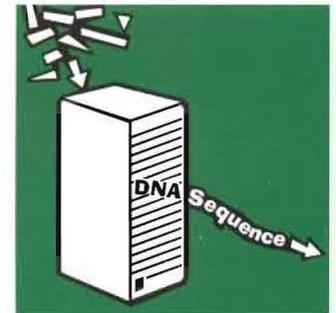
The worm's book of life is written in the DNA code.



This very large text first was broken up into about 3,000 chapters, each with 40,000 letters. The researchers dealt with one chapter at a time.



Using about 100 copies, they cut each chapter into pieces. Each piece was small enough to be sequenced.



Sequencing machines can read the DNA code. They decoded about 2 million pieces of worm DNA.

# Mining the worm genome

DNA that carries human genes.

"Sequencing the *C. elegans* genome was such a technological challenge that it allowed us to fully develop the methods and infrastructure necessary to even think about sequencing the human genome — which is 30 times larger — in a reasonable period of time and at a reasonable cost," says Richard K. Wilson, PhD, associate professor of genetics and co-director of the Genome Sequencing Center.

By 1995, Waterston and Sulston had persuaded the scientific community that their technologies were a match for a genome with 3 billion letters. They now are part of an international consortium that will obtain a working draft of the human genome by the spring of 2000. The School of Medicine will obtain one-third of this sequence, thanks to a 12-month \$38-million grant from the National Human Genome Research Institute.

"Bob and John's work gave us a lot of confidence that we could get the human sequence done sooner than planned," Collins says. "Now we are more eager than ever to get the instruction book for a human being." ●

"Having all of the genetic information needed to specify an animal puts biology on a very firm footing," says Robert H. Waterston, MD, PhD. "The task ahead is to figure out what the sequence means and how it is used."

Lawrence B. Salkoff, PhD, professor of neurobiology and genetics, is wasting no time. With a grant from the National Institute of Diabetes and Digestive and Kidney Diseases, he is using the worm data to study certain electronic components of the nervous system.

"This is the first attempt to use the complete DNA sequence of a multicellular organism to create a comprehensive picture of potassium channels in a single animal," Salkoff says.

Potassium channels are cylindrical proteins that admit potassium ions into a cell, altering the difference in electrical charge between its interior and environment. Such ion movements enable nerve cells to transmit and process information, while defects in ion regulation underlie many disorders of nerve and muscle. By analyzing the

*C. elegans* genome, Salkoff has identified 80 potassium channel genes, and he may find more.

The 80 genes fall into families, which have persisted and expanded in mammals, suggesting that evolution has generated variations on a theme rather than designing totally new components. These similarities make the worm useful for clinically relevant research. For example, people with an abnormal cardiac rhythm called long QT syndrome have a defect in a potassium channel gene in heart muscle. The corresponding worm gene can be mutated and studied — its protein product operates in a muscular pump called the pharynx.

The functions of most of the 80 genes are not yet known, so Salkoff intends to systematically study the collection. He hopes the project will set a precedent for using the human sequence data that now is coming off the press. "Knowledge of the full range of diversity, tissue-specific patterns of expression and functional properties of each gene-encoded electronic component could have enormous clinical implications," he says. ●

obtain large amounts of each piece of worm DNA, whose average length was about 40,000 base pairs. After physically cutting each sample into smaller lengths, they subcloned the pieces into bacteria to obtain large quantities of sequence-ready snippets.

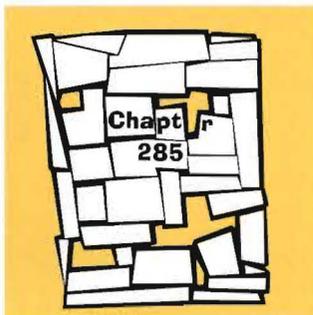
Sequencing began by essentially tagging each of the four types of nucleotide base with a fluorescent dye of a different color — A is green, T is red, C is blue and G is yellow (see image above). The color-coded DNA fragments ran down a gel that was monitored by a laser. The machines that performed this operation, Applied Biosystems DNA Sequencers,

therefore could determine the order of the nucleotide bases in the original sample. The information went directly into a computer, which used software developed by the collaborators to assemble the sequences of the small pieces of DNA into the sequence of the original 40,000 base pair clone.

Automated sequencing was followed by finishing, a process that uses different sequencing techniques to clarify ambiguous parts of the sequence. The finished sequences were laid out on the physical map that marks the locations of the original clones, building a continuous sequence of all the nucleotide bases in the *C. elegans* genome. ●



By overlapping fragments of sequence, the scientists put most of each chapter back together.



But there were still pieces missing.



The researchers completed the project by hunting specifically for the missing pieces.



Now they have the complete blue-print for a worm.

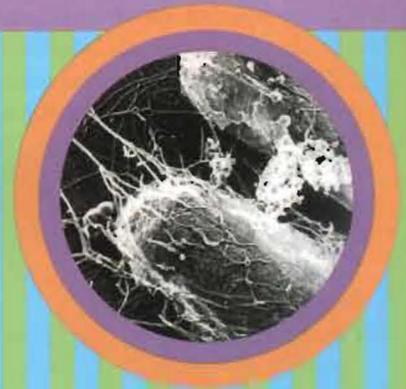
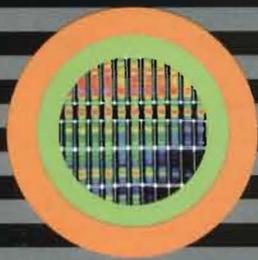
# The Division at

2

DBBS 1973

DBBS 1998

5



The experiment continues

by STEVE KOHLER

**A** detailed description of the University's Division of Biology and Biomedical Sciences published here could easily be inaccurate by the time it reached readers. That's by design.

The hallmark of the organization (often called DBBS or just "the Division") is that it changes its arrangement in response to the needs of scientists and science. Now turning 25

years old, the Division has altered its organizational stripes many times. It is, in the words of John H. Russell, PhD, associate dean of graduate studies, "an ongoing experiment."

Charged with providing training for PhD students in the biological and biomedical sciences, the Division contends with vast increases in the amount of information about subjects that reveal themselves to be increasingly complex. Interaction between traditional disciplines becomes more vital. "Good science gets done when different perspectives come together," says Russell.

Bringing those perspectives together seamlessly is where the Division excels. A quarter of a century ago, educational visionaries here realized that the conventional structure of universities and medical schools did not match the increasingly interdisciplinary way in which scientific investigations were being conducted. They called for a reorganization focused on the most important questions in biology. It was a straightforward but brilliant insight that opened a door to huge changes and broad success, spawning many imitators.

Today, the Division comprises 11 programs affiliated with 29 basic

science and clinical departments on the Medical Campus, and at the School of Engineering and College of Arts and Sciences on the Hilltop Campus. More than 300 faculty train students to be outstanding scientists.

By 1997, the Division had graduated 389 PhD scientists, 209 of whom had completed all of their postdoctoral training. More than

half work in academic institutions — 84 as assistant, associate or full professors. Sixty-three practice or direct science in industrial environments.

Of the 15 who work in government or public health, eight are senior or staff scientists at the National Institutes of Health.

Here is what some who have intimate knowledge of the DBBS have to say about it.

## Beginning

**M**uch of what is best about universities as societal institutions and Washington University in particular is distilled in the Division's adaptability, says William H. Danforth, MD, who was chancellor of the university in 1973 and today serves as chairman of the Board of Trustees. "The overall structures of universities persist without much apparent change," says Danforth, "but what people do within those structures can change greatly."

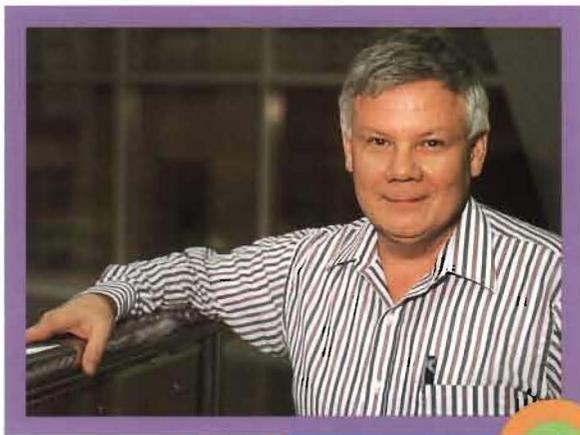
The creation of the Division was such a major change. "It was a very imaginative idea," Danforth says, giving credit for the concept to P. Roy Vagelos,

MD, then head of the Department of Biological Chemistry. "There was some restiveness at the university about graduate education in the biological sciences, and an interest in doing things better, in examining our weaknesses," Danforth says.

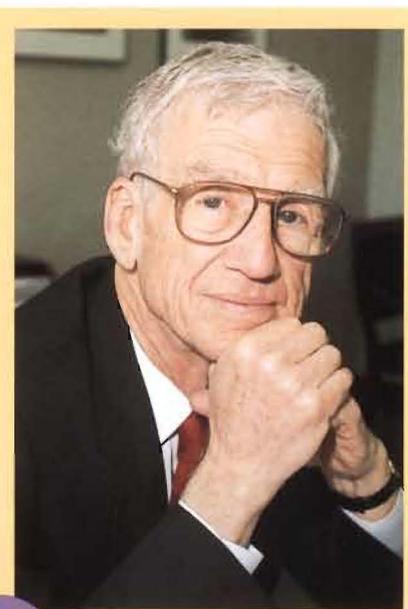
"At the same time, Vagelos and Max Cowan, who was then head of the Department of Anatomy, realized that biological research had to be tied to the other sciences — physics and chemistry. And scientists would have to be able to follow their interests across traditional lines. We had an inadequate overview and insufficient regard for how these things fit together," Danforth says.

With the help of Dean Kenton King at the medical school and Dean Merle Kling in Arts and Sciences, graduate education in the biological and biomedical sciences was disconnected from traditional departmental structure and reorganized around scientific interests. Students were recruited into the Division in its entirety, which at first consisted of six basic science departments at the medical school and the Department of Biology on the Hilltop Campus.

"We had three purposes," says Danforth. "New methods of graduate teaching was one. We also



John H. Russell, PhD



William H. Danforth, MD

wanted to gain an overview to monitor the biological sciences so the deans and the chancellor could be advised of weaknesses. And we wanted to recruit faculty where they were most needed by the university, not solely by individual departments."

Danforth calls the Division a "great innovation that has persisted because it is so successful." It reflects Washington University's place as an "institution in which people work well together across traditional lines, a place with few barriers to working together." He expresses surprise that it took decades for the Division's concept to be imitated, a delay he attributes to parochialism elsewhere. "But it has persisted because it has worked so well," he says. "It is a typical example of how a big idea arises among the faculty and is put into operation at Washington University."

## Alumna

When Lynda Morrison, PhD, opened her virology laboratory at Saint Louis University's School of Medicine in 1995, she fell back on her training in the DBBS at Washington University in several ways.

"I felt well prepared scientifically," Morrison says, considering her PhD work here and subsequent postdoctoral studies at Harvard Medical School. "And I was prepared to teach. But I hadn't been trained to run a lab — the business, personnel and management aspects." And so the days during which she had so carefully emulated her Washington University mentor became even more important.

"You closely observe your mentor, consciously or subconsciously," Morrison says, "how they guide lab meetings, how they present the work that comes out of the lab," and the other details of being a scientist.

Additionally, Morrison reconnected with her Division counterparts. She and her students attend weekly laboratory meetings at Washington University, where they participate in a joint critique of their work's progress. "We believe that if we can get our work past our colleagues at Washington University, then we're okay," she says.



Lynda A. Morrison, PhD

And the collaborative nature of the Division continues to infuse her work. She brings an expertise in immunology to the meetings and benefits from her colleagues' understanding of virology. "They expand their knowledge, and we expand ours," she says.

The Division's commitment to close, almost familial ties between

thesis mentor and student also serves Morrison in her teaching. St. Louis University recently adopted a graduate science education program that features admission to the larger program, core classes for first-year students and a chance for doctoral candidates to rotate through a variety of labs before making a choice about where to settle for thesis research — all central properties of Washington University's DBBS.

Morrison's experience with that style means that she is familiar with the interactive growth that such a system fosters. "It's not just teacher to student; the interactivity means that learning flows both ways," she says, as students grow to become independent, thoughtful scientists.

## Faculty

When colleagues ask Susan Wentz, PhD, associate professor of cell biology and physiology, about department-to-department interactions, the question is easy for her to answer. "In the Division, collegiality is the principle," she says. "The organization and grouping is by interest, and walls between departments just don't exist. Our laboratory is part of a group of eight from five departments doing yeast research. A larger group interested in signal transduction consists of about 20 labs from 10 departments."

Indeed, Wentz says that she can "e-mail anybody in the Division about anything. My students go to any lab to learn what they need to know to do their work."

One concern Wentz has about the system is that students might

**To celebrate the 25th anniversary of the Division of Biology & Biomedical Sciences, a symposium will take place April 15-16 on the Medical and Hilltop campuses.**

**The event is an opportunity to reflect on the Division's groundbreaking influence on graduate education and to explore the future of graduate training in the biological and biomedical sciences.**

become lost in its size. In more conventional programs organized departmentally, students know perhaps 15 trainees and 20 faculty members; in the larger Division, “we struggle to give a sense of belonging and camaraderie. But we succeed because of the central office and its concern, and our compact campus,” she says.

When a student selects Wente’s lab for thesis research and is accepted there, any anxiety about camaraderie vanishes. “I evaluate potential students on the basis of the motto: ‘Think deeply. Work hard.’ I look for students devoted to what they’re doing, excited about the science. And they should evaluate me as a potential mentor,” she says. The arrangement between mentor and student is like the program in general: Standards in both cases are high, but once those hurdles are cleared, no resources are spared to see that projects and students succeed.

Wente provides her students with the independence they need to try bold science. “They have ideas I’d never have, and they take ideas I have and run with them. My students don’t work for me, they work with me,” she says. In fact, she claims her excellent students have made her successful.



Susan R. Wenté, PhD

The ardent interaction between mentor and trainee makes each student like a family member. “I try to be proactive — help them plan and prepare for further careers,” she says. The bond that develops still causes her to feel pangs when students earn their degrees and move on, but she has learned that “when they leave your training and become colleagues, you have to say, ‘This is how science progresses.’”

## Student

Christina Gargiulo has been excited by science since she served an internship in a Sanford University laboratory during high school. The former Westinghouse Fellowship winner (for a school science project) is now a third-year student in the Division’s molecular cell biology program and a fellow in the Markey Special Pathway in pathobiology, studying proteins that transport lipids across the cell membrane. And she’s more energized by her work than ever.

“There’s so much interesting science being done here — from frog cell development to cardiology — that the challenge has been to pick from among the choices,” she says. During a first year of core courses, Gargiulo began her effort to select the most appropriate lab for her thesis work. Gargiulo performed four rotations — not just to test the water, but to explore areas of interest and to plug holes in her education.

She chose to work in the lab of Jean Schaffer, MD, assistant professor of medicine and of molecular biology and pharmacology, and was accepted there, striking up what she calls “an intense, special relationship.” Of her thesis adviser, Gargiulo says, “The emphasis has been on educating me. There’s a lot of steering and guiding by the principal investigator while I gather independence.

My friends studying at other universities don’t report the same attitude,” she adds. “Here, I’m not just a data machine, and the faculty purpose is clearly to train students, not to use them.”



Christina E. Gargiulo

For Gargiulo, the Division’s approach to graduate science education has two particular strengths. First, she says, because all students study core classes together for a year, future plant scientists mingle with future microbiologists. “We develop friends and colleagues in other areas. I know so many people with different strengths and skills that it creates new perspectives and generates ideas.”

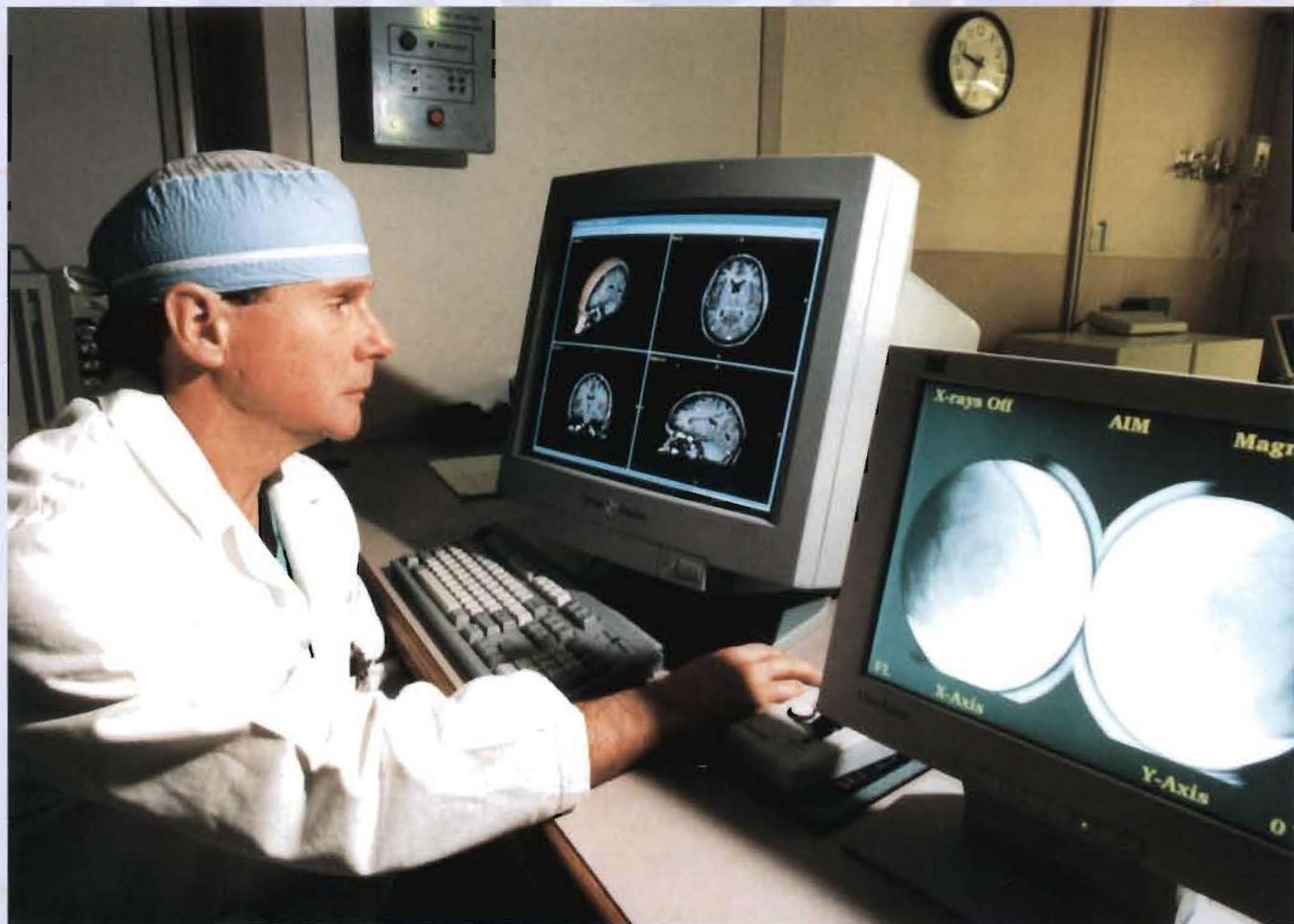
Second, the integration of bench science with clinical science that characterizes the Markey program lends focus. “It’s hard to ask the right questions if you don’t understand the disease process involved,” she says. “We learn both: PhDs teach us the biochemical structure of hemoglobin; MDs show us sickle cell anemia.” The Division now is developing other, similar pathways to link bench science with clinical endeavor.

For Gargiulo, “a lot of science is about asking the right questions.” In two years, she hopes to leave, doctoral degree in hand, to pursue post-doctoral training before seeking her final goal of an academic research position. There, she will rely on her education as background to ask those questions and steer students herself. ●

# MAGNETIC NAVIGATION

*Magnetic surgery system allows precise manipulation of surgical tools inside the brain*

BY LINDA SAGE



Ralph G. Dacey Jr., MD, at the computer console of the Magnetic Surgery System. The monitor on the right displays the fluoroscopic images of a patient's brain that are taken during surgery and reveal the whereabouts of the small magnet. The monitor on the left displays magnetic resonance images taken before the surgery. These enable the surgeon to plan the path between the surface of the brain and the tumor, and they display the movement of the magnet along this path as surgery proceeds.

A young man lies on the table, cocooned in a body warmer, his head in a strong magnetic field. The nurses and doctors shiver as the cooling system for the magnets cools the room as well. They forget their discomfort as the neurosurgeon presses a switch on a computer console, however. Millimeter by millimeter, a small magnet glides through the patient's brain like a Stealth missile, directing a straw-like catheter to a tumor. When the catheter reaches its target, the neurosurgeon inserts a flexible biopsy tool, snipping out a piece of diseased tissue.

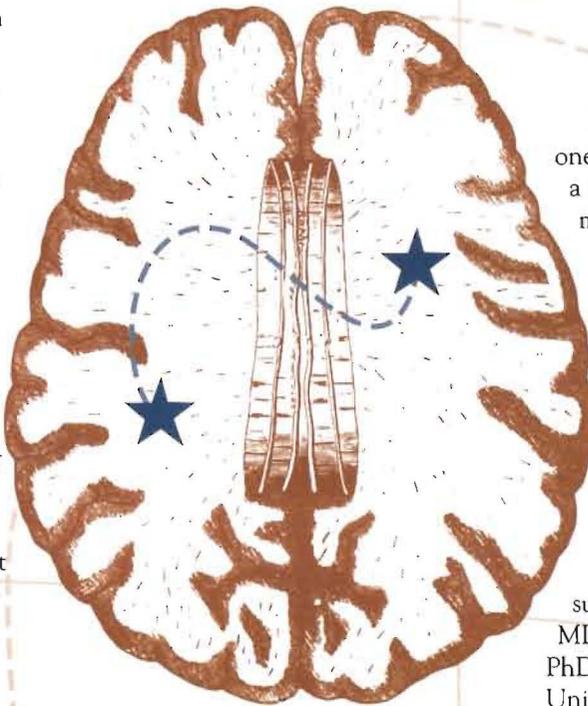
Ralph G. Dacey Jr., MD, the Edith R. and Henry G. Schwartz Professor and head of neurological surgery, performed the world's first magnetic brain surgery Dec. 17 at Barnes-Jewish Hospital in St. Louis. "This is a fundamentally new way of manipulating surgical tools within the brain that promises to be minimally invasive," Dacey says. "And it should be a safer way of doing brain surgery because it allows us to use a curved pathway to reach a target. Therefore we can go around sensitive structures, such as those that control speech or vision, instead of going through them."

The Magnetic Surgery System can safely access hidden parts of the brain — and eventually other parts of the body — because it allows surgeons to control the front end of a catheter. Like a long length of hose, a catheter can be moved more precisely to a given place if directed from the front rather than the back. "What we have achieved is the simplified, computerized control of the working tip of a catheter," Bevil Hogg said at a Dec. 22 press briefing. Hogg is CEO of Stereotaxis Inc., the St. Louis-based company that is spearheading the system's development.

"This is the first time that surgery has been done using forces other than the muscle power of the surgeon to drive the tip of a catheter," Dacey says. "Instead of mechanical forces, we are using very precisely controlled magnetic fields. It is a completely new way of performing surgery."

*"The direct path between two points is a straight line, whereas with the Magnetic Surgery System, we can use a curved trajectory."*

Ralph G. Dacey Jr., MD



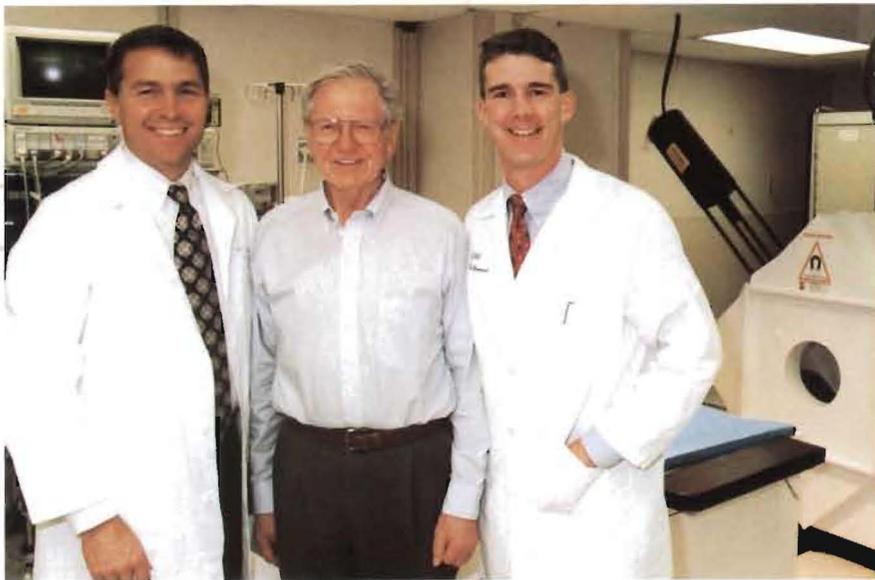
In the operating room lounge one day in 1984, Howard watched a nurse put her lunch in the microwave oven. Reading the warning about metal pans and foil, Howard thought of heating a metal implant with microwaves to selectively destroy a brain tumor. A few days later, he imagined that a magnetic field could be used to guide the metal implant through the brain.

The idea began to take shape when Howard and neurosurgery resident, M. Sean Grady, MD, hooked up with Rogers Ritter, PhD, a physics professor at the University of Virginia. An internationally known magnetic suspension expert, Ritter calculated that it should be possible to use a magnetic field to guide medical instruments into the brain. During the next couple of years, one of his graduate students built a small model system, which she tested on a gelatin "brain." Then in 1986, former graduate student George Gillies, PhD, joined the University of Virginia engineering faculty. After raising more than \$1 million in foundation money, Ritter, Gillies, Howard and Grady — who by this time had moved to the University of Washington — built a prototype system, testing it on gels and pigs and dogs. Ritter and Gillies also overcame a major obstacle by developing image intensifiers that would not be damaged by strong magnetic fields.

In 1990, the four researchers joined forces with Sanderling, a venture capital company in Menlo Park CA, to establish Stereotaxis Inc. The company moved to

## FROM MICROWAVES TO MAGNETS

The idea for a magnetic surgery system was conceived at the University of Virginia in the early 1980s, when Dacey was an assistant professor there, and a medical student named Matthew A. Howard III, was taking classes. At that time, CT (computerized tomography) scanners were allowing doctors to obtain the first detailed images of the brain. "It was clear to me that this sophisticated imaging was not being exploited properly because people were just looking at the pictures and applying them to surgical techniques that had been used for decades," says Howard, now an associate professor of neurosurgery at the University of Iowa. "I thought there must be some way to link that imaging with a refined manipulation technique."



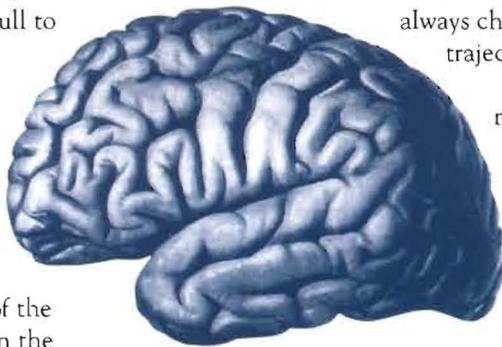
Magnetic Surgery System inventors from left: M. Sean Grady, MD, professor of neurosurgery at the University of Washington; Rogers C. Ritter, PhD, professor of physics at the University of Virginia; and Matthew A. Howard III, MD, associate professor of neurosurgery at the University of Iowa.

## The first human magnetic brain surgery

The Dec. 17 surgery began when Ralph G. Dacey, Jr., MD, drilled a finger-sized hole in the patient's skull. He placed a plastic bolt in the hole to provide a subsequent entryway for surgical instruments. He also attached six small metal markers to the outside of the skull to enable the computer to localize the catheter.

Dacey, Howard and Grady then viewed magnetic resonance images (MRIs) of the patient's brain on the screen of a computer console. The 3-D views and virtual slices through the brain allowed them to plan the best route to the tumor.

The surgeons next placed the patient's head in the Magnetic Surgery System (MSS), positioning it between the superconducting magnets with a titanium frame. Opening the plastic bolt in the skull, they introduced a tiny magnet into the brain. The magnet was



attached to a guidewire, which was covered by a narrow plastic catheter.

Sitting at the computer console, Dacey guided the small magnet to the tumor. As the magnet moved along the preplanned path, the computer advanced the guidewire and catheter one millimeter at a time, always checking the trajectory.

After the magnet reached the tumor — about a 5-minute trip — Dacey gently pulled it and the guidewire out of the brain, leaving the catheter in place to act as a tunnel. He then inserted a specially designed biopsy tool along the catheter. Because the tool was flexible, it followed the preplanned path. A few minutes later, Dacey had snipped out a tissue sample for the pathology lab. After taking additional samples from other parts of the tumor, he removed the catheter and cranial bolt and closed the small hole in the skull. ●

St. Louis in 1995, when the School of Medicine entered into an agreement to test the Magnetic Surgery System. "We were attracted by Dr. Dacey's national reputation as a leader in neurosurgery and by the premier status of Washington University School of Medicine and BJC Health System," says J. Michael Egan, who was interim CEO of Sanderling at that time.

"The recruitment of Washington University triggered tremendous growth in this project," Howard says, "because Dr. Dacey was able to attract financial and other resources and coordinate a tremendous multidisciplinary scientific development effort."

By this time, the company had shifted its focus from hyperthermia to other applications, and in 1998, the Food and Drug Administration gave permission to test the system for biopsying tumors in the brain's frontal lobe. The first patient was a 31-year-old man who needed a biopsy of a second brain lesion. The biopsy confirmed that the lesion was a tumor, identified the type of cancer cell involved and therefore the appropriate form of chemotherapy. The magnetic surgery system now will be used to biopsy four additional patients in Phase I of the clinical trial.

## APPLICATIONS BEYOND THE BRAIN

Surgeons currently use images of the brain to see a tumor, and they can localize instruments that have sensors. But until now, there has been no way to automatically navigate tools through the brain along an optimal path. To obtain a biopsy, for example, neurosurgeons manually push a rigid needle toward a tumor, passing through whatever lies en route. "The direct path between two points is a straight line," Dacey says, "whereas with the Magnetic Surgery System, we can use a curved trajectory."

The system is likely to have applications in many parts of the

# *“We envision that this technology will be used broadly in medicine”*

Matthew A. Howard III, MD

body because it puts three components — visualization, localization and navigation — together for the first time to create an interventional workstation. Future possibilities may include implanting electrodes into the brains of patients with movement disorders and delivering therapeutic drugs or chemotherapy agents to parts of the brain.

Stereotaxis already has shown that the system can guide catheters through the twists and turns of the brain’s minute blood vessels. So the company hopes it will be able to reach and repair burst blood vessels or malformed veins in the brain. “We also are anticipating that the system will be able to guide a catheter into a beating heart and place it at strategic locations to

achieve therapeutic benefits such as the treatment of arrhythmia,” Hogg says. “And we hope to navigate cutting tools [through arteries] to remove plaque.”

Data from the five patients with brain tumors will be used to seek approval for a Phase II study, which likely will involve 30 brain tumor patients at the School of Medicine and a second site. If all goes well, the system could come into commercial use within three to four years.

“We envision that this technology will be used broadly in medicine,” Howard says. “But when that all pans out, the bottom line is that Washington University was the first place in the world where this surgery was performed.” ●



Ralph G. Dacey Jr., MD, the Edith R. and Henry G. Schwartz Professor and head of neurological surgery, stands in front of the Magnetic Surgery System. He is holding part of the helmet that keeps the patient’s head in the required position during surgery.

## Magnetic Surgery Q&A

### How is the small magnet guided through the brain?

The MSS generates a magnetic field the contours of which are determined by the strength of the current flowing to each of six superconducting magnets. Increasing or decreasing the current to one magnet alters the contours of the field, which alters the direction in which the small magnet moves.

### Does the small magnet pull the guidewire and catheter?

No. A computer-controlled device provides the mechanical force to advance the guidewire. So the positioning system is like the system’s motor, whereas the magnet is like its steering wheel. The surgeon steers by remote control from the computer console.

### How does the surgeon know where the magnet is in the brain?

The MSS contains a fluoroscope, which takes X-ray images in two planes of the patient’s head every few seconds. Because the six metal markers show up on these images as well as on the MRIs, the two types of images can be superimposed. Therefore the computer can mark the position of the magnet — which the fluoroscope detects — on the MRI images in the computer console. These images also display the predetermined path to the tumor.

### Who finances the research?

Major investors are: Advantage Capital Partners, Alafi Capital, BJC Health System Inc., CID Equity Partners, Community Investment Partners II, LP, A.G. Edwards, Emerson Electric, Gateway Venture Partners, Graystone Venture Partners, Oakwood Investors, and Sanderling Venture Partners II, LP. ●

## Back on track: Spinal cord injury fails to deter student-athlete

by Ian Rice

**A**S a first-year occupational therapy student, I have studied the concepts of adaptation, accommodation, occupational performance and purposeful activity extensively. As a student athlete with a disability, I also have lived through and experienced the concepts of occupational therapy from the other side, as a recipient of rehabilitative care.

After suffering a spinal cord injury in 1993 as a result of a gymnastics accident at the University of Illinois, I was confronted personally with the very elements of therapy I am now learning to deliver to others as an occupational therapy student. I learned firsthand what it is like to experience loss and to be confronted with the physiological and psychological trauma inherent to catastrophic injury.

My occupational therapist, Laura McLaughlin, a graduate of Washington University, helped me realize my full potential as a person with a disability and used a client-centered treatment approach. The occupational therapy I received in rehab centered on those activities that were most meaningful and relevant to my particular pursuits as a college student and former athlete.

Through the course of the rehabilitation, with my therapists as facilitators, I eventually understood

the term “former athlete” was completely false. As I regained my independence and my confidence grew, I began to realize my athletic



*A world-class marathon wheelchair racer, Ian Rice has set his sights on taking part — and taking a medal — in the 2000 Paralympics in Sydney, Australia.*

potential was still within, and I considered the possibility of wheelchair athletics.

Back at the University of Illinois a semester after my accident,

I quickly learned of the extensive world-class wheelchair athletics program that had been there all along. Rolling into the training facility one

day, I found myself interrupting the U of I wheelchair road racing team in the middle of weight lifting circuit training. The atmosphere of the gym was intense, and I saw these wheelchair athletes hopping in and out of their chairs, making graceful transfers all over the lifting equipment at the speed of light. The coach, in the corner of the room gripping a stop watch, was screaming at the athletes, letting them know how much time they had to rotate from station to station. The scene was no different from any other elite or world-class team I had ever witnessed or taken part in during my 11 years of gymnastics. I later learned the room that day was filled with numerous Olympic and Paralympic athletes, many of whom were world record holders and who also had the major sponsorships that one would expect of any world-class athlete.

Not long after, I found myself once again knee-deep in this mix of athletes as a member of the University of Illinois wheelchair track and road

team. I had no idea how much strength and conditioning I would be subjected to before even being allowed in a racing chair. I was under the impression that much of

the upper body strength I still possessed from gymnastics would translate easily into wheelchair racing. My impressions, for the most part, were incorrect. It took at least a year of conditioning and weight training before my musculature was adapted and ready to handle the rigors of wheelchair racing.

While wheelchair racing has certainly been phased into mainstream sports within the past 10 years, most people have neither been exposed to nor understand it.

Comparing the way an individual uses or pushes an everyday manual wheelchair to the technique used with a racing chair is like comparing apples and oranges. A racing chair is its own entity and requires enormous amounts of upper back and shoulder strength and flexibility to propel properly, especially at an elite level.

What drew me to the sport of wheelchair racing immediately was that it was, in fact, its own entity. I recognized that it was a pure sport in the sense that the equipment used had not been adapted equipment used by an able-bodied person. Racing chairs are custom built to suit the needs of the individual athlete depending upon body type, degree of disability and pushing technique. A racing chair must fit the body of the racer as a pair of shoes must fit the feet of a runner.

Ultimately, racing equipment was designed by people with disabilities to be fully utilized by a person with some degree of atrophy of the lower body. The atrophy of the

lower body and the subsequent hypertrophy of the upper body work together to produce athletes with incredible strength-to-weight ratios. This in turn leads to the birth of a dynamic sport, combining the drafting strategies and aerodynamics of bicycle racing but without the mechanical advantages of gears. So it is appropriate for wheelchair racers to compete on the same courses as runners, but they compete within their own divisions and for their

**“When I sustained a spinal cord injury I experienced loss, but doors of opportunity also opened. I was able to continue to pursue competitive athletics at the elite level and gain insights useful to my choice of career.”**

own prize money, because wheelchair racers are significantly faster than runners due to the strength-to-weight ratio factors. For example, it is not uncommon for an elite wheelchair racer to weigh 120-140 pounds and be able to bench press well over 250 pounds.

After being a part of this intense culture of wheelchair athletes at the University of Illinois for several years, my competence as a racer grew. The first major road race I won was the 1996 Chicago Marathon. From there I went on to compete in and have successes in dozens of other races of varying distances. One highlight was placing second among some of the best

wheelchair racers in the world at a marathon in Switzerland in the summer of 1998. In addition, I turned in the 20th fastest time within my division among a list compiled by an Austrian racer of the top 100 marathon times recorded in history.

At present my goals are to continue winning as many road races as I can, and to qualify, compete and medal at the 2000 Paralympics in Sydney, Australia — and, of course, to graduate from Washington

University with a master's degree in

occupational therapy. The Program in Occupational Therapy has supported my efforts to compete in athletics at a high level. Program administrators have allowed me to extend the standard two-year

program to three years so that I have adequate time to train, travel and

compete. For their willingness to accept and support my athletic pursuits, I am grateful.

My experiences as a student-athlete with a disability have and will continue to have an impact on my understanding of disability from the perspective of an occupational therapist and as person living with a disability. When I sustained a spinal cord injury I experienced loss, but doors of opportunity also were opened. I was able to continue to pursue competitive athletics at the elite level, and also gain insights useful to my choice of career. I am a firm believer in promoting the abilities of people with disabilities, and for me, wheelchair athletics has been a great vehicle to accomplish this goal. ●

## The Honorable Continuum

by Ruth Bebermeyer

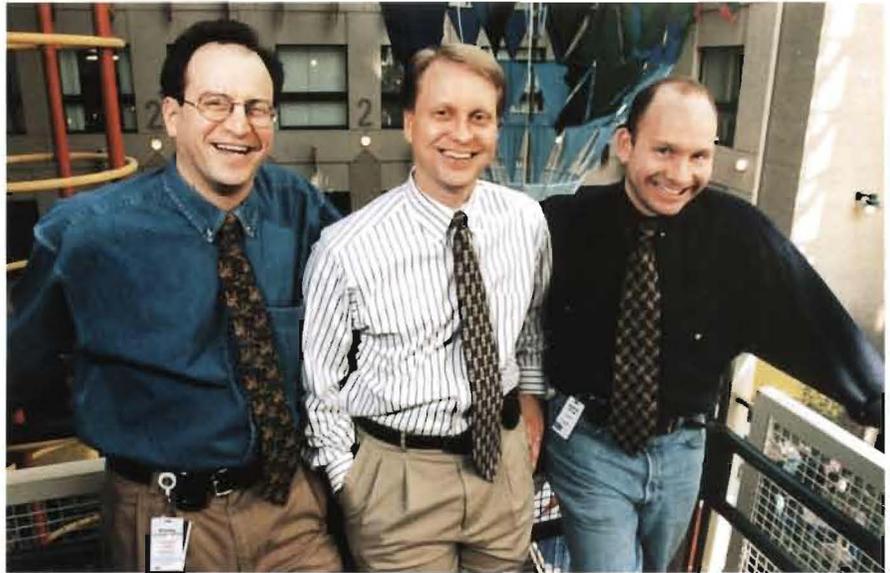
“THE Honorable Continuum” is a series of profiles highlighting the accomplishments of some who represent the many who embody the unbroken Washington University School of Medicine tradition of excellence — from emeriti professors to current students, from medical graduates to current and former house staff. This issue focuses on three current fellows at the School of Medicine.

### The Terrific Trio

Pediatric residency director, James P. Keating, MD, who dubbed them “the terrific trio,” says of the three friends: “They provided that core of leadership, inspiration and hard work without which residency could be just another job... they have the spark and the brains and they just did it.”

Brad Schlaggar, Luke Bruns and Andrew White, who now are fellows in pediatric neurology, pediatric cardiology and pediatric immunology and rheumatology, respectively, continue to infuse their scientific and medical achievements with purpose, humanity and humor. Their friendship was cemented early in their residencies as they combined their musical and dramatic talents to produce the show for the annual residents’ holiday party. Their leadership soon extended into more serious enterprises.

Bradley L. Schlaggar, MD, PhD ’94, earned his bachelor of science degree *magna cum laude* in neural science in 1986 at Brown University, where he also acted in drama department productions. He then entered the Medical Scientist Training Program at Washington University. When his mentor,



*The Terrific Trio, from left, Bradley Schlaggar, Luke Bruns and Andrew White, work together and play together as physicians, friends, musicians and advocates for children.*

Dennis D.M. O’Leary, PhD, moved to the Salk Institute in California, Schlaggar spent two years as a research assistant in the molecular neurobiology laboratory there completing his thesis. His earliest publications have been described as analogous to hitting grand slams in one’s first two at-bats in the major leagues. The first paper not only appeared in *Science* in 1991, but also provided the cover illustration for the journal; his second article appeared in *Nature* in 1993. Nominated by peers, he won the Wendel Krieg Cortical Scholars Award for graduate students from an international pool of candidates. His current research is with Steven E. Petersen, PhD, professor of anatomy and neurobiology, neurology and radiology. They use functional MRI to study how infants who endure perinatal strokes develop language and motor function, despite substantial brain injury that would devastate an adult.

Schlaggar shares his mother’s love of teaching (she developed a program for gifted education in the Chicago Public Schools), which has been part of his academic life since he was a teaching assistant at Brown. At Washington University, he tutored in the neurobiology course and was an instructor in cell biology in the Minority Student Prematriculation Program, which he also coordinated. For two years, he directed the Neural Science Graduate Student Seminar Series. In 1998, he received the Outstanding Fellow Teacher Award at St. Louis Children’s Hospital. He now lectures for the Introduction to Clinical Medicine (Pediatrics) course.

Luke A. Bruns, MD ’94, comes from a medical family — his father is a family practice physician and his two older brothers are an internist and an otolaryngologist. He earned his bachelor of science degree in biology *summa cum laude* with a

minor in religious studies at Indiana University in 1990. Even before he graduated from the School of Medicine, he was nicknamed "Skywalker" by appreciative nurses who recognized his intellect and sensitivity to young patients and their parents. He received an award for excellence from the St. Louis Pediatric Society in 1994 and is a member of Phi Beta Kappa and Alpha Omega Alpha honoraries. He spent his fourth year of residency at St. Louis Children's Hospital as chief resident. He also served as a member of the Liaison Committee on Medical Education subcommittee on graduate medical education.

Andrew White, MD, HS, was awarded a prestigious summer research fellowship at Woods Hole Oceanographic Laboratory during undergraduate school at Brandeis University, where he earned his bachelor of arts degree in chemistry *cum laude* in 1986. After teaching high school chemistry for a year, he went to the University of Chicago, where he received his master's degree in chemistry in 1989. His pursuit of a PhD was diverted by a laboratory explosion that required hospitalization for temporary blindness and second-degree burns over 27 percent of his body. It was then that he decided it might be prudent to find a "safer career" in medicine (his brother is a urologist and his sister a dentist). While waiting for an opportunity to apply to medical schools, he worked at the national headquarters of the Stanley H. Kaplan organization in New York, producing written and audiovisual materials to prepare students to take the medical school entrance exam (MCAT). He earned his MD from the University of Texas Southwestern Medical School in 1994, then came to St. Louis Children's Hospital for residency.

White remembers vividly the incident that led him into pediatrics. Working at Parkland

Hospital's emergency room in Dallas during medical school, he was recruited to stitch a cut over the eye of a 3-year-old girl who had been injured. He says she was the first patient who thanked him (and the only one who made the comment that convinced him that pediatrics was his field: "You have the biggest nose I've ever seen!")

## Advocates for children

The trio have joined forces in community service and child advocacy activities as well. They expect to continue to work for programs and legislation that affect child health because, "kids are innocent, blameless... they can't speak for themselves."

In cooperation with the American Stop Smoking Intervention Study (ASSIST), Schlaggar and White started a program to alert children to the dangers of tobacco. It won them ASSIST's Community Leadership Award in 1997 and continues to be a success. Twice monthly, groups of 150 middle school students come to St. Louis Children's Hospital for a two-hour program on the effects of smoking. Together, Schlaggar, White and Bruns have worked to ensure continuance of the program. When Schlaggar's neurology residency consumed more than 100 hours a week, White took over presentations. Bruns, as chief resident, integrated responsibility for participating in preventive health education into the pediatric residency so that other residents now teach the sessions.

Having a daughter in day care inspired Bruns to pilot a program to educate workers on how infectious diseases are spread. In 1997, he developed teaching materials and a lecture, "Keeping Kids Healthy in Day Care," that residents present to day care center staffs. Administered through the St. Louis Children's Hospital's advocacy department, the

program continues to grow and is now promoted by the St. Louis Child Day Care Association as a valuable continuing education opportunity.

## Off duty

Away from medicine, Schlaggar enjoys sports, especially basketball, and is an avid reader. He is married to Karen Good, a recent graduate of Washington University's master's program in physical therapy.

Bruns and White compose and perform their own songs, accompanying themselves on guitar. Bruns began as a classical pianist, then studied jazz piano while an undergraduate at Indiana University. He worked part-time as a professional musician both in college and medical school, playing with a band and providing solo dinner music. The birth of his first child ended time for such activity, but he still plays often at home. He and his wife, Karen, an information systems project manager, now have two daughters.

White, the son of a gynecologic oncologist who put himself through medical school playing jazz, is an accomplished flautist. He played piccolo at age 4, switching to the flute when his hands grew big enough. He played saxophone in his father's band and took up bass in college, where he formed two successful rock bands (Occasional Sax and Absolute Zero) and played in the college jazz ensemble. His mother, a nurse turned scuba diving instructor, got him interested in ichthyology. His basement is crowded with tanks of rare tropical fish. Like Bruns, his time is also limited — he and his wife, Hilary Babcock, MD, chief resident in internal medicine, are the parents of 15-month-old twins.

In the future, Schlaggar and Bruns anticipate careers in academic medicine, combining research and clinical activity, while White plans to focus on clinical work. ●

## Art and Emily Stickle: Partners in adventure, business and philanthropy

by Nancy Mays

WHEN St. Louis ophthalmologist Arthur W. Stickle, MD, scheduled cataract surgery more than two decades ago for his patient, Emily Price, he figured it would be a routine procedure. Stickle was one of the city's most prominent ophthalmologists at the time, with seven clinics in the St. Louis area.

But Price wasn't a routine patient at all. By bringing her daughter, also named Emily, to the hospital with her, she put into motion a sweet twist of fate.

"He came right in and started asking me if I rode horses," recalls the younger Emily, who later married Stickle. "And I was crazy about horses — rode all the time. My mother sat there with her mouth wide open. When we left, she said, 'I've been going to that doctor for eight years and I've never so much as seen him smile.'"

Smile, he did — all through a three-year courtship. And, the retired physician says, he's smiled all through their 20-year marriage as well.

"We have had a lot of fun," says Stickle, who is now an assistant professor emeritus at the School of Medicine.

After graduating from the University of Oklahoma Medical School in 1943, Stickle came to the School of Medicine for a fellowship and stayed for his residency. He then joined the clinical faculty, in addition to starting his own general ophthalmology practice with a focus on ocular motility. Before retiring in 1992, Stickle's practice was one of the largest in the area.

Stickle enjoyed a lifelong professional association with the medical school, which he credits with keeping him ahead of the curve in the field's latest advancements.

"I loved the atmosphere around the School of Medicine," he says. "It gave me a buzz teaching the younger residents. I'm happy I did that."

As a sign of his gratitude for the affiliation, Stickle and his wife

ophthalmology, including pediatric ophthalmology. He was also the first to teach about the business side of being a physician; about how to run an office and see patients efficiently. Now, of course, it's done all the time, but it wasn't then."

While Emily acknowledges her husband was a fan of the 15-hour workday, he also has taught her a great deal about having fun.

Together, the Stickles worked a cattle farm near Belle MO, that in its heyday boasted some 2,000 head of cattle. The farm provided the perfect respite from city life — and an opportunity for Stickle to fly his own plane regularly.

When not flying, the Stickles could be seen riding any of their nine motorcycles. Though Emily couldn't even ride a bicycle when she met her husband, he soon had her commandeering a top-of-the-line Kawasaki down I-70.

But their most treasured leisure time activity was riding horses. With a 22-stable barn on 55 acres in St. Louis County, the Stickles recall many peaceful evenings riding through the woods.

When not embarking on one adventure or another, Emily has been a volunteer in a number of St. Louis organizations, including the Volunteer Service Council (VSC), Girls Inc., the St. Louis Symphony and Dance St. Louis.

Now, the two enjoy an active social life — and each other.

"My favorite thing about retirement," says Stickle, "is that I can devote more time to my dear wife." ●



Art and Emily Stickle have generously supported the Department of Ophthalmology and other programs at the School of Medicine.

endowed the Stickle Pediatric Lectureship in Ophthalmology in 1997. They are also members of the Medical School Eliot Society and will bequeath a large portion of their estate to the Department of Ophthalmology.

Michael A. Kass, MD, interim head of the Department of Ophthalmology and professor, says the Stickles are exceptional supporters of the school, and that Art was a physician and teacher ahead of his time.

"The Stickle's generosity to the department has been extraordinary. Art was also a generous teacher. He taught residents a great deal about

## From the archives... 'It's the pits'

by Ruth Bebermeyer

**A**SK alumni from the '30s, '40s and early '50s about their most memorable, embarrassing or humorous experiences at the School of Medicine and you frequently hear various versions of, "It was the pits!"

There were several instructional "pits" — steeply-tiered amphitheatres where medicine and surgical rounds were conducted by such medical legends as Carl Moore, Barry Wood, "Ernie" Sachs and Evarts Graham. Students recall cowering in fear of being called upon to be interrogated about the patient

case being reviewed. One alumnus says he was the patient on display when he was hospitalized with a classic case of influenza.

Another says, "I was so scared I forgot to put my stethoscope in my ears when I first went into The Pit with Dr. Sachs." Sachs is seldom mentioned without reference to his prominent midriff, with which he habitually pushed students called upon. Anecdotes such as these abound: "I will never forget Dr. Ernie Sachs holding a skull in one hand, asking me anatomical questions, and pushing me around while

I tried to answer."

In spite of such trials, students came to understand Sachs' professed intent to "teach the eye that sees not, the ear that hears not, the hand that feels not."

"One Saturday morning Dr. Sachs invited me to join him on the floor of the amphitheater he had made famous," recalls an alumnus. "Our first patient that morning was a perfectly healthy-appearing young woman who had a

problem eye. Sachs more or less yelled at me, 'Just look! Don't touch, don't talk, just look!'"

"One time Sachs displayed a woman with a swollen abdomen and asked the student what he saw," another alumnus recalls. "The student instinctively put his hands on the women's abdomen. Dr. Sachs slapped him and said, 'What do you see, not what do you feel!' The chastened student went on to teach and says he has told that tale to his own students many times, hoping to instruct them to look before they leap.

Evarts Graham evoked similar awe, although with different methods. One alumnus remembers when he and two classmates early in medical school "were caught woefully unprepared by Dr. Graham's inquisition in The Pit before the upperclassmen, who loved to watch the three of us squirm." Another says he will never forget misspelling the word "aspirin" on the blackboard as he presented a case to Graham at a noon joint conference, and having his general education roundly criticized for the error. Still another remembers Graham lecturing him on proper English for describing an abscess as "odiferous" instead of "odoriferous."

Robert A. Moore triggered one student's most frightening moment by "peering over the top of his glasses from down in The Pit and informing us that anyone he felt would not be a good enough doctor to care for his son on the battlefield would not pass pathology." The student passed.

Rebuilding and renovation have long since replaced the notorious Pits, but vivid memories linger. ●



The Washington University School of Medicine Class of 1944 pays close attention to discussion of a surgical case. The photo, provided by Virgil Loeb Jr., MD '44, appeared in the St. Louis Post-Dispatch in 1943.

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62	6.8%
64	6.9%
66	7.1%
68	7.3%
70	7.5%
72	7.7%
74	8.0%
76	8.3%
78	8.7%
80	9.2%
82	9.6%
84	10.2%
86	10.8%
88	11.4%
90	12.0%

### TWO LIFE

**Ages**                      **Rate**

60 & 60	6.4%
60 & 65	6.4%
65 & 65	6.6%
65 & 70	6.7%
70 & 70	6.8%
70 & 75	7.0%
75 & 75	7.3%
75 & 80	7.5%
80 & 80	8.0%
80 & 85	8.4%
85 & 85	9.0%

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## Dan and Betty Viehmann: Couple shares enthusiasm for living and giving

by Kleila Carlson

**T**HE St. Louis home of Dan and Betty Viehmann is a treasure trove of their travels to such faraway places as China, Europe, Indonesia, Japan, Philippines, Russia and Scandinavia — all because a 1986 trip to Hong Kong forever changed their lives.

The two flew to Hong Kong on the same plane, although they didn't know it at the time. Betty, a widow, was traveling with a woman friend; Dan, whose spouse also had died, was with a group.

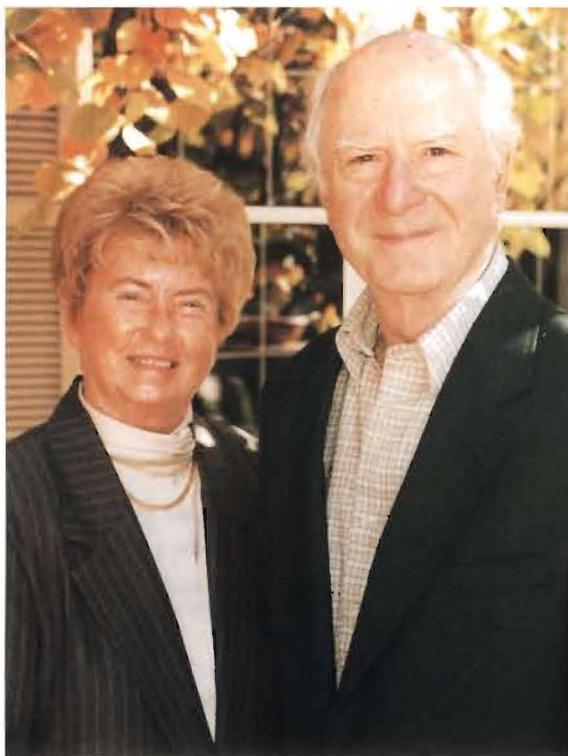
The two met in the lobby of the hotel at which they both were staying. Although different interests steered them in different directions, they ran into each other several times during their two-week stay before finally sitting down to get acquainted. The next day, Betty left.

"I got her name before she left," says Dan, who lived in Belleville IL at the time. "But we didn't see each other again until I got home. I had videotaped the entire trip and I had taken a photo of her, too. I had to show her my pictures, of course, so I came over here for our first date. I felt like a teenager."

"The rest is history, as they say," Betty adds.

Not only do the two share a love of travel — they have returned to Hong Kong nearly every year since they met — but they share other commonalities as well. Like Dan, Betty's first husband was a longtime employee of Southwestern Bell. Dan worked for the company for 37 years, retiring as a construction manager about eight years ago. And they both have longevity in their genes — Dan's mother lived to

be 96 and Betty's mother is going strong at 90. Both of their spouses died as a result of cancer, and philanthropy is an important part of their lives. The Viehmanns, who have long supported local charitable causes, have bequeathed their entire estate to the School of Medicine.



*St. Louisans Dan and Betty Viehmann support School of Medicine programs so that others may benefit.*

The experience of losing a spouse to cancer is, in part, what drew them to support School of Medicine programs in cancer research and orthopaedic surgery.

"We have been fortunate," says Betty. "We have been through illness ourselves and with our parents and former spouses, but we are able to do so many things."

The couple was introduced to the university through their

neighbors, Alvin and Leadora Extein, both of whom are Washington University alumni.

"It's a way for us to give something back," says Betty. "Giving a gift that will be put to good use just makes sense. And we know that by giving to the School of Medicine, we will be helping others."

"After we met with Dr. (Richard) Gelberman, we were so impressed with him and his management of the Department of Orthopaedic Surgery that we decided to designate our gift in that area," says Dan.

Richard H. Gelberman, MD, Fred C. Reynolds Professor of Orthopaedic Surgery and head of the department, says support like that from the Viehmanns will enable the department to achieve its goal of becoming the premier orthopaedic department in the country.

"I have the highest level of respect for the Viehmanns — truly remarkable individuals and supporters of improvements in health care," says Gelberman. "Their foresight and their thoughtful support of orthopaedic surgery will help enable our department to achieve its goals of recruiting and maintaining the most outstanding clinicians and researchers at Washington University."

William A. Peck, MD, executive vice chancellor for medical affairs and dean of the School of Medicine, says, "Dan and Betty approach life with such enthusiasm. Thanks to their generosity, many individuals who one day might have suffered from cancer or orthopaedic problems will have the opportunity to live life with equal enthusiasm." ●

**20s**

**Carl A. Rosenbaum, MD '27**, a retired general surgeon was honored in November by the board of trustees at the University of Arkansas as the oldest living former board member. Rosenbaum earned his undergraduate degree there and served on the board of trustees in the 1950s. Rosenbaum, who will be 100 on May 19, was presented with a Razorback jacket and cap. Following his graduation from the School of Medicine, Rosenbaum married Washington University alumna Mildred Obermiller and moved to Little Rock. He was on the surgical staff at the University of Arkansas Medical Center for 25 years. He started seven tumor diagnostic clinics across the state and in 1945 formed the Arkansas Cancer Commission, serving as its first chairman.

**30s**

**Marion J. Dakin, MD '38**, enjoyed a two-week safari in East Africa with his four children in August. He lives in New Smyrna FL.

**40s**

**Renate Vambery, OT '40**, remains active in a retirement community in Chicago, serving on three committees on the residents' council.

**C. Read Boles, MD '43**, was named an honor member of the St. Louis Metropolitan Medical Society in January for his patient advocacy and service to the profession, community and medical education. A retired pediatrician and associate professor emeritus of clinical pediatrics at Washington University School of Medicine, he remains active in the Missouri Chapter of the American Academy of Pediatrics, of which he is a past-president.

**Joyce Davis, MD, HS '48**, retired as head of the Department of Pathology and Laboratory Medicine at Texas A&M University in 1990.

She and her husband, Phil, have been married nearly 53 years. They have four children; two teachers and two physicians. The Davises enjoy travel, gardening, reading and family, including seven grandchildren.

**Ray Lyle, MD '49**, challenges his classmates to appear in large numbers for their 50th reunion in May 1999.

**50s**

**Zoe Winkler Braner, NU '50**, retired four years ago after more than 40 years of nursing. She enjoys retirement and looks forward to a 50th reunion with classmates in 2000. She and her husband, an attorney, have three grown children and seven granddaughters.

**Eugene A. Foster, MD '51**, was the lead author of an article in the Nov. 5, 1998, issue of *Nature* reporting DNA evidence supporting the contention that Thomas Jefferson fathered a child with one of his slaves.

**Merlin J. Kilbury Jr., MD, HS '51-'53**, has retired in Little Rock AR.

**Jessie L. Ternberg, PhD, MD '53**, professor emeritus of surgery and pediatrics at Washington University, was named an honor member of the St. Louis Metropolitan Medical Society. Ternberg retired in 1998 following an illustrious career that included 18 years as pediatric surgeon-in-chief and director of the division of pediatric surgery at St. Louis Children's Hospital. She was the first woman resident and chief resident in surgery at Barnes Hospital, the first woman surgeon on the faculty at Washington University, and the first woman president of the St. Louis Surgical Society. Her many honors include an honorary degree from the University of Missouri at St. Louis and the *St. Louis Globe-Democrat* Woman of Achievement Award.

**Ulrich B. Jacobsohn, MD '54**, is retiring after 27 years serving the

State of Maine. He has been medical director of the Maine Mental Health Department and state forensic director.

**Noble T. Macfarlane, MD, HS '54-'56**, is retired from the Lexington Clinic, but still serves on the admissions committee for the University of Kentucky Medical School. He also is involved with pediatrics, as the Macfarlanes travel often to visit their 11 grandchildren who live everywhere from San Francisco to Boston.

**David L. Edwards, MD '55**, writes that his recent activities since retirement include becoming a vocal spokesman for the medicinal marijuana initiative (I-692) which was approved by voters in Washington State last November, along with similar initiatives in five other western states and Washington, DC.

**Donald H. Tilson Jr., MD '55**, of Vancouver WA writes that he "is still working everyday but only doing minor outpatient trauma and occupational medicine — no surgery since 1986, and happy with the decision to not be 'an old man in greens.'"

**Patricia Melechen, OT '56**, and husband Norman of St. Louis enjoyed their first "Dialysis Cruise" on the Eastern Caribbean in December 1998.

**Harold Stern, MD, HS '58**, of Woodbridge CT retired as a thoracic surgeon and is now a part-time surveyor for the Joint Commission on Accreditation. In his spare time he plays golf and skis.

**Albert Rhoton Jr., MD '59**, has been honored with the establishment of a \$4 million endowed professorship in his name at the University of Florida in Gainesville. The Albert Rhoton MD Chairman's Professorship in Neurosurgery represents the accumulation of \$2 million in gifts from neurosurgeons who trained under Rhoton, medical-surgical colleagues and staff at UF and from around the world, friends,

family and former patients. The university qualifies for a \$2 million match from Florida's Major Gifts Trust Fund to create the \$4 million endowment. The donations, kept secret for more than three years, were announced Jan. 9 at a banquet in Gainesville celebrating Rhoton's 35 years of achievements to improve the accuracy and safety of neurosurgery and as a teacher of new generations of neurosurgeons. Such accomplishments have won him the highest honors in his field, including the Harvey Cushing Medal, awarded in 1998, by the American Association of Neurological Surgeons.

### 60s

**Marjorie Moore, PT '62**, retired from pediatric PT in 1995 and is now a Nikken independent distributor living in Boca Grande FL December through April with husband Jack Moore.

**Melvin Dace, MD '62**, was assistant chief medical officer at the 1996 Olympics. Since then he has been chief of medical operations for the University of Florida Athletic Association.

**Peggy Dunner, OT '64**, no longer does occupational therapy. She now has an antique jewelry business and is active on the web. She lives in Mercer Island WA.

**Martin B. Harthcock, MD, HS '65**, was a volunteer for two months last summer for the Alaskan Park Department. He retired in 1989 and enjoyed three months traveling in the Orient in 1996. The Harthcocks live in Raymond MS.

**M. Alan Permutt, MD '65**, directs the Diabetes Research and Training Center at Washington University School of Medicine.

**Michael B. Strope, DMD '66**, returned to the University of Texas Southwestern Medical Center in Dallas in 1995 as a cardiologist specializing in congestive heart failure-cardiac transplantation. His

family now includes spouse Laurie and two children, Clayton and Rachel.

**Gerald B. Kirschner, OT '69**, has retired as rehabilitation coordinator from the Veterans Association Medical Center in Asheville NC. He was chief of occupational therapy at the VAMC before becoming coordinator. Presently he is doing home health for Interim Healthcare.

### 70s

**Bruce Fisher, MD '70**, works full-time at Muhlenberg Regional Medical Center in Plainfield NJ, and teaches at the University of Medicine and Dentistry of New Jersey-Robert Wood Johnson Medical School. In May 1998 he was selected by students and faculty to receive the first annual NBI Healthcare Foundation Humanism in Medicine Award, given for being an exemplary model for students and colleagues by consistently demonstrating compassion and empathy in the delivery of care to patients, and for administering excellent scientific clinical care, showing respect for the patient's viewpoint and sensitivity to the patient's psychological well-being and adhering to professional ethical standards. The NBI Healthcare Foundation is a new organization that promotes humanism and compassion in the delivery of medical care.

**Lisa M. Dunkle, MD, HS '72-'76**, is executive director, antiviral clinical research, Bristol-Myers Squibb in Connecticut.

**J. Larry Read, HA '74**, is the new president and chief operating officer of University Health Care System in Augusta GA.

**Lawrence E. Blanchard III, MD '76**, assumed the presidency of the 6,000-member Medical Society of Virginia on Nov. 1, 1998. He practices with Dermatology Associates of Richmond P.C., where he has been active with the Richmond Academy of Medicine,

The Richmond Area Business Group on Health and the Richmond Medical Business Coalition. He and his wife, Vickie, have a son, David, 21, and a daughter, Berkeley, 16.

**Craig W. Jones, HA '76**, assumed a new position in November 1998 as president of the Oklahoma Hospital Association.

**Karen D. Summers, MD '76**, of Atlanta, became engaged to Jeffrey Finkel in December. They plan to be married this year.

**John B. Schweitzer, MD '78, HS '78-'85**, is a professor and chairman of the Department of Pathology at the Quillen College of Medicine, East Tennessee State University. The Schweitzers (wife Janice and three children, John, Kathleen and Eric) moved to Johnson City in February.

**Daniel C. Weaver, MD '79**, is the author of an article, "Beyond the Glass," that appeared in the September 1998 issue of *Discover*. He lives in Jasper IN.

### 80s

**Myron Tanenbaum, MD '81**, practices full-time eye plastic surgery with a part-time clinical appointment at the University of Miami School of Medicine.

**Brian Organ, MD '81**, is in private practice in Atlanta and would like to hear from classmates. He has three children.

**James McDonald, MD, HS '82**, was recently elected moderator of the Board of Southwest Regional Medical Center in Little Rock AR.

**Bryan Hoynak, MD '82**, became chair of the Department of Emergency Medicine at the Newark Beth Israel Hospital in Newark NY on July 1, 1998. He also directs the residency program in Emergency Medicine, a program affiliated with the Mt. Sinai School of Medicine in New York City. The program is jointly accredited by the RRC and the AOA for 12 positions per year and currently has 33 residents who

rotate through Newark Beth Israel, a 600-bed teaching hospital, and three other local hospitals in northern New Jersey.

**Gary Chun MD '84**, writes from San Diego: "Just as in school, I'm cramming again. This time the goal is to complete my third original musical play for Christian Youth Theater in time for auditions next month. At least this beats learning neuroanatomy."

**Alfred Hargrave, HA '84**, was promoted Sept. 1, 1998, to administrator of Baptist Medical Center-Downtown in Montgomery AL.

**Joan Kneedler, OT '84**, is a pediatric OT working for J.D. McCarty Center in Norman OK area schools, doing early intervention and after-school therapy for children with developmental disabilities.

**Michael B. Kastan, MD '84**, moved to Memphis to become chair of the Department of Hematology-Oncology at St. Jude's Children's Research Hospital. He and wife Kathy and three sons enjoy their new home.

**M. Kaya Sila, MD '84**, is assistant professor in the Department of Anesthesiology at St. Louis University, director of Acute Pain Management Services and of Chronic Pain Management for St. Louis University Hospital.

**Joseph Awad, MD '85, HS '88**, is associate professor of medicine and pharmacology and course director for medical student pharmacology at Vanderbilt University in Nashville TN. He is medical director of liver transplantation at the Nashville VAMC. He and wife Jane Gilliam, formerly a nurse at Barnes Hospital, have two children, Peter, 5, and Sarah Jane, 3. He still plays trombone in the local version of the "Hot Docs," called "Sound Therapy."

**Laura Roach, PT '85**, owns an outpatient physical therapy clinic in Effingham IL.

**Marcie Glicksman, PhD '86**, works at DuPont Pharmaceuticals in research, trying to identify new lead molecules for new drugs. She lives in Swarthmore PA with her husband, a science writer, and three wonderful children (ages 2, 7 $\frac{1}{2}$ , and 9). She welcomes e-mail at [marcie.a.glicksman@dupontpharma.com](mailto:marcie.a.glicksman@dupontpharma.com).

**Melissa S. Cubitt, PT '86**, works at a back and neck outpatient clinic in Flint MI and looks forward to a May 1, 1999, wedding.

**Lynda Fuller Peters, PT '86**, and husband Jesse Peters welcomed daughter Elena Christine, born Feb. 23, 1998.

**Jayne Fleck-Pool, PT '87**, and Ray Pool had a baby girl, Kaylie Ann, July 12, 1998. Jayne is vice president of clinical services for NovaCare Outpatient Rehabilitation in King of Prussia PA.

**Sondra Siegel, PT '87**, is on the faculty at Husson College in Bangor ME, where she is responsible for teaching the neuro component in the physical therapy curriculum.

**Glen Reznikoff, MD '89**, wife Kelly and son Ethan have moved into a new home in Easton CT. He has moved into a new practice of medical oncology in Fairfield CT.

**Louis V. Smith, PT '89**, is a captain in the U.S. Air Force based northeast of Cambridge, England, at Lakenheath Base.

### 90s

**Leah Amir, HA '90**, is executive director for the Institute for Quality Resource Management in St. Louis. She is married to Jake Amir, president of Data Management Consultants, Inc.

**Jeff Grills, MD '90**, works with a six-member pediatric group in Joplin MO. He and Heather have two children, Christopher, 7, and Maggie, 3. They are all very busy; he still writes and recently had a story published in a Canadian magazine.

**Deborah Veis Novack, MD '91**, writes that her family has grown again. Benjamin, born Sept. 18, 1998, joined brother Joshua, born Dec. 18, 1995. Deborah is board-certified in anatomic pathology after residency and fellowship at Barnes-Jewish Hospital, where she is now doing research.

**Joe Graziano, PT '91**, is director of inpatient, outpatient and home health rehab services at Jefferson General Hospital. He lives in Chimaquam WA.

**Nancy Scullion Brennan, PT '93**, lives in Oak Park IL with her husband and two children, Caleb, 3, and Ella, four months. She works part-time for a school district's early childhood program.

**Angela Cantrell, PT '92**, reports the birth of their second child, Seth Andrew, on Nov. 12, 1998.

**Greg Gorman, MD '97**, completed his military pediatrics internship at Walter Reed Army Hospital in Washington, DC. He is now at Camp Lejeune NC serving as a medical officer with the U.S. Marine Corps. Last October, he worked with humanitarian relief operations off the coasts of Puerto Rico, the Dominican Republic and Haiti.

**Susan Culican, MD, PhD '98**, and **John R. Pruett Jr. (MD, PhD expected 2000)** gave birth to a son, Jack, on Oct. 22, 1998. Susan is completing a preliminary year of internal medicine at Barnes-Jewish Hospital and will then begin a residency in ophthalmology at Washington University.

**Mark S. Cohen, MD '98**, received the Association for Academic Surgery Student Research Award and is presently working on his general surgery residency at Barnes-Jewish Hospital in St. Louis. He and his wife, Erica Person, would like to hear from former classmates at [cohenm@msnotes.wustl.edu](mailto:cohenm@msnotes.wustl.edu).

**IN MEMORY**

**Katherine Bain, MD '25**, died Jan. 10, 1999, at a nursing home in Washington, DC. She was 101. She was the only woman in the Class of 1925. A pediatrician, she practiced in St. Louis with her brother-in-law, the late Park J. White, until 1940, when she went to Washington, where she spent the remainder of her career in government service. She worked for the U.S. Department of Labor and for the Department of Health, Education and Welfare where, in the 1960s, she held positions dealing with international health concerns. She was a tireless advocate of improved pediatric care both in the United States and abroad. In 1993, Washington University School of Medicine presented her with the Aphrodite Jannopaulo Hofsommer Award.

**Melvin J.H. Tess, MD '30**, died of a heart attack on Oct. 29, 1998, at age 91. He practiced internal medicine, specializing in pulmonary diseases, in St. Louis for 42 years. In the 1960s he served as commissioner for the St. Louis Health Department, and he was a former board member of the Eastern Missouri Chapter of the American Lung Association. Survivors include two sons.

**Dora Gold Slater, NU '30**, died in Houston on May 27, 1998, at age 91. She received her diploma in nursing from Washington University and attended night school for 10 years to earn a bachelor's degree with honors from St. Louis University. She was a 30-year employee of the American Red Cross and founder of the St. Louis Blood Bank. She taught at both Washington University and at St. Louis University. She was a pianist, a couturiere, antique connoisseur, aesthetician, sports fan and humorist.

**Benjamin Allen, MD '32**, died Dec. 27, 1998, at his home in Westport CT of complications from

asthma. He had practiced otolaryngology in Westport and Norwalk since 1956.

**Brig. Gen. Sheldon S.**

**Brownnton, MD '33**, of LaGrande OR died Nov. 8, 1997, at 91. He had a career in aerospace medicine. He was buried with full honors at Arlington National Cemetery in Washington, D.C.

**Jean F. Rogier, MD '34, MPH** of Mason City IL died Dec. 23, 1998, in Fullerton CA after a brief illness. His career in public health began as a municipal physician to the Island of St. Croix under the auspices of the Department of the Interior. In 1941 he joined Pan American Airways as medical officer on the ferry route established across Africa to the Middle and Far East. He was commissioned into the U.S. Army in 1943 and assigned to the Division of Health and Sanitation, Institute of Inter-American Affairs, working in Brazil and Paraguay. When World War II ended, he became a civilian public health administrator with the U.S. Foreign Service, and over the next 29 years fulfilled assignments in Paraguay, Colombia, Jordan, Bangladesh and Washington, D.C. Survivors include his wife of 62 years, Verna, a daughter Suzanne, and a son Robert, who currently resides in Jakarta, Indonesia.

**Nathan Kimelman, MD '38**, died in Atlanta on Jan. 19, 1999, at age 86. He was an internist in St. Louis for more than 40 years and was an assistant professor at St. Louis University School of Medicine. He is survived by his wife, Annette, four sons and a daughter.

**Sidney S. Boyers, MD '39**, died in California on Dec. 14, 1998. He is survived by his wife, Shirley, and two sons.

**Frederick S. Whitfield Jr., MD '39**, died in Alabama on Nov. 16, 1998, where he had been a family practitioner prior to retirement.

**Samuel W. Gollub, MD '41**, a

pediatrician for 40 years in St. Louis, died of a heart ailment on Jan. 1, 1999, in Virginia Beach where he had lived after retiring in 1986. He was 82. His wife, Fae Sievers Gollub, and three children survive.

**Wilbur F. Haines, MD '43**, died Jan. 9, 1999, of complications from a stroke. He spent nearly 50 years as a family practitioner and surgeon in Belleville IL. Survivors include his widow, Annamae, two daughters and a son.

**Jay O. Gibson, MD '45**, died of cancer on Dec. 18, 1998, at his home in California. He was a retired surgeon and a founding member and director of the board of Chico Community Memorial Hospital. He is survived by his wife Mary, two sons and two daughters.

**C. Harold Beasley, MD, HS '47-49**, an ophthalmologist and longtime consultant to Alcon Laboratories, died Jan. 5, 1999, at his home in Heber Springs AR at the age of 82. He practiced medical and surgical ophthalmology in Ft. Worth for 30 years and was the first physician in the area to perform corneal transplants. In 1980 he moved to Heber Springs, where he practiced until 1986. He served as a flight surgeon in the U.S. Air Force during World War II. An accomplished airplane pilot for 60 years, he became a member of the United Flying Octogenarians on his 81st birthday. He is survived by his wife, Eleanor, two daughters and one son, Clifford H. Beasley, Jr., MD.

**Adelaide M. Kloepper, NU '50**, died Aug. 21, 1998, in Spartanburg SC. She was a former instructor at the Washington University School of Nursing. She was the daughter of the late Henry Kloepper, MD, and Dorothy Krey Kloepper of St. Louis and is survived by one sister and one brother.

**Alfred Barnett Hathcock, MD '56**, of Fort Smith AR, died Oct. 1, 1998. He practiced orthopaedic and hand surgery for 35 years, the fifth

generation in his family to practice medicine in Arkansas. He had been an associate clinical professor at the University of Arkansas College of Medicine. In addition to his many professional activities, he was active in community organizations, particularly the Boy Scouts, the Fort Smith Symphony Board and his church. He is survived by his wife of 40 years, Barbara Jane Hathcock, a son and a daughter. Memorials may be made to the Westark Boy Scouts of America, Rogers Scout Reservation, 1401 South 31st, Fort Smith 72901, or to The Alfred Barnett Hathcock Series, First United Methodist Church, 200 North 15th St., Fort Smith 72901.

**Marie Alice Brown, NU '64**, died on Oct. 26, 1998, at her home in Bloomington IN at the age of 88. She earned her diploma in nursing from Washington University in 1937, and returned in the '60s to complete a bachelor's and master's degree. A nurse anesthetist, she worked at Barnes Hospital for many years and also taught nursing at St. Louis Community College prior to her retirement in 1975. Survivors include two brothers.

## FACULTY

**Henry Gerard Schwartz, MD**, the August A. Busch Jr. Professor Emeritus and lecturer in neurological surgery at the School of Medicine, died on Dec. 24, 1998, in St. Louis from emphysema. He was 89.

One of this century's most influential figures in his field, Schwartz chaired the Department of Neurological Surgery from 1946 to 1974. Out of the 37 residents he fully trained, 16 went on to direct training programs at other U.S. medical schools. Seven of those have been elected president of the Society of Neurological Surgeons, the leading organization for academic neurosurgeons in North America. Five others are full professors in teaching programs.

In 1996, 60 former neurosurgery residents jointly contributed \$1 million to endow the Edith R. and Henry G. Schwartz Chair in Neurological Surgery. Of the endowed chair, former neurosurgical resident Kenneth R. Smith Jr., MD, now professor and director of the division of neurosurgery at Saint Louis University School of Medicine and a past president of the Society of Neurological Surgeons, says, "This was an outpouring of emotion. The Schwartzes inspired all who went through the program to become great neurosurgeons and great parents."

In 1983, Schwartz's colleagues and former residents established the Henry G. Schwartz lectureship, which is delivered every year at the School of Medicine. The former residents also commissioned a 1974 portrait of Schwartz, which hangs in the Henry G. Schwartz Archives and Rare Book Room on the seventh floor of The Bernard Becker Medical Library. The Schwartzes helped support the library's expansion and provided ongoing support for its Archives and Rare Book Section. They also contributed to the Medical Scholars Loan Program and were Life Members of the Eliot Society.

Schwartz was born in New York City on March 11, 1909. He obtained his bachelor's degree in 1928 from Princeton University, which he entered at age 15. He then earned a medical degree from Johns Hopkins University School of Medicine.

The Schwartzes moved to St. Louis in 1936, when Schwartz became a fellow in neurological surgery at the School of Medicine. During that year, he made the first direct recording in the United States of electrical activity from the human brain. In 1937, he joined the school's faculty as an instructor, performing one of the earliest randomized studies in neurosurgery,

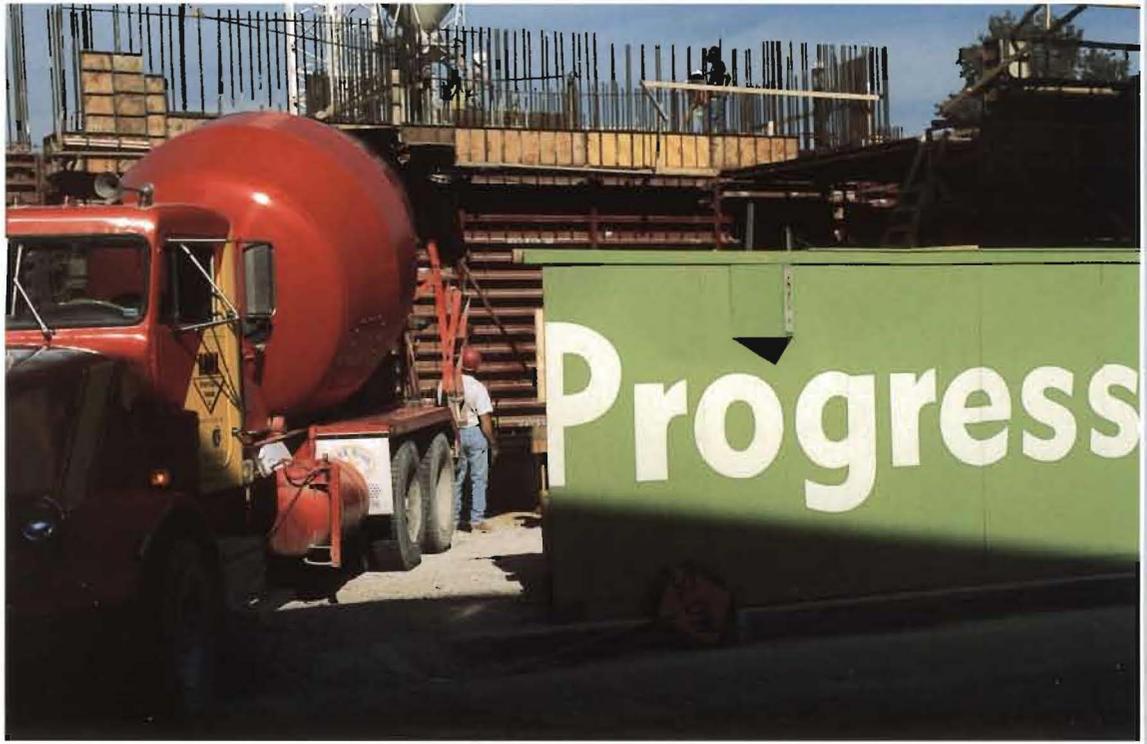
on the effect of lumbar puncture in reducing the pressure inside the skull in severe head injuries.

In addition to his academic appointments, Schwartz was acting surgeon-in-chief at Barnes Hospital from 1965 to 1967 and chief neurosurgeon at Barnes and St. Louis Children's hospitals from 1946 to 1974. He also consulted at St. Louis City Hospital, the Jewish Hospital of St. Louis and Los Alamos Hospital in New Mexico. As neurosurgical consultant to the Army's Surgeon General, he visited Vietnam in 1967.

He became the August A. Busch Jr. Professor in 1970 and took emeritus status in 1984. During this period, he was instrumental in establishing a craniofacial reconstruction program at Washington University Medical Center. He also was one of five scientists who oversaw the Department of Defense's Vietnam Head Injury Study, which showed that prompt surgical treatment of penetrating head wounds is an effective way to restore function.

Schwartz was cremated Dec. 28, and a memorial will be held at 3 p.m., on Saturday, April 17, at Graham Chapel on the Hilltop Campus. Donations to honor Schwartz may be made to the South Side Day Nursery, 2930 Iowa Ave., St. Louis, MO 63118, or to Washington University School of Medicine, Box 8509, 4444 Forest Park Ave., St. Louis, MO 63108.

Survivors include Schwartz's sister, Jean Grottano of New York City, and the Schwartz's three sons: Henry G. Schwartz Jr., of Ladue; Michael R. Schwartz of Birmingham MI; and Richard H. Schwartz, MD, of Salt Lake City. There also are six grandchildren and four great-grandchildren. Schwartz's wife, "Reedie" — Edith Courtenay Robinson, MD, a pediatrician and pediatric psychiatrist — died in 1994. ●



**A Work in Progress:** Medical photographer Bob Boston captures a colorful slice of construction hubbub taking place at the Medical Center. The photo is of the site of the future McDonnell Pediatric Research Building located at the northwest corner of Euclid and Children's Place. For a more in-depth look at the transformation occurring on the Medical Campus, watch for Boston's photo essay appearing in the summer issue of *Outlook*.

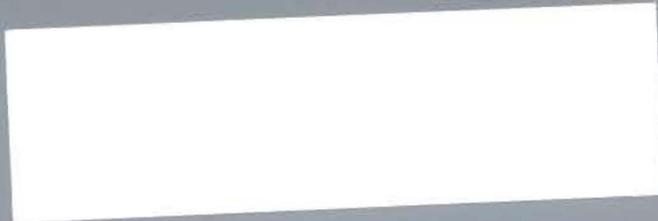


# Washington

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## School of Medicine

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U.S. Department of Education photo service

*A Blessed Event:* Renee Cunningham-Williams, PhD, research instructor in psychiatry at the School of Medicine, left, greets Pope John Paul II during his January visit to St. Louis. With Cunningham-Williams are her one-month-old son, Benjamin E. III, and her husband, Benjamin E. Jr., a St. Louis attorney. The family was one of four St. Louis families to greet the pontiff during a welcoming ceremony at Lambert Airport.