

Washington University School of Medicine

Digital Commons@Becker

Washington University Record

Washington University Publications

7-7-1988

Washington University Record, July 7, 1988

Follow this and additional works at: <https://digitalcommons.wustl.edu/record>

Recommended Citation

Washington University Record, July 7, 1988. Bernard Becker Medical Library Archives.
<https://digitalcommons.wustl.edu/record/449>.

This Article is brought to you for free and open access by the Washington University Publications at Digital Commons@Becker. It has been accepted for inclusion in Washington University Record by an authorized administrator of Digital Commons@Becker. For more information, please contact vanam@wustl.edu.



Discovering design: Some 47 high school juniors and seniors from around the country traveled to St. Louis last month to take part in the two-week Architecture Discovery Program at Washington University. Students attended lectures and seminars taught by University faculty, visited construction sites and outstanding architecture in St. Louis, and took part in daily design classes. Pictured in the design studio are high schoolers Leonard Ray of Signal Mountain, Tenn., and Amy Struckmeyer of Detroit, Mich. The two were working on an assignment to design a vacation home in the Mediterranean. The program was established by the School of Architecture in 1985.

Star Wars

'It's just bad science,' says physicist about defense system

Crazy Horse wiped out Custer; the Colonials defeated the British; the North Vietnamese thwarted the Americans; and the Afghan mujahedin extended the Russians into the ninth year of their contest.

While these may sound like late-night results of athletic games, they are examples of low-technology underdogs bringing high-technology giants to their knees. Carl Bender, Ph.D., professor of physics, extends the analogy to the eventual Soviet response to the proposed U.S. Strategic Defense Initiative (SDI), commonly known as "Star Wars."

Bender, since 1979 a scientific consultant in pure (nonweapons) physics research at the Los Alamos National Laboratory, frequent lecturer on the SDI and constant critic of the proposal since it was announced in March 1983, says the fatal flaw of Star Wars lies in its disregard for some basic rules of physics. And, he claims, its designers have largely ignored the history of the arms race and human behavior.

"Star Wars as a defensive system is not a case of poor engineering; it's just bad science," Bender says. "The concept relies on the assumption that the Soviet Union's nuclear arsenal will be static, and that we will be able to create new science to make the system work. In fact, the system can be attacked — there are dozens of simple tricks an adversary can put into place that will nullify Star Wars, and the proposed science is not even close to being in existence."

The SDI, as President Reagan outlined it in his famous March 23, 1983, speech to the nation, proposes an umbrella-like defense of lasers, orbiting

satellites and mirrors powered by new computers, computer languages and algorithms for battle management, power stations and rockets, "fully enough technology to at least double the national debt, which already stands at more than two trillion dollars," says Bender. The United States is funding SDI research at approximately \$3.9 billion per year.

The purpose, according to Reagan and SDI backers, is a defense system that will make nuclear weapons "impotent and obsolete," protecting the United States from incoming ballistic missiles launched by an aggressor. The SDI would be ineffective against so-called "stealth" weapons, such as the cruise missile, which moves at low altitude and is capable of evading radar. Cruise missiles, or their equivalent, can be launched on the ground or from nuclear submarines.

The SDI, for all its vaunted capabilities and appeal to the imagination, must overcome some basic tenets of physics to ever become a practical system, Bender says.

"First, consider the fact that the earth is round and has a horizon," he points out. "To track the flight of a missile launched from Siberia hurtling 65 miles in the atmosphere, the Star Wars system has to be deployed 2,000 miles above Alaska to compensate for the stealth effect of the horizon."

Second, there is the principle of conservation of energy. To fuel a satellite that would supply the laser, mirror and computer technology at such an elevation would require tons of chemicals, because, Bender says, if a certain amount of energy is required to

destroy an approaching missile, a like amount of energy must be furnished to the weapon.

Many of the SDI satellites would be armed with kinetic energy weapons — rockets or "rail guns," which have linear motors that conceivably could launch metal projectiles. The power required for the satellites to operate such weapons, Bender says, would be the equivalent of hundreds of millions of watts for each rail gun, the amount that is generated by a large power station supplying energy to a city of several million.

But it is lasers — very intense light beams — that are the bulwark of the SDI. Lasers and particle beams are called directed energy weapons. Particle beams are intense beams of atomic particles that, like lasers, are intended in the Star Wars plan to disable the Russian rockets carrying nuclear warheads. The proposed armada of lasers that would theoretically intercept an offensive missile include ultraviolet, infrared and X-ray lasers. The most powerful laser known today, according to an assessment of directed energy weapons by the American Physical Society, is just one percent as powerful as what is required. The Star Wars system must be able to track and aim at incoming missiles precisely and instantaneously.

"The accuracy required of the lasers would be equivalent to hitting the tip of the Washington Monument to within a few inches while standing on the Statue of Liberty," Bender says. "And humans wouldn't be aiming the lasers; computers would."

Computers are the driving force behind Star Wars. Certain computer

Continued on p. 2

Arts and sciences academy elects three medical faculty

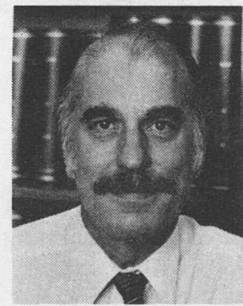
Three faculty members at the School of Medicine have been elected as fellows of the American Academy of Arts and Sciences, one of the nation's oldest societies of leaders in science, scholarship, the arts and public affairs.

The new fellows are Gerald D. Fischbach, M.D., Edison Professor of Neurobiology and head of the Department of Anatomy and Neurobiology; Stuart A. Kornfeld, M.D., professor of biological chemistry and medicine; and Philip W. Majerus, M.D., professor of biological chemistry and medicine.

"These three men are at the forefront of their respective research, and all have been recognized internationally for their contributions to science," said Samuel B. Guze, M.D., vice chancellor for medical affairs at the School of Medicine. "Their election as fellows of the American Academy of Arts and Sciences is clearly appropriate, because it is an honor meant for those with the most outstanding of accomplishments."

Fischbach, director of the Center for Cellular and Molecular Neurobiology, was elected to the academy in recognition of his pioneering studies of the development of embryonic neurons and muscle cells in tissue culture and the formation of functional connections between them.

Fischbach and his associates are investigating events that occur within a few hours after an embryonic nerve cell contacts an embryonic muscle. A cluster of receptors that recognize the transmitter acetylcholine, which is released by the nerve, appears on the surface of the muscle exactly at the point of nerve-muscle contact. Fischbach believes that the nerve instructs the muscle, in some way, to increase the production of new acetylcholine receptors and to insert them at the appropriate place.

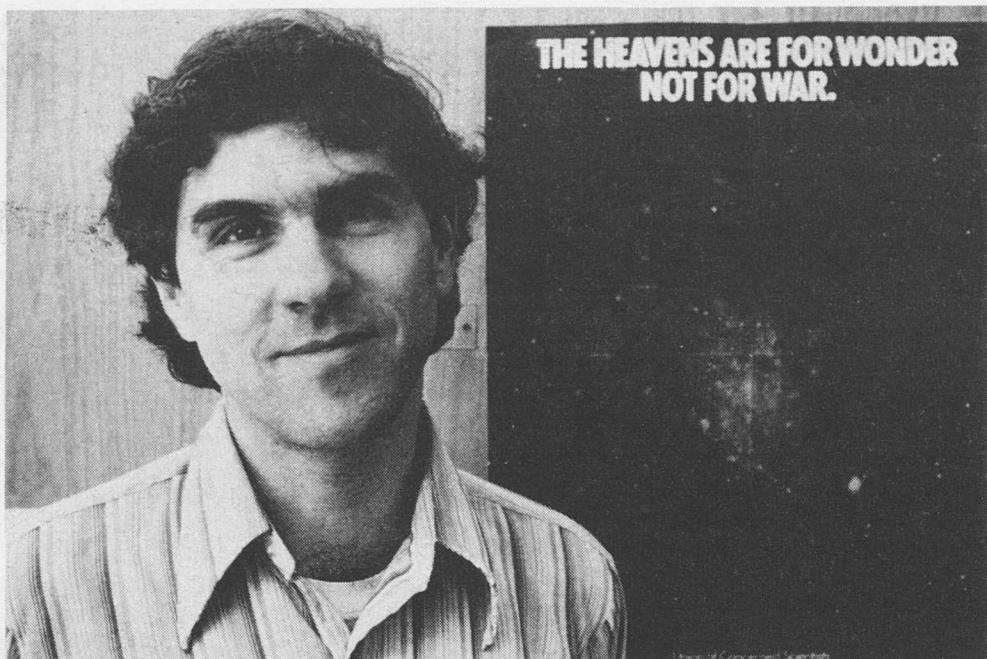


The newly elected fellows of the American Academy of Arts and Sciences are (clockwise from upper left): Gerald D. Fischbach, M.D., Stuart A. Kornfeld, M.D., and Philip W. Majerus, M.D.

His team has isolated a molecule from brain tissue that may be responsible for this instructive or nourishing effect. He is currently purifying larger amounts of the molecule and further characterizing its actions.

This molecule, or class of molecules, may be important not only at the neuromuscular junction, but also at synapses within the brain. Knowledge of its composition will enable Fischbach and his research group to synthesize it and eventually show where and when in the nervous system the molecule is

Continued on p. 6



The message on the poster taped to Carl Bender's office door reflects his attitude on the proposed Star Wars system: The heavens are for wonder, not for war.

Star Wars — continued from p.1

components must factor in the earth's magnetic field and the effects of air and diffraction within the earth's roughly 65-mile-high atmosphere. These elements alter and diffuse lasers and charged particle beams.

Presently, giant, possibly even football-field-sized mirrors are proposed to focus the lasers. The mirrors would direct the laser beams to their intended targets. But, like the Allies dropping tin foil over Germany on bombing runs in World War II to negate the German radar, the Soviet Union could foil the mirrors by simply launching vacuum cleaner bags of dust. Once a particle of dust scratches the mirror, Bender explains, the mirror will absorb the light from the laser that it was supposed to reflect, and melt; the laser, in effect, would destroy its own mirror, committing a sort of high-tech suicide.

"You can't get much more low-tech than dust bags in outer space," Bender says. "But that is all it takes."

The SDI computer system will require a new computer language that might encompass more than 10 million lines of code. In comparison, Bender points out, the Internal Revenue Tax Code is 10 percent as long, and "the tax code is full of loopholes. Indeed, it is the feasibility of the Star Wars computer component that most concerns many scientists."

There already are computer-driven, defensive systems that are miniature versions of Star Wars. Their susceptibility was dramatically illustrated in the 1982 Falkland War when the British destroyer Sheffield, a \$50 million warship, was destroyed by a single Exocet missile an Argentine pilot fired from 20 miles away. The reason for the failure? The Sheffield was carrying Exocet missiles on board and its computerized radar, because of a programming error, could not detect whether the Argentine Exocet was friendly — so the computer let the missile penetrate.

Such potential computer snafus pose many problems for Star Wars, Bender says. A curtailed missile boost time (the amount of time it takes for a missile to launch its warheads), large numbers of decoy intercontinental ballistic missiles, a concealed or altered rocket exhaust plume — all are "off-the-shelf" techniques that could outwit computers.

"No system," the physicist says, "can anticipate all possible combinations of tricks."

Still, a defense that captured the fancy of a segment of the population

and the support of a minority of scientists must have some credibility for the Reagan administration to back it. Proponents argue that few ever dreamed that nuclear power would be harnessed as soon as it was, or that a man would ever walk on the moon. Some have pointed out that the United States has been using Star Wars as a bargaining ploy to bring the Soviet Union to the negotiating table.

Others say that the U.S. computer supremacy is so dominant over the Russians — there is an embargo on U.S. computer goods to Soviet Bloc countries — that it makes sense to use the technology while the U.S. has the edge.

Most scientific and political experts agree that the Soviet Union is leery of U.S. computer superiority, but not because the technology would give the United States an impenetrable defensive shield. The Russians have said repeatedly that they fear the SDI would give the United States a "first-strike" capability. Thus, they believe SDI is a misnomer — it is actually the groundwork for an offensive system. The perspective is not without a shred of truth, Bender observes.

"There is no perfect defensive weapon," he says. "One can always think up a new offense that has not been anticipated. Nuclear weapons strategy is a lot like chess — the only good defense is a good offense. Also, offensive weapons are immensely cheaper than defensive weapons."

Bender cites the United States' deployment of the multiple, independently targetable reentry vehicle (MIRV) to solve the technological challenge the Russians posed in the 1960s with their version of an anti-ballistic missile system (ABM) that was intended to protect Moscow. The United States, wanting to maintain its retaliatory capability over the Soviet ABM, developed the MIRV, which carries multiple warheads and "completely overwhelms the Soviet ABM," Bender says.

Ironically, it was the Russians who actually first experimented with the Star Wars concept. A decade ago, they researched a version of the system and reached the same conclusion that most American scientists have: too expensive, too vulnerable.

"In addition to its many shortcomings, Star Wars does not prevent stealth weapons from reaching U.S. targets," Bender says, "nor will it stop a terrorist toting a basketball-sized nuclear bomb on the back of a bicycle."

Tony Fitzpatrick

Cost savings plan announced to staff during Danforth's talk

"How can we talk so poor when we are so rich?" was a question raised by Chancellor William H. Danforth during an administrative staff meeting held June 10 in Simon Hall auditorium.

More than 400 staff and administrators attended the standing-room only meeting, which was held to explain the University's budgetary situation for the new fiscal year and to introduce a cost savings program that would enlist employees' help in conserving resources.

In reply to his own question, Danforth said, "The answer is that we are indeed a very wealthy institution, but no institution, however wealthy, can spend more than it has — just as no man, even the strongest in the world, can lift himself up."

Referring to the recent ALLIANCE FOR WASHINGTON UNIVERSITY campaign that yielded \$630.5 million, Danforth said, "I have been puzzling over the fact that at the end of the most successful campaign, not just in the history of Washington University but in the history of American higher education, we ... have had to ask for savings out of next year's budgets."

"I have come to the conclusion that with the increase in resources we expect more of ourselves and of our institution than ever before. The expectations have outpaced our resources. Since the budget cannot be expanded infinitely, we will have to think of more creative ways of meeting the challenges before us — doing better with what we have."

Danforth explained that "what we have" may sound like a great amount of money at the University's disposal, but much of the campaign donations are governed by two specific principles: 1.) We can spend gift and grant money only for the purposes specified by the donor;

and 2.) We cannot spend our endowment. We are limited to spending the income from that endowment.

During the meeting, Benjamin S. Sandler, assistant vice chancellor for budget and institutional studies, reviewed the major categories of income and expense for the Hilltop fiscal units. His slide presentation showed that tuition is the most important income source and that salaries and fringe benefits are the largest expenses.

Sandler pointed out that restricted income, funds given by donors and earmarked for a specific purpose (such as scholarships, research projects) does not cover the day-to-day operating costs. The same is true for endowment income.

Sandler said that while tuition supplies much of the operating income for most of the University, tuition cannot continue to rise at its present rate or "we will simply price ourselves out of the markets in which we need to compete successfully ... We therefore need to look for ways to economize with imagination and intelligence."

Gloria W. White, vice chancellor for personnel and affirmative action, said that the recently appointed 10-member Cost Savings Committee will be asking the employees for their input and ideas on conserving resources. White, who is chairperson of the committee, noted that a cost savings incentive program will be launched soon with details on the program forthcoming.

During the meeting, which lasted about one hour and 20 minutes, Danforth, Sandler and White answered questions from the audience.

Printed copies of Danforth's and Sandler's talks are available in the Personnel Office, Room 126, N. Brookings Hall.

Former alumni relations director dies

Winston E. Forrest Jr., 51, alumnus and former director of alumni relations at Washington University from 1964 to 1972, died June 18 of a viral infection at

Lenox Hill Hospital in New York. Forrest, who lived in Scarsdale, N.Y., was vice president for resources of the Planned Parenthood Federation of America.

Since Forrest joined Planned Parenthood in 1976, he was credited with raising \$120 million, most of which went to the organization's education programs. He also served as a consultant to several other nonprofit organizations, including the National Resources Defense Council, Amnesty International, the American Civil Liberties Union and the Sierra Club.

Forrest received a bachelor's degree in English from Washington University in 1959. E.B. McDonald, acting dean of admissions, was Forrest's friend for 31 years, since they were sophomores at Washington. McDonald says, "Winston was considered one of the best fund raisers in the country. He picked only those causes that he thought were worthwhile. He gave of his time without any fanfare, but he was powerfully effective."

From 1972-75, he was president of the American Alumni Council, now the Council for the Advancement and Support of Education.

He is survived by his wife, Donne; his parents, Winston and Irene Forrest of Arlington, Texas; two brothers; a sister; two sons; and a grandson.

RECORD

Editor: Susan Killenberg, 889-5254, Campus Box 1070; P72245SS at WUVMC
Assistant Editor: Fran Hooker, 889-5202, Campus Box 1070; P72245FH at WUVMC
Editor, Medical Record: Joni Westerhouse, 362-8257, Medical School Campus Box 8065; P72245JW at WUVMC
Contributing writers: Debra Bernardo, Joyce Bono, Tony DiMartino, Regina Engelken, Tony Fitzpatrick, King McElroy and Carolyn Sanford
Photographers: Tom Heine, David Kilper, Herb Weitman and Peter Zimmerman
Washington University Record (USPS 600-430; ISSN 0745-2136), Volume 12, Number 34, July 7, 1988. Published weekly during the school year, except school holidays, monthly during June, July and August, by News and Information, Washington University, Box 1070, One Brookings Drive, St. Louis Mo. 63130. Second-class postage paid at St. Louis, Mo.

Address changes and corrections:

Postmaster and non-employees: Send to: Record, Washington University, Box 1070, One Brookings Drive, St. Louis, Mo. 63130.
Hilltop Campus employees: Send to: Personnel Office, Washington University, Box 1184, One Brookings Drive, St. Louis, Mo. 63130.
Medical Campus employees: Send to: Payroll Office, Washington University, Box 8017, 660 S. Euclid, St. Louis, Mo. 63110.

NOTABLES

Mark N. Beorkrem, a first-year graduate student in the Department of Psychology's Organizational Behavior Program, has been selected as a summer fellow in the 1988 United States Air Force Universal Energy Systems Graduate Student Research Program. He is working as a research associate within an Air Force laboratory/center in Phoenix, Ariz. Beorkrem, who is working in organizational diagnostics in Phoenix, was one of 100 graduate students in the country to be selected as a summer fellow in this program.

Barbara A. Bohne, Ph.D., associate research scientist at the Central Institute for the Deaf (CID) and professor of anatomy and physiology in the Department of Speech and Hearing, co-authored a paper with **William Clark**, Ph.D., associate professor of speech and hearing and research scientist at CID, on the "Hazardous Effects of Noise on Hearing." **Ira J. Hirsh**, Ph.D., senior research scientist at CID and Edward Mallinckrodt University Professor of psychology and audiology, presented the paper at the International Conference on Noise Control, held in Beijing. Bohne presented a paper, titled "The Differential Vulnerability of the Apical and Basal Turns of the Cochlea to Excessive Exposure to Noise," at a course on Noise-Induced Injury and Ototoxicology at Johns Hopkins University in Baltimore and at the University of Missouri-Kansas City. She reported on "Aging of the Peripheral Auditory System of the Chinchilla" at the Academy of Research in Otolaryngology meeting in Florida. Bohne was named director of the Division of Basic Research in the Department of Otolaryngology.

Harold A. Ellis, Ph.D., assistant professor of history, read a paper, titled "D'Argenson's *Considerations* Reconsidered: Despotism and the Problem of Political Personality in the Old Regime," at the annual meeting of the Society for French Historical Studies. Ellis also spoke on "Boulainvilliers and His Readers in the Old Regime: The Problem of Modern Despotism" at the annual meeting of the South Central Society for Eighteenth-Century Studies. In July, Cornell University Press will publish Ellis' *Boulainvilliers and the French Monarchy: Aristocratic Politics in Early Eighteenth-Century France*, a full-length study of aristocratic controversy, propaganda and the uses of history in France at the end of Louis XIV's reign.

Ronald G. Evens, M.D., vice chancellor for financial affairs and director of the Mallinckrodt Institute of Radiology, has been appointed as a consultant to the Office of Health Technology Assessment, National Center for Health Services Research and Health Care Technology Assessment, an office of the Federal Department of Health and Human Services. Evens will provide technical, scientific and policy-related advice and support to the center.

Joseph D. Ketner II, acting director of the University's Gallery of Art, presented a paper titled "The Ohio River Valley and the Light of Europe" on a panel with Lynda Hartigan, of the National Museum of American Art, and James O. Horton, of George Washington University. The panel discussion was part of a symposium on "The Life and Works of Robert S. Duncanson" in honor of Cincinnati's Bicentennial. The symposium was held at the Cincinnati Art Museum. Ketner also presented a paper on "Thomas Cole's 'Aqueducts Near Rome' (1832)" at

the 15th annual meeting of the Midwest Art History Society, held at the Walker Art Center in Minneapolis, Minn. In addition, Ketner wrote an article on "The Belmont Murals of Robert S. Duncanson in the Taft Museum," which appeared in the spring issue of the Queen City Heritage Magazine of the Cincinnati Historical Society.

Ronald M. Levin, J.D., professor of law, has been elected chairman of the Washington University Senate Council for the academic year 1988-89.

Robert Paine, M.D., clinical professor of internal medicine and chief of the Department of Medicine at St. Luke's Hospital, Chesterfield, has written a book (five contributors) titled *Generation and Interpretation of the Electrocardiogram*. The book was derived from a series of lectures presented in a senior cardiology elective at the School of Medicine and St. Luke's Hospital. The book gives a complete explanation of the electrophysiology of the heart, has a practice manual for analysis and interpretation of data contained in more than 100 sample ECGs, and gives an introduction to the new technique for computer modeling of the ECG from myocardial cellular events.

Peter Riesenberger, Ph.D., professor of history, has been invited again to participate in a summer institute at the National Humanities Center in Research Triangle Park, N.C. The institute, funded by the NEH and the center, will focus on "Republics, Ancient to Modern." Riesenberger recently chaired a conference on "Responsibility and Integrity in Public Discourse," which was held on campus and was co-sponsored by the University and the Exxon Education Foundation. Speakers at the conference were William Safire; Hodding Carter III; **Thomas F. Eagleton**, University Professor of Public Affairs; and **William H. Gass**, Ph.D., David May Distinguished University Professor in the Humanities. Other participants were faculty from the College of Arts and Sciences, law school and medical school, national and regional newspaper editors, and invited students.

William Merritt Sale, Ph.D., professor of classics and comparative literature and chair of comparative literature, delivered a paper and directed a seminar on "Homeric Troy and the Homeric Formula" on May 10 at the Center for Literary and Cultural Studies at Harvard University.

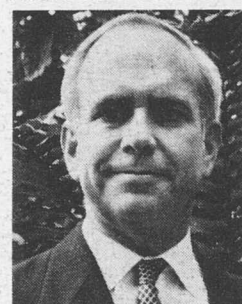
Arthur G. Wirth, Ph.D., professor emeritus of education, delivered the Charles De Garmo Lecture at the meeting of the American Educational Research Association in New Orleans. His lecture was titled "The Violation of People at Work in Schools." Wirth's chapter on "Issues in the Vocational-Liberal Studies Controversy (1900-1917)" appeared in *Education for Work: Background to Policy* (Palmerston, New Zealand, 1988), edited by David Corson.

Have you done something noteworthy?

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

Philosophical Society elects botanist Peter Raven

Peter H. Raven, Ph.D., director of the Missouri Botanical Garden and Engelmann Professor of Botany at Washington University, has been elected to the American Philosophical Society, the oldest learned society in the country. Founded by Benjamin Franklin in 1743, the society



Peter H. Raven

is one of the most prestigious of its kind and recognizes achievement in sciences, letters and the arts.

The Philadelphia-based American Philosophical Society regularly supports research and scholars through a program of grants. It is renowned for the quality of its semi-annual meetings and its publications.

Raven is an internationally known scientist who is widely regarded as an authority on biological diversity, tropical botany and deforestation. His active participation in the world's scientific community includes serving as home secretary of the National Academy of Sciences and director of the World Wildlife Fund-U.S.; as well as membership on the National Geographic Society's Committee on Research and Exploration and on the National Re-

search Council's governing board.

Raven came to St. Louis in 1971 after being named director of the garden and professor of biology at Washington. He had been on the Stanford University faculty since 1962. He was named Washington's Engelmann Professor of Botany in 1975, becoming the fourth botanist to be so honored since the Engelmann chair was established at the University in 1885.

Raven, who is a fellow of the American Academy of Arts and Sciences, received a prestigious MacArthur fellowship in 1985. His other scientific achievements include being named the second recipient of the International Prize for Biology from the Japanese government; a member of The Global 500, an environmental honor roll of the United Nations Environment Programme; and the keynote speaker at the 1987 American Association for the Advancement of Science meeting.

Membership in the American Philosophical Society is limited to about 500 residents representing 30 states, and 125 foreign members representing almost 24 countries. Past members have included George Washington, John Adams, Thomas Jefferson, Alexander Hamilton and Thomas Paine. Of the 525 people who have received the Nobel Prize, 185 have been members of the society.

Area's first graduate program in biotechnology is offered

In response to the need for trained personnel in the growing biotechnology field, Washington University will launch a new master of arts program in that discipline this fall. The Master of Arts Program in Biotechnology will be the only one of its kind in the St. Louis metropolitan area. Late afternoon and evening courses for adult part-time students will be offered.

Through biotechnology, genetic material is manipulated to make or modify products, improve plants or animals, or develop micro-organisms for specific beneficial uses.

"There is a great demand for people who have expertise in biotechnology," says Roy Curtiss III, Ph.D., chairman of the biology department. He is using the diverse approaches of biotechnology to develop vaccines against important diseases of animals and humans. Curtiss says "local corporations, particularly companies like Monsanto, as well as the major research

universities, are searching for employees who can clone and sequence genes, genetically engineer microbes, plants, and animals, and have the skills to produce and recover the products that these engineered organisms produce."

The Washington University 30-credit hour program is sponsored jointly by the Graduate School of Arts and Sciences and University College, the evening division of the Faculty of Arts and Sciences. The program, which will feature specialized areas in microbial, plant, medical and commercial biotechnology, is open to qualified applicants with a bachelor's degree in science, engineering, business or economics.

Ales Prokop, Ph.D., affiliate associate professor of chemical engineering, is coordinator of the program.

Registration begins Aug. 1 and classes start Aug. 31. For details on admission, registration and program costs, call 889-6777.

NEWSMAKERS

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

Your teeth will look and feel better and your dentist will have to scrape less if you use a tartar-control toothpaste, says Thomas Schiff, D.M.D., associate professor of dental medicine, in the April 24 *Chicago Tribune*. Schiff's three-month study showed that volunteers

using tartar-control toothpastes had 30 to 50 percent less tartar buildup than those using regular toothpaste.

The welfare system is once again in the news as the Senate prepares to debate Daniel Moynihan's welfare reform package, says an essay in the May 3 *Modesto Bee* by Mark R. Rank, Ph.D., assistant professor of sociology. Rank believes the real issue is not welfare; it is poverty. He says as long as reform focuses on the outcome of poverty and not on its causes, we will not make any real headway.

MEDICAL RECORD

Deaf education debate: signing vs. the spoken word

To speak or not to speak...that is a question teachers of the deaf have hotly debated for more than a century. Is it better for the deaf to be educated and to communicate through sign language, or through the spoken word?

At Washington University Medical Center's Central Institute for the Deaf (CID), deaf children are taught to speak. And researchers there have compelling new evidence that teaching the deaf to speak — before they learn to sign — helps them to attain their highest educational levels.

In a nationwide study contracted by the National Institutes of Health, CID researchers found that among 100 16- to 17-year-old profoundly deaf adolescents who had been taught speech, average reading scores were a full five grade levels higher than the national average for the deaf, which is about the third grade level. It's the first time data has been collected on such a large sample of orally-educated deaf youth.

"What we found especially interesting is that 30 of the 100 were reading at or above the 10th grade level. That means they were functioning for all practical purposes like normal-hearing adolescents, which is rather outstanding considering the severity of their deafness," says Ann Geers, Ph.D., principal investigator of the study.

Profoundly deaf people, even when fitted with the most powerful hearing aids, cannot understand speech without special training. However, they may be able to hear some sounds.

The CID evaluation of oral education was accompanied by separate but related NIH-funded studies of total communication — a combination of speaking and sign language — carried out by Gallaudet University in Washington, D.C.

Gallaudet researchers measured reading skills in deaf children with deaf parents and those with normal-hearing parents. Researchers at both institutions looked for elements, such as hearing ability, that set good readers apart from those who didn't read well.

Knowledge of the English language was the primary factor influencing the development of reading and writing skills in the sample of orally-educated hearing-impaired adolescents, according to coinvestigator Jean Moog, principal of the school at CID.

Speaking ability key to reading

"The major predictor, the factor we were supposed to ferret out, was what most predicts reading ability," Moog says. "It's not socioeconomic status. It's not hearing loss — within the profound range, if you have a little more hearing, you don't read better than somebody who has less. It's not I.Q. — the very bright students didn't read better than the normal students on the average."

"What appeared to make the most difference was their facility with English: the extent to which they mastered vocabulary, understood syntactic structure and how to form complex sentences, how to write them, how to speak them, and how to understand them when they were spoken."

Study results also showed that it is possible for profoundly deaf persons to develop excellent spoken language skills, according to Moog. She adds that in order to do so, they should have at least average nonverbal intelligence, early educational management, early amplification and auditory stimulation, instruction in spoken language from an early age and no sign language instruc-

tion until spoken language is firmly established.

Oral communication programs such as CID's teach deaf children to communicate by using various hearing devices to maximize the limited hearing capacity present (known cumulatively as residual hearing), reading lips and speaking.

Of the 20,000 profoundly deaf youth under age 21 in the United States, only about 10 percent are currently taught through this method. The majority of students are taught in total communication programs, which teach a combination of speaking and sign language.

Deaf children in total communication programs don't read as well, Geers says, because in many signing programs, deaf children are not given intensive instruction in speech and language, and therefore don't learn English very well. Furthermore, she says, if deaf students are to reach their full potential in the hearing world, they must be taught to speak at an early age, before signing is learned.

Learning to speak before signing

"What we are finding in this large population of oral deaf adolescents is that their English language skills are, for the most part, extraordinarily good. Their oral English language skills — sentence structure, knowledge of vocabulary, discourse skills — are well-developed. I think that's primarily what accounts for their reading skills," Geers says.

To participate in the CID study, teens had to be profoundly deaf and to have been profoundly deaf before they learned language. They had to have been educated in an oral setting only, and to have a normal I.Q. with no other significant educational handicaps.

"We know the students we train at Central Institute for the Deaf achieve higher reading scores than the national average," says Geers. "But in this study we were looking at kids from all over the country, so we didn't really know what to expect."

Results showed that the average child in the study was rated as reading and comprehending paragraphs at the 8th grade level. Deaf students of deaf parents in the Gallaudet study achieved reading levels at mid-sixth grade, and deaf students with hearing parents taught in total communication programs were at high fifth grade level. All scored higher than the national average of third grade, though, which researchers attribute to the fact that these students had been screened to eliminate additional handicaps that could affect reading scores.

As expected in the total communication programs, deaf students of deaf parents fared better than those with hearing parents, probably because deaf parents begin signing fluently with their children during infancy, whereas hearing parents who want to sign must learn a new method of communicating with their child.

But Moog stresses that though students in total communication programs may become proficient at signing, most are not learning to speak well. She bases that on data from this reading study as well as another NIH-sponsored study conducted at CID in which 300 profoundly deaf children — 150 from total communication programs and 150 from oral programs — were tested for spoken English skills.

Results showed that by the age of



At Central Institute for the Deaf (CID), students like 7-year-old Dominic Flumenbaum are taught speech rather than sign language. CID researchers say that students who are taught speech achieve higher reading levels than those who are taught to sign.

8, the spoken language of children in oral programs was 30 to 40 percent better than those educated in total communication programs. In both studies, the children tested were comparable in age, hearing impairment and intelligence.

"The theory of total communication is to teach signing and talking together to give children the benefit of taking information through whatever system suits them. The implication is that they will learn to both sign and talk," says Geers.

"But our studies show that children are not learning to talk and sign together. Some are learning to sign, but they are not learning to talk as well as those in oral programs, and most are not learning to talk well enough to be understood." Furthermore, Geers adds, they are not learning to sign English at any higher level than orally educated deaf children learning to speak English.

Both Geers and Moog agree that using signs and speech can be very helpful for a deaf person to communicate, but they maintain that learning spoken English before signing is crucial.

"There is no evidence that shows a profoundly deaf child can be taught simultaneously to sign and speak and do both well," Moog comments. "There is also no evidence that a child can first become a competent signer and then learn to speak well. However there is evidence that if you become a competent talker, you might later acquire signs if you wanted to be able to use both systems. Everybody that we've ever studied who was competent with both modes, learned to speak first and sign later. Our philosophy is to start with an oral program, and become completely proficient orally before attempting signs," says Moog.

Only 10 percent taught orally

Advocates of total communication have criticized CID's results, saying the reading levels were high because CID tested economically advantaged children whose parents had the money to get them the best education possible. However, according to the Office of Demographic Studies at Gallaudet, of the some 20,000 profoundly deaf children being taught in the United States, only 10 percent of them are taught in spoken language programs, Moog notes. "That in itself reduced the pool from which we had to draw," Moog says.

"We believe there are fewer than

500 children nationwide in the 16- to 17-year-old age group who have been educated exclusively with the oral approach. We tapped a sizeable proportion of the orally educated sample in that age range. There was no reason for our sample to be skewed socioeconomically because we paid all expenses for the testing."

Moog does attribute the small number of children in oral programs partly to financial reasons. "Speaking is extremely hard for a deaf person, and it's hard to do well. It is also expensive to do well. It takes very highly trained teachers to teach deaf children to talk, and I think there are probably not a lot of people who want to finance it."

On the other hand, Geers says, the expense is a concentrated one. The expense is probably equivalent in both methods of teaching. When children are very dependent on sign language, they are either required to stay in special education all the way through adulthood or have an interpreter accompany them in a normal-hearing setting.

Whereas for children who speak, its very expensive on the front end, she says and adds, that after intensive instruction in an oral program over several years the children are then placed in regular classrooms with normal-hearing children.

"Children at CID are taught in small groups with a ratio of one teacher for every four children, and most teachers have master's degrees," says Geers. "So it's very expensive to teach these children, but it's also relatively short term."

Parents begin receiving training with their infants as soon as the deafness is diagnosed, and children begin intensive instruction at the CID school starting at age 3. Some are ready to be mainstreamed by the time they reach first grade, especially if they are diagnosed during infancy and are well-fitted with hearing aids, Geers notes. On the average, children are placed in regular schools after they have finished elementary education.

Participating in a hearing world

Most people are under the misimpression that it is not possible to understand deaf people when they speak, according to Moog. "When the teens in the study were rated through an interview technique developed by Gallaudet, 90 percent of them were rated as being

Continued on p. 6

Stahl awarded MERIT status

Philip D. Stahl, Ph.D., Edward D. Mallinckrodt Jr. Professor and Head of the Department of Cell Biology and Physiology at the School of Medicine, has been honored for his scientific contributions by receiving MERIT status for his latest grant.

The five-year grant, totaling nearly \$700,000, is from the National Institute of Allergy and Infectious Diseases, part of the National Institutes of Health (NIH). MERIT (Method to Extend Research in Time) status provides long-term, uninterrupted financial support to investigators who have demonstrated superior achievement during previous research projects.

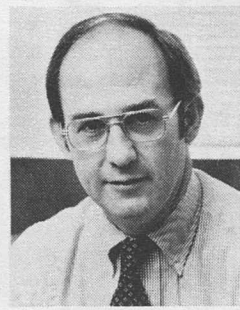
Researchers cannot apply for MERIT status, but are chosen in recognition of their consistent commitment to excellence. Those who receive MERIT status are freed from time-consuming paperwork and other delays associated with grant renewal applications, and may also obtain a three- to five-year extension of their grant, based on an expedited review of work accomplished during the initial period.

"Philip Stahl's work has been tremendously influential in our understanding of the mechanisms by which cells recognize and transport proteins," says Samuel B. Guze, M.D., vice chancellor for medical affairs at the School of Medicine and president of the Washington University Medical Center. "His efforts to decipher the codes involved in handling cell traffic are most deserving of MERIT status."

Stahl's research centers on the mechanisms of protein recognition, transport and degradation in macroph-

ages, cells that help to repair the body and defend it against infection. In 1978, Stahl and his colleagues discovered a new receptor on macrophages, the mannose receptor, that binds sugar-coated proteins as well as certain microorganisms and viruses and transfers them into a cell through a process called endocytosis. Once molecules and/or organisms are selectively taken into the macrophage, they are transferred to digestive bodies within the macrophages called lysosomes, where the organisms are killed and macromolecules are disassembled.

During the next phase of his research, Stahl and his colleagues will



Philip Stahl

use the mannose receptor as a model to investigate the mechanism of endocytosis and receptor-recycling. Receptors that mediate the selective uptake of macromolecules, microorganisms and viruses are present on the cell surface.

After engaging the molecule or microorganism of interest, the receptors are internalized into the cell along with the particle. However, after internalization is complete, the receptors are thought to recycle back to the cell surface where they are reutilized. This is called receptor recycling, and means that a small number of receptors can mediate the uptake of a large number of macromolecules or many microorganisms.

Hruza named director of cutaneous surgery

George J. Hruza, M.D., has been named director of the Cutaneous Surgery Center at the School of Medicine.

Hruza joined the faculty July 1. He comes to St. Louis from the University of Wisconsin Hospital and Clinics in Madison, where he was the Mohs micrographic surgery fellow. He also has served as a research fellow in cutaneous laser surgery at Harvard University Medical School.

Hruza replaces Blake Goslen, M.D., who has accepted a position as director of the Mohs Micrographic Surgery Unit at the University of Pennsylvania.

Cutaneous surgery consists of three components: laser surgery, which can remove unsightly birthmarks; dermatologic procedures, such as dermabrasion for acne scars; and Mohs micrographic surgery, a highly successful treatment for skin cancer.

Developed 40 years ago by Freder-

ick E. Mohs, M.D., at the University of Wisconsin, micrographic surgery involves removing a thin layer of skin, examining it beneath a microscope for cancer cells, and repeating the process until no further evidence of cancer is found. In 1982, Washington University became the first medical center in Missouri to offer the surgery, and in 1986 the School of Medicine established its own unit at Barnes Hospital, a sponsoring institution of the medical center. It is the only unit in Missouri, and one of about 180 units across the country.

Hruza received his medical degree from New York University School of Medicine in 1982. He served an internship in internal medicine at New York Hospital, Cornell University, and a residency in dermatology in the skin and cancer unit at New York University Medical Center.

Hearing aid wearers needed for study

Audiologists at the School of Medicine are asking people who are happy with their hearing aids to volunteer for a study. Researchers are trying to determine the most appropriate amount of amplification needed to compensate for hearing loss.

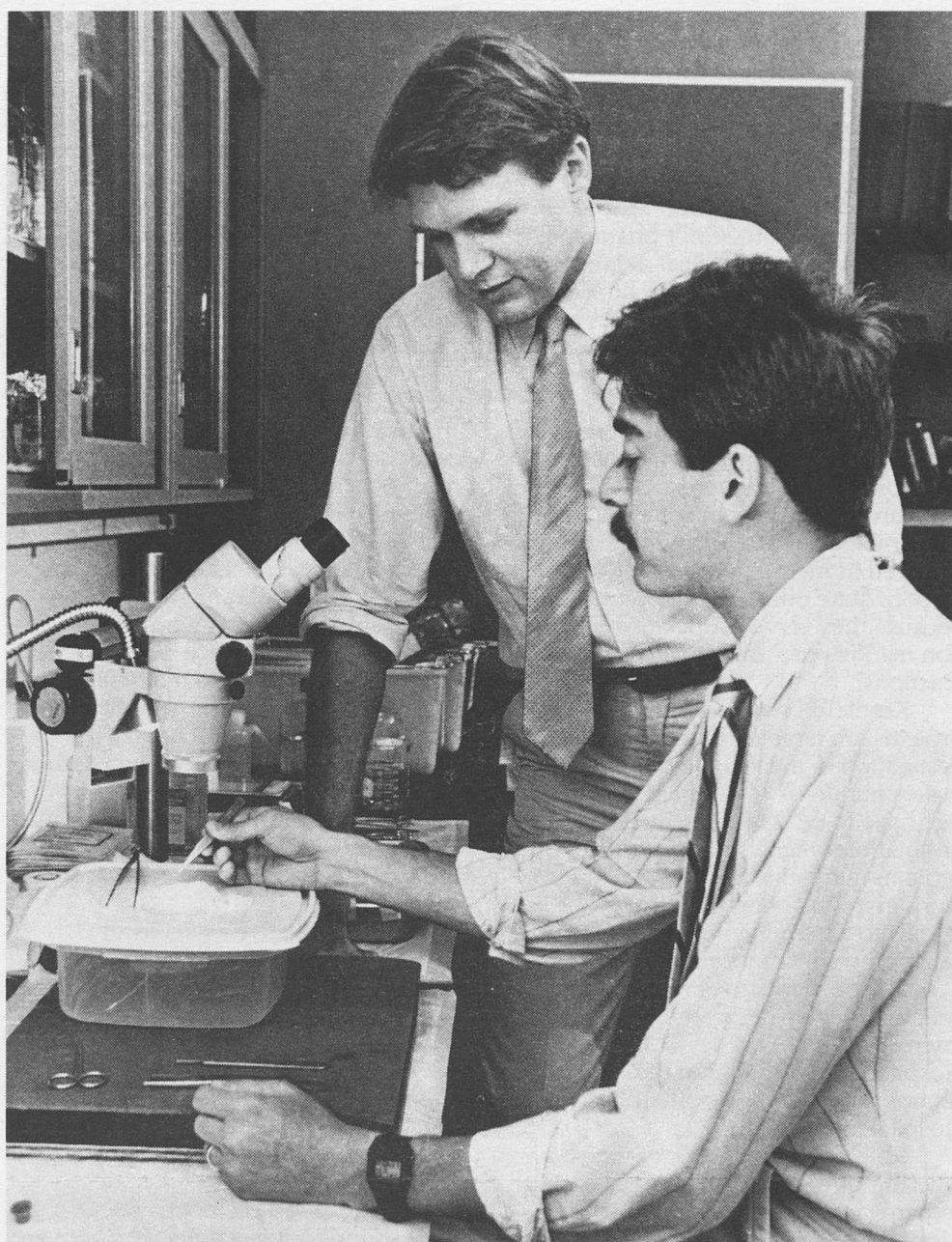
The study will be led by Michael Valente, Ph.D., assistant professor of otolaryngology and director of the adult audiology program. According to Valente, several methods or formulas are now used to measure the amount of volume amplification needed by hearing-impaired individuals. Because hearing aid manufacturers use various modifications of these formulas when they receive prescriptions from audiologists, it is possible for the same prescrip-

tion to be interpreted in different ways by different manufacturers.

By testing hearing aid wearers who are satisfied with the level of sound provided by their hearing aids, audiologists hope to find out which formula provides the most accurate measure of the volume gain actually preferred by the patients.

Volunteers must be 18 years of age or older, with mild to moderately severe sensorineural hearing loss (nerve deafness). They must have successfully worn an in-the-ear hearing aid for at least three months, and must be satisfied with the level of hearing provided by the aid.

All tests will be free of charge. For more information, call 362-7489.



George F. Schreiner, Ph.D. (left), assistant professor of pathology and medicine, and James B. Lefkowitz, M.D., instructor of medicine, eliminated essential fatty acids in the diets of organ-donor rats and found the rats' kidneys could be donated to other rats without the need for immune suppression drugs.

Kidney rejection in rats blocked by special diet

Changes in the diet of organ-donor rats made their kidney acceptable to transplant-recipient rats of a different genetic strain without any immune suppression, report scientists in the May 20 issue of the journal *Science*.

These results mark the first time that dietary manipulation has been shown to eliminate the specific cells within the donated kidney that trigger rejection in the transplant recipient, according to James B. Lefkowitz, M.D., and George F. Schreiner, Ph.D., who conducted the research at the School of Medicine.

"We have come upon something very fundamental and though it may not have immediate clinical application it does have clinical relevance," said Lefkowitz.

White blood cells in the donated kidney trigger the recipient's immune system to reject the transplant. Schreiner and Lefkowitz have shown that placing rats on a diet with no essential fatty acids for two months depletes the white blood cells throughout the kidney. Kidneys from 33 rats fed an essential fatty acid-deficient diet were not rejected when transplanted to another strain of rats. No immunosuppressive drugs were required to sustain the transplants, explained Lefkowitz.

Fatty acids are fundamental building blocks of stored fats and many other lipid molecules. Fatty acids serve as substrates for the synthesis of prostaglandins and leukotrienes, families of molecules that have a variety of powerful hormone-like roles. Leukot-

rienes are known to play a key role in the immune response and in the stimulation and distribution of white blood cells. Although the researchers don't now know how essential fatty acid deficiency short circuits rejection, they have postulated that fatty acid metabolites like leukotriene are a reasonable suspicion.

"We know that there must be some signal attracting the white blood cells into the kidney under normal circumstances," Lefkowitz said. "No one yet understands why white blood cells go where they do — they're found in all tissue. Perhaps we're dealing with a way to intervene in that signal system."

Lefkowitz and Schreiner said they do not feel this research warrants placing human kidney donors on a fatty acid-deficient diet prior to surgery. "That would be foolish based on these findings alone," said Lefkowitz. "Much more would need to be done regarding the safety of such a diet in humans. However, this work does have clinical relevance. In other studies we have found that the diet also depletes the white blood cells in heart and pancreas tissue, and that that depletion can block some autoimmune diseases from occurring."

"With respect to transplantation," he added, "it is more reasonable to try to manipulate whatever systems are involved through a pharmaceutical that mimics the effect of the diet. We have to learn more about the role of essential fatty acids to reach that point."

MEDICAL RECORD

Academy — *continued from p. 1*

active. Ultimately, this work could improve treatment for chronic degenerative disease of the nervous system.

Fischbach came to Washington in 1981 from Harvard Medical School, where he was professor of pharmacology. He received a medical degree from Cornell University Medical School and a bachelor's degree in mathematics and chemistry from Colgate University.

Kornfeld, co-director of the School of Medicine's hematology-oncology division, is recognized for his research on the biochemistry of glycoproteins. His work has helped to explain the structure of the carbohydrate units of these molecules and to define the steps involved in their biosynthesis. These carbohydrate units are important because they serve as specific recognition markers in a variety of biologic reactions.

Kornfeld is interested in how these proteins are targeted to their correct destination in the cell, because the cell makes hundreds of different proteins that have to be sent to many different destinations. Signals built into the proteins allow this to occur. Kornfeld's work involves trying to decipher the signals to determine how proteins get sent to the correct location.

A 1962 graduate of Washington's School of Medicine, Kornfeld served his internship and residency at Barnes Hospital. He has been on the medical school faculty and the staff at Barnes Hospital since 1966.

Majerus is co-director of the Division of Hematology-Oncology. His research involves defining the mechanisms by which a blood cell responds to signals within its environment both to evoke responses inside the cell and to modify its surroundings.

Work in his lab uses biochemistry and molecular biology techniques to define the pathways involved in generating cell messages. He and his colleagues recently discovered several new enzymes and metabolites involved in this pathway and are further exploring these and other new reactions. Another project involves the study of an endothelial cell protein, thrombomodulin, which is a natural anticoagulant molecule.

Majerus pioneered the clinical research that first indicated that aspirin, taken daily in low doses, could help prevent possibly fatal thrombosis (blood clotting) in kidney dialysis patients, without harmful side effects. His work suggested that aspirin might prevent clotting among patients who had already suffered one such occurrence, and that healthy persons might take aspirin on a regular basis to reduce the possibility of a heart attack. That preliminary work was confirmed earlier this year when Harvard University announced results of a follow-up study that involved 11,000 doctors nationwide who took an aspirin or placebo every other day.

Majerus joined the faculty at Washington in 1966 after serving as a research associate in biochemistry at the National Heart Institute. He received a medical degree from the University in 1961 and completed undergraduate studies at Notre Dame University in 1957.

The American Academy of Arts and Sciences, founded in 1780, conducts studies that reflect members' interests and respond to societal needs. There are currently 17 faculty members at Washington University who are academy fellows.

Deaf education — *continued from p. 4*

proficient at speaking English, which I think is important," she says. "I think speaking proficiently improves their ability to interact and participate in the hearing world if they so choose."

As a reward for working hard during the testing, the students spent much of their week sightseeing in the St. Louis area. They ordered their own food at restaurants, bought their own tickets to an amusement park, asked the tour guide questions at an underground cavern and spent one evening dancing and talking on a riverboat ride on the Mississippi River. "They went independ-

ently everywhere a normal-hearing person would, and they didn't need to be accompanied by an interpreter," Moog says. "That's the point of teaching speech. If you can only communicate using sign language, and nobody can understand you when you speak, you probably won't have as many opportunities as those who can speak."

NOTE: Results of CID's study will be presented in July in Orlando, Fla. to the A.G. Bell Association, which is an association of deaf adults and parents and teachers of deaf children.

Joni Westerhouse

Faculty named to editorial board

Dennis M. Bier, M.D., co-director of endocrinology and metabolism for St. Louis Children's Hospital and the Department of Pediatrics at the School of Medicine, has been named the next editor-in-chief of the professional journal *Pediatric Research*.

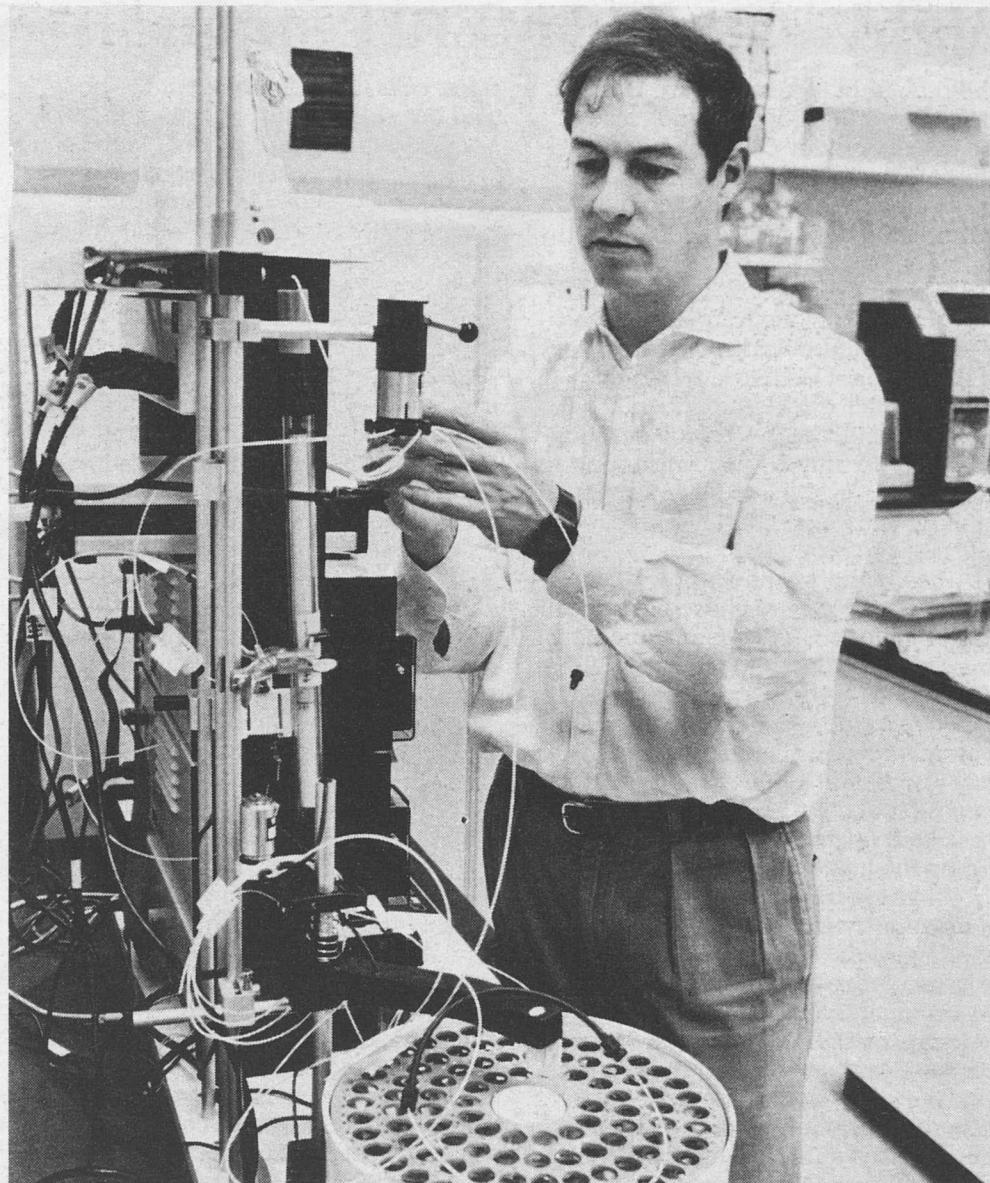
The journal's next editorial board will include five other members of the St. Louis Children's Hospital staff — F. Sessions Cole, M.D., director of newborn medicine; Dan M. Granoff, M.D., director of infectious diseases; Alan L. Schwartz, M.D., Ph.D., director of hematology and oncology; Arnold W. Strauss, M.D., director of cardiology; and Joseph J. Volpe, M.D., director of neurology. The five-year appointments begin January 1.

"The selection of Dennis Bier and his colleagues for the new editorial

board of *Pediatric Research*, from among many highly qualified groups, is further evidence of the depth and breadth of quality in the Department of Pediatrics at Washington University," said Harvey R. Colten, M.D., pediatrician-in-chief. "I believe the journal and research in pediatrics will be the beneficiary of their assumption of this responsibility."

Pediatric Research is published monthly for the International Pediatric Research Foundation Inc. It is sponsored by the American Pediatric Society, European Society for Paediatric Research and the Society for Pediatric Research.

The journal offers original research reports on clinical and laboratory studies and abstracts of major research meetings on childhood diseases.



Michael J. Holtzman, M.D., uses high pressure liquid chromatography to purify proteins from lung epithelial cells.

\$1 million in funding

Holtzman to study asthma causes with two grants

A researcher at the School of Medicine has been awarded more than \$1 million to study the causes of asthma and other inflammatory lung diseases.

Michael J. Holtzman, M.D., assistant professor of medicine, will receive funding from two five-year grants, one from the National Institutes of Health (NIH) and the other from the American Lung Association.

Holtzman's research focuses on the biochemistry of cells lining the lung airways. The cells are in direct contact with the environment, and might be responsible for protecting the airways, he says. He hopes to learn if and how they contribute to an inflammatory response when certain particles in the environment — such as dust, pollen and mold — are inhaled. The explanation for diseases that involve inflammation of the airways — for example asthma, bronchitis and cystic fibrosis — may lie in the normal or abnormal responses of these airway lining cells.

The NIH's Heart, Lung and Blood Institute has given Holtzman an \$831,000 grant to support his studies. Also, he is one of two recipients nationwide of a Career Investigator Award from the American Lung Association. The \$175,000 award is given annually to scientists whose work shows exceptional promise for treating lung disease.

Holtzman is a staff physician at Barnes Hospital, a sponsoring institution of the Washington University Medical Center. Before joining the faculty at Washington University in 1987, he was an assistant professor of medicine and a staff member at the Cardiovascular Research Institute at the University of

California, San Francisco. He has lectured internationally and has written numerous scientific papers on his research.

Participants still needed for diabetes study

The campaign to recruit patients for a major national diabetes study, being conducted in part at the School of Medicine, will come to a close in September.

The Diabetes Control and Complications Trial (DCCT) is designed to determine whether the newer forms of diabetes treatment can prevent or stop the progression of eye, kidney and nerve damage that commonly occurs in patients with insulin dependent diabetes.

During the last five years more than 1,000 volunteers have been recruited at 27 diabetes research centers in the United States and Canada. Local participants in the DCCT are treated by specialists at the School of Medicine.

All diabetes care and supplies will be provided free of charge, including physical examinations and regular testing for the early detection of the complications of diabetes. In order to participate in the DCCT, volunteers must be between the ages of 13 and 39 and have been taking insulin for one to five years.

For more information about how to participate in the study, call 454-6025.

PERSONNEL NEWS

Accommodating the handicapped

Rehabilitation programs, readers, special equipment, extra time off — when is an employer obligated to provide these or similar handicap accommodations, and to whom? What is reasonable, who is handicapped, and when is a handicapped job applicant "otherwise qualified" under the law? The following is a sample from RMP Press' *The Job Accommodation Handbook*, by Paul McCray, which answers many of the questions employers have about the law and handicapped workers.

What the statutes say

The Vocational Rehabilitation Act of 1973 (401:501) requires all federal contractors and subcontractors with annual contracts of more than \$2,500 to take affirmative action to employ qualified handicapped workers. Any organization that receives federal financial assistance must take similar affirmative action.

In addition, the Vietnam Era Veterans Readjustment Assistance Act (401:521) requires that businesses with annual federal contracts in excess of \$10,000 have an affirmative action program that encourages employment of qualified disabled veterans and Vietnam era veterans. The federal government is required to comply with similar regulations (29 CFR 1613.704).

Each statute requires employers to make "reasonable accommodation" to the physical and mental limitations of a "qualified" handicapped employee or job applicant, unless the employer can demonstrate that such an accommodation would impose an "undue hardship" on the company's business.

Finding the handicapped

The Rehabilitation Act applies to a specific group of handicapped people. Not only must they be qualified for the work in question, they must also be "handicapped" within the parameters of the statute. Under the act, a handicapped individual is one who:

- Has a physical or mental condition that limits one or more of the person's major life activities;
- Has a previous history of this type of impairment; or
- Is viewed as having such a condition.

Major life activities include the ability to function independently within the community or the workplace, as well as to care for one's physical, mental or emotional needs. A handicap is not limited to readily apparent impairments such as spinal cord injury or cerebral palsy. It also may include so-called hidden handicaps such as cancer, heart disease, diabetes, AIDS, mental illness, drug addiction or alcoholism.

It is not up to the employer to ferret out an employee's hidden handicaps. If handicapped individuals do not indicate the extent of their impairment, or do not request accommodation, the employer is not obligated to take action. Employers must inform workers and job applicants of their rights under the law; it is then up to the employees to make their needs known.

Determining qualifications

Employers are required to accommodate only those handicapped workers who are "otherwise qualified." Determining when an individual is qualified hinges to a large extent on the handicapped person's ability to perform essential job functions. Handicapped individuals who are unable to do the job, even with accommodations, are not

considered qualified.

Key issues in determining whether a person is qualified for a particular job are:

- What are the essential functions of the job, i.e., what basic qualifications are necessary to perform the job?
- Is the handicapped individual capable of performing all the essential functions of the job?
- Are there reasonable accommodations available that would enable the handicapped person to perform all the essential job functions?

Reasonableness

If accommodations will enable a handicapped worker to perform the essential functions of the job, the employer is obligated to provide those accommodations, so long as they are deemed "reasonable." The value and nature of a particular accommodation may be clarified by considering the following:

- Is the accommodation necessary for the performance of duties?
- To what extent does the accommodation compensate for the handicapped worker's limitations?
- Will the accommodation give the employee the opportunity to function, participate, or compete on a more nearly equal basis with co-workers?
- Would the accommodation benefit others, both non-handicapped and other handicapped workers?
- Are there alternatives that would accomplish the same purpose?

The accommodation must be job-related, effective, and must enable the handicapped person to perform the essential functions of the job. Providing inadequate accommodations simply for the purpose of marginal compliance is not acceptable. Reasonable accommodations should enable the handicapped worker to carry out the essential job duties in much the same manner expected of any other employee.

Cost is an important factor in determining reasonableness, as is the degree to which an employer's business may be disrupted by the accommodation. Courts have consistently ruled that accommodations that would require "fundamental alterations," "massive changes," "substantial modifications," or would "endanger a program's viability," or "jeopardize effectiveness" are not required.

Employee 1988-89 holiday schedules

Hilltop campus

The following holiday schedule has been approved for the 1988-89 fiscal year for all employees on the Hilltop campus other than those represented by union contracts.

Holiday	Date	Date(s) of Recognition
Personal Holiday	Open	One day during the year*
Independence Day	July 4	July 4, 1988
Labor Day	Sept. 5	Sept. 5, 1988
Thanksgiving	Nov. 24	Nov. 24, 1988 Nov. 25, 1988
Christmas	Dec. 25	Dec. 23, 1988 Dec. 26, 1988
New Year's Day	Jan. 1	Dec. 30, 1988 Jan. 2, 1989
M. L. King Jr. Birthday	Jan. 15	Jan. 16, 1989
Washington's Birthday	Feb. 22	Feb. 20, 1989
Memorial Day	May 30	May 29, 1989

*The personal holiday may be used by staff personnel for any personal reason. It is available after six months of service with the advance approval of the

Undue hardship exception

While accommodations that cause an employer undue hardship need not be made, the burden of proving hardship rests with the employer. Factors that may be considered in evaluating the extent of the hardship include:

- The overall size of the company with respect to the number of employees, number and type of facilities, and size of budget;
- The type of operation, including the composition and structure of the workforce; and
- The nature and cost of the accommodation.

While employers have an obligation to pay for reasonable accommodations, they also have a right to choose the accommodation that will be provided. The accommodation selected from a group of alternatives must enable the handicapped employee to perform the essential job-related functions, but the employer may rightfully select the least costly option.

Selection process

Reasonable accommodations are required when the application and selection process might discriminate against an otherwise qualified individual. Employers may need to modify testing procedures, for example, so that handicapped applicants can demonstrate their abilities competitively. Examination content also can be modified to measure the same areas of knowledge, skills and abilities without screening out handicapped competitors. Other accommodations in the application process may include:

- Reading to applicants who are blind, or who have reading disabilities;
- Writing for applicants who have difficulty using their hands;
- Interpreting test instructions into sign language for the deaf.

In addition to making sure tests are administered fairly, employers should be sure selection criteria themselves are not discriminatory. Criteria that purport to measure the physical or mental abilities of employees or applicants may not unnecessarily exclude individuals on the basis of their handicap, and the criteria must be clearly job-related. Employers should consider the extent to which selection practices or standards

Continued on p. 8

Limits set on tax-deferred annuity contributions

Under current law, employees of certain tax-exempt organizations, such as educational and research institutions, may reduce or set aside a portion of their salaries, before taxes, to purchase retirement annuity benefits. Such funds set aside on a salary reduction basis may be contributed to an institutionally sponsored retirement plan, like the one at Washington University.

The maximum amount that may be tax-deferred is limited by the Internal Revenue Code. It is determined by several formulas, which depend on factors such as years of service with your institution, prior tax-deferred contributions, and any after-tax contributions that you make.

You may set aside the least of:

(1) Your "exclusion allowance" — the sum of your gross salary, your institution's contributions to the retirement plan for the year and any prior tax-deferred contributions made by your institution, times the applicable service factor, minus the sum of your institution's contributions for the year and any prior tax-deferred contributions made by your institution.

(2) 20 percent of your gross salary minus 80 percent of the sum of your institution's contributions to the retirement plan for the year plus any after-tax employee contributions for the year.

(3) \$30,000 minus the sum of your institution's contributions for the year and your after-tax contributions for the year.

(4) \$9,500.

The amount that you may contribute is called your "General Limit." There are also three special alternatives or "catch-up elections" that employees of teaching institutions, hospitals, churches, home health care service organizations, and health and welfare service agencies may use. You may be able to contribute more on a tax-deferred basis using one of the alternatives (although even under the alternatives you may not contribute more than \$9,500).

Alternative A is available to terminating employees only. It may be elected only once in a lifetime.

Alternative B permits you to tax defer the least of:

(1) the exclusion allowance described above;

(2) 20 percent of your gross salary, minus 80 percent of the sum of your institution's contributions to the retirement plan and any after-tax contributions, plus \$3,200.

(3) \$15,000 minus the sum of your institution's contributions to the retirement plan and any after-tax contributions;

(4) \$9,500.

Alternative C permits you and your institution to contribute the lesser of the amounts available under Steps 2 and 3 of the "General Limit" described above — or \$9,500 (if less).

Continued on p. 8

Personnel News

Personnel News appears monthly in the Record and is prepared by Gloria W. White, associate vice chancellor for personnel and affirmative action, and other members of the Personnel Office. Personnel News is designed to keep Washington University employees and their families informed of the benefits and opportunities available at the University.

CALENDAR

MUSIC

July 7-Aug. 4

Sunday, July 10

8 p.m. Dept. of Music Presents Gateway Festival Orchestra Concert with William Schatzkamer, conductor. Brookings Quadrangle. In case of rain, Graham Chapel.

Sunday, July 17

8 p.m. Dept. of Music Presents Gateway Festival Orchestra Concert with William Schatzkamer, conductor. Graham Chapel.

Sunday, July 24

8 p.m. Dept. of Music Presents Gateway Festival Orchestra Concert with William Schatzkamer, conductor. Brookings Quadrangle. In case of rain, Graham Chapel.

Monday, July 25

8:30 p.m. Dept. of Music Presents the Washington University Percussion Ensemble with Rich O'Donnell. Patio behind the WU music dept. Blewett A Hall, 6500 Forsyth Blvd.

Sunday, July 31

Dept. of Music Presents the Gateway Festival Orchestra Concert with William Schatzkamer, conductor. Brookings Quadrangle. In case of rain, Graham Chapel.

EXHIBITIONS

"Highlights From the Permanent Collection" with 20th-century art in the upper gallery and with 19th-century art in the lower gallery. Both

portions close Aug. 21. The Gallery of Art is closed on Mondays during the summer months. Hours are 10 a.m.-5 p.m. Tuesday- Friday and 1-5 p.m. weekends. For more info., call 889-4523.

"The Core Show," works by freshmen and sophomore fine arts students, continues in Bixby Gallery through July 22. Bixby Gallery is closed on weekends during the summer months. Hours are 10 a.m.-4 p.m. weekdays. For more info., call 889-4623.

MISCELLANY

Friday, July 15

A certificate program in family and marital therapy will be held once a week on Wednesdays from Oct. 5, 1988, to May 3, 1989, at the George Warren Brown School of Social Work. The application deadline is July 15, 1988. The program is open to applicants who have completed a master's or doctoral degree in a human service field. The program is sponsored by the social work school's Family Therapy Training Center, a division of the Continuing Education Program. For more info., call 889-6606.

Calendar Deadline

The deadline to submit items for the Aug. 4-Sept. 1 calendar of the Washington University Record is July 26. Items must be typed and state time, date, place, nature of event, sponsor and admission cost. Incomplete items will not be printed. If available, include speaker's name and identification and the title of the event; also include your name and telephone number. Send items to King McElroy, calendar editor, Box 1070, or by electronic mail to p72245KM at WUVMC.

Contributions

continued from p. 7

Once you choose one of these alternatives, you may not choose one of the others in the future, even if you are employed by a different institution. You may always choose the amount available under the General Limit — even if you previously elected one of the alternatives.

Salary reduction contributions are generally limited to a maximum of \$9,500. You may, however, exceed the \$9,500 general contribution limit if: (1) you have at least 15 years of service with Washington University; and (2) your salary reduction possibility under the General Limit or one of the alternatives you have selected is limited by the \$9,500 cap.

If you are not terminating employment, you may elect either Alternative B or C. If you have several years of service and have not made extensive use of tax-deferred contributions in the past, you may be able to tax defer a relatively large amount by electing Alternative B. Conversely, if extensive tax-deferred contributions have been made in the past, or you have only a few years of service, the Alternative B amount may not be as attractive. Alternative B provides the greatest flexibility for employees who have a number of years of service and have not taken extensive advantage of their tax-deferred possibilities.

You can also elect to contribute the amount that is available under Alternative C. Alternative C generally allows a greater salary reduction for the recently

employed individual than would be permitted under the contribution limitations of the General Limit or Alternative B. However, if Alternative C provides the same amount as the General Limit there is no need to select Alternative C, because selecting Alternative C precludes selecting Alternative A or Alternative B in the future.

If you are terminating employment, you may elect Alternative A, provided you have never elected one of the other alternatives before. The election of Alternative A would probably permit the greatest tax-deferred annuity contributions. Remember, Alternative A may be used only once in a lifetime, not every time you terminate employment.

However, Alternative B may, in some situations, provide a greater tax-deferral opportunity than Alternative A (depending on years of service, salary level and extent of past 403(b) contributions). If you terminate employment and Alternative B is acceptable, it is advisable to elect Alternative B. If you accept employment at another institution, you retain greater flexibility for future tax-deferred annuity contributions.

You may also choose Alternative C if you are terminating employment if this would provide the greatest tax-deferred opportunity.

Work sheets for computing your maximum contribution are available in the Personnel Office. Calculation request forms were included in the April 1988 Benefit Bulletin #24 regarding retirement annuity.

Orchestra's 25th season opens July 10

The Gateway Festival Orchestra will celebrate the beginning of its 25th summer season with a concert at 8 p.m. Sunday, July 10, in Brookings Quadrangle. Listeners are encouraged to bring chairs, blankets and picnic suppers to the outdoor concert, which will be the first of four Sunday evening performances by the orchestra in July.

The concerts, which are free and open to the public, are co-sponsored by the Department of Music.

Program selections for the July 10 concert include Antonin Dvorak's "Symphony No. 8 in G Major" and Carl August Nielsen's "Concerto for Flute and Orchestra." The orchestra will continue its tradition of closing each concert with a show tune, offering "Carousel" as its final piece for the evening. Flutist Janet Scott will be the featured soloist.

Scott, who received her bachelor's and master's degrees in music at Washington University, has performed with the St. Louis Symphony Orchestra, the St. Louis Opera Theatre Orchestra and the St. Louis Chamber Orchestra.

The Gateway Festival Orchestra was founded in 1963 by William Schatzkamer, professor emeritus at Washington. Schatzkamer, who last year retired

after teaching for 36 years, has conducted the 50-piece orchestra since its inception 25 years ago.

The Gateway Festival Orchestra will perform three additional Sunday concerts at 8 p.m. on July 17, 24 and 31.

Selections for the July 17 concert, which will be held in Graham Chapel, include Brahms' "Symphony No. 3," Gershwin's "Piano Concerto in F," and the music from "Evita." Pianist Paul Laubengeyer will appear as guest artist.

The July 24 concert will be held in Brookings Quadrangle and will feature work by Berlioz, Tartini, Faure and Saint-Saens. The concert will close with Gershwin's "An American in Paris" and selections from "Man of La Mancha."

The final concert of the season, to be held July 31 in Brookings Quadrangle, will include Tchaikovsky's "Romeo and Juliet," Chausson's "Poeme," Saint-Saens' "Havanaise," Rossini's Overture to "La Gazza Ladra," and selections from the musical "Hair." Sixteen-year-old violinist Julie Kurtzman will be the featured soloist.

In case of rain, the outdoor performances will be held in Graham Chapel. For more information, call 889-5581.

Woman's Club offers free membership

The Woman's Club of Washington University is offering one-year free memberships to women newly affiliated with the University for the 1988-89 academic year. The regular yearly membership fee is \$10.

The Woman's Club is a social organization that sponsors cultural and educational functions. The club also sponsors an annual Assembly Series lecture in Graham Chapel. This year the lecturer will be Flora Lewis, author and columnist, who will speak on Sept. 14.

Club members are woman faculty and staff and wives of faculty and staff.

New and present members receive the 1988-89 club yearbook in September, which contains a calendar of all club events as well as addresses and phone numbers of the members. They also receive monthly newsletters.

A welcoming social will be held in September at University House. M. Fredric Volkmann, associate vice chancellor and director of public relations, will be the speaker.

For more information, call Coreen Motard, president, at 645-2022, or Natalie McFarland, membership chairman, at 727-4949.

Handicapped

continued from p. 7

can be modified to accommodate the unique needs of the handicapped

Reasonable accommodation

The types of actions that can be taken in connection with reasonable accommodation once a handicapped applicant is hired are as varied as the needs of the individuals involved, the type of job, and the ingenuity of the employer. Worksites can be modified by:

- Rearranging files and widening access areas for wheelchair accessibility;
- Using Braille labels;
- Modifying equipment for hand or foot operation;
- Installing telecommunication devices or telephone amplifiers;
- Providing holding devices on desks and telephones;
- Providing special heating or air conditioning units for those who are sensitive to temperature variations; and
- Eliminating barriers, or relocating offices for jobs to places that are accessible to handicapped workers.

Some handicaps require accommodations in the jobs themselves, rather than the physical environment. Employ-

ees with diabetes or epilepsy, for example, may need to work a regular schedule. On the other hand, workers who require periodic medical treatment may need flexible schedules. Providing readers or interpreters may be a reasonable accommodation for some handicapped workers. For able-bodied workers who become handicapped after employment, retraining or reassignment may be reasonable accommodations.

Through advanced technology, there are numerous assistive devices that can enable handicapped workers to compete favorably with other employees. Sources are often available to aid employers with the cost of accommodation equipment.

The concept of reasonable accommodation does not apply only to selection and placement. Employers should also be aware of anti-discrimination requirements in recruitment, training, promotion, reassignment and developmental assignments. (The Job Accommodation Handbook is available for \$37.50 from RPM Press, P.O. Box 31483-1483, Tucson, Ariz. 85751.)

Evening woodworking class offered

An evening course in woodworking and furniture design will be offered beginning in September by the Fine Arts Institute of Washington University. The course, taught by St. Louis designer Ron Diefenbacher, will be held for 12 Monday evenings at John Burroughs School's woodshop, 755 S. Price Road.

"Washington University has offered this course for three years," Diefenbacher says, "but we really never had a home. We met wherever we could find

space. We were delighted with John Burroughs' invitation."

Diefenbacher has been designing and making furniture for the past seven years in St. Louis. His work is found in many St. Louis homes and corporations. He developed the Washington University course in response to requests.

For more information on the course, call Libby Reuter, institute director, at 889-6597.