

1976

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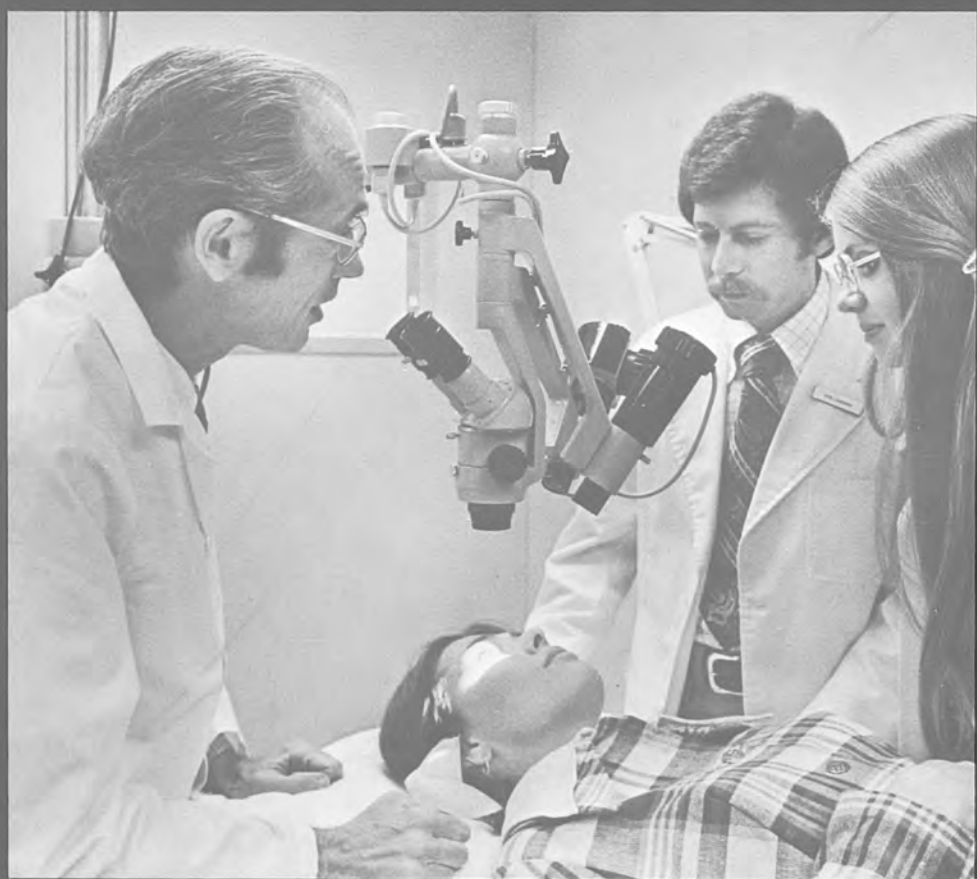
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Bulletin of Washington University

St. Louis

School of Medicine

1976/77

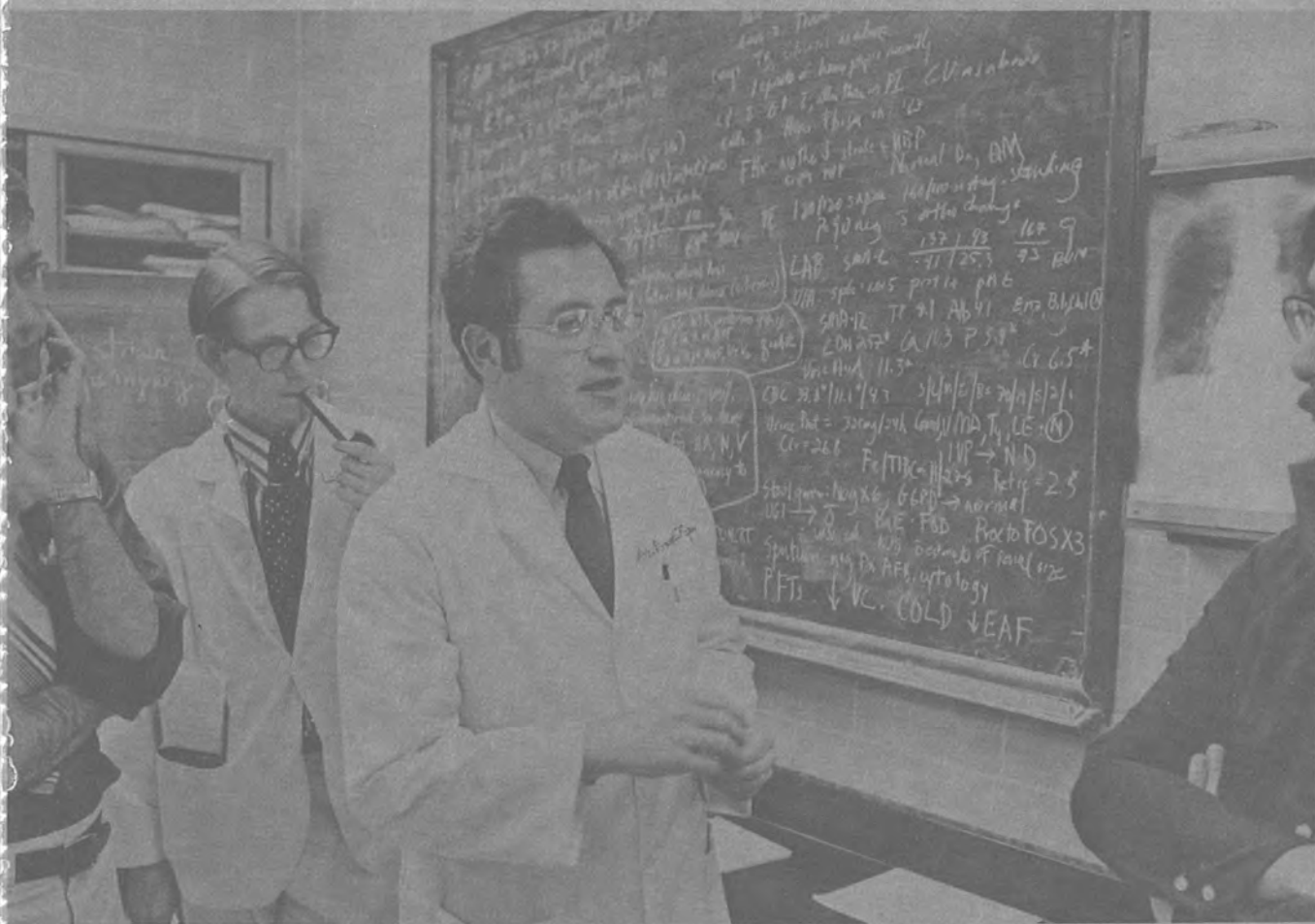


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The on-rushing flood of future possibilities brings with it a spirit of adventure; a need for bold, imaginative thinking; a willingness to gamble on provocative new concepts; the courage to break away from the entrenched viewpoint and the aggressiveness to bring them into reality.

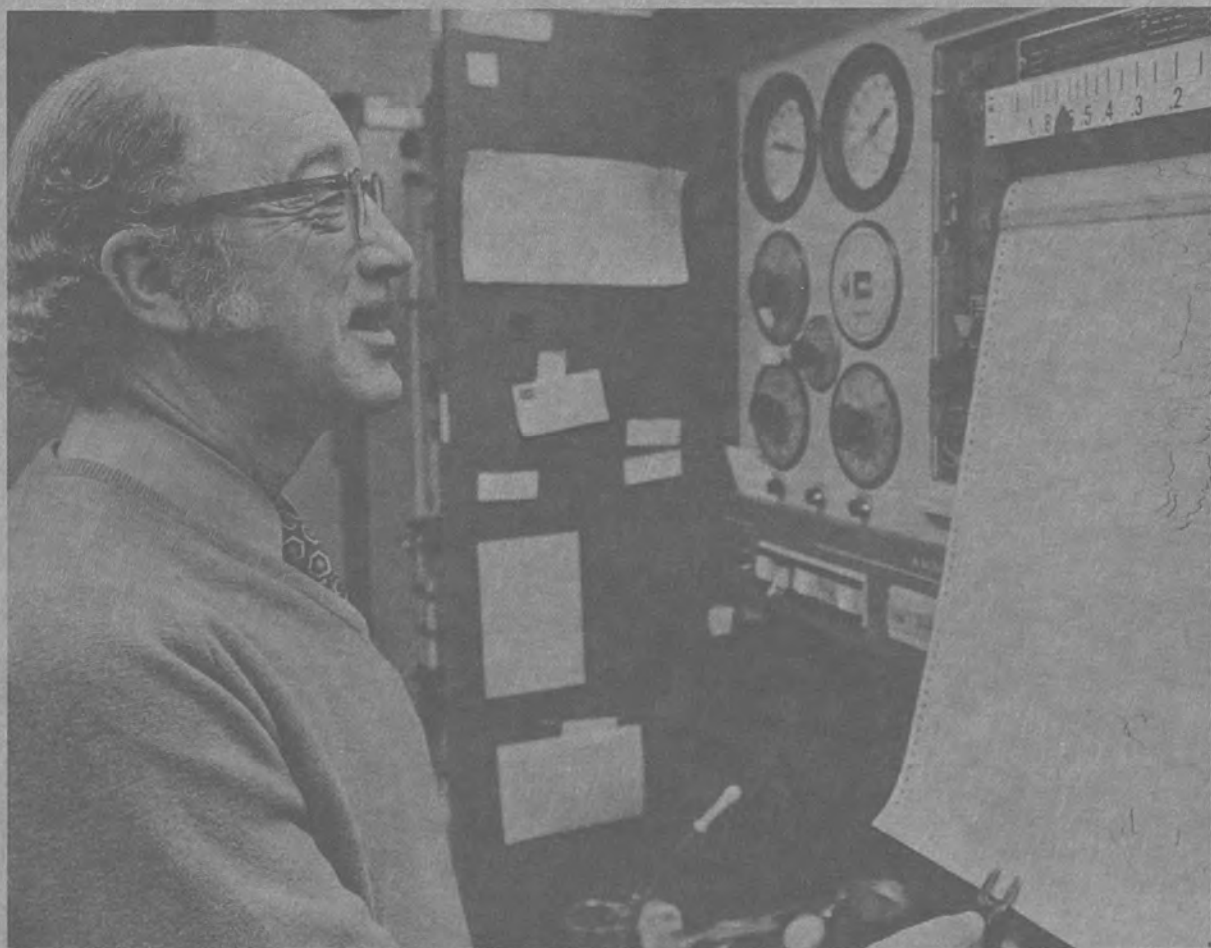
Wendell G. Scott





Both the man of science and the man of art live always at the edge of mystery, surrounded by it; both always, as the measure of their creation, have had to do with the harmonization of what is new and what is familiar, with the balance between novelty and synthesis, with the struggle to make partial order in total chaos.

J. Robert Oppenheimer

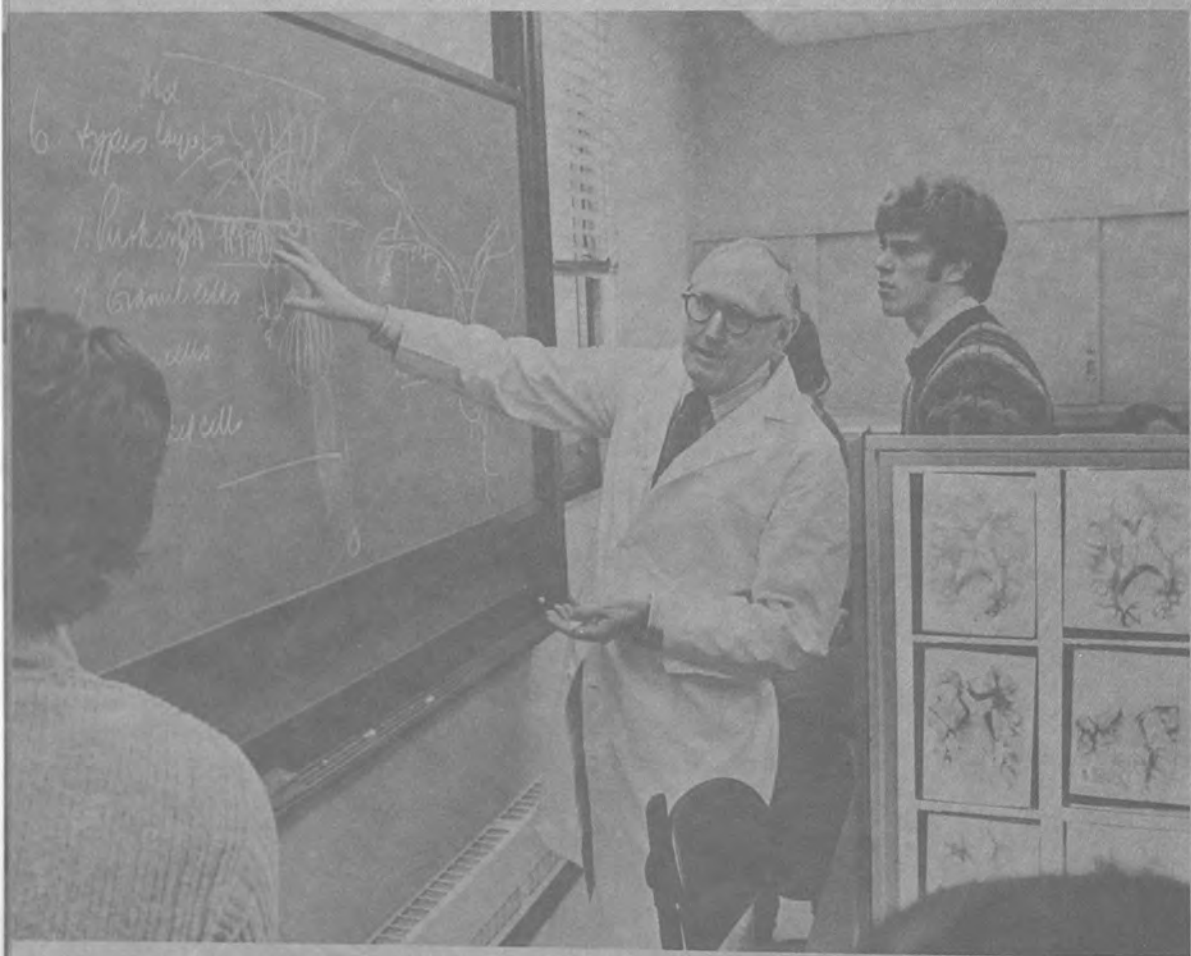




It is a rare blending of learning and humanity, incisiveness of intellect, and sensitiveness of the spirit which occasionally come together in an individual who chooses the calling of Medicine; and then we have the great physician.

Hans Zinsser





The whole point of a university, on its educational side, is to bring the young under the intellectual influence of a band of imaginative scholars.

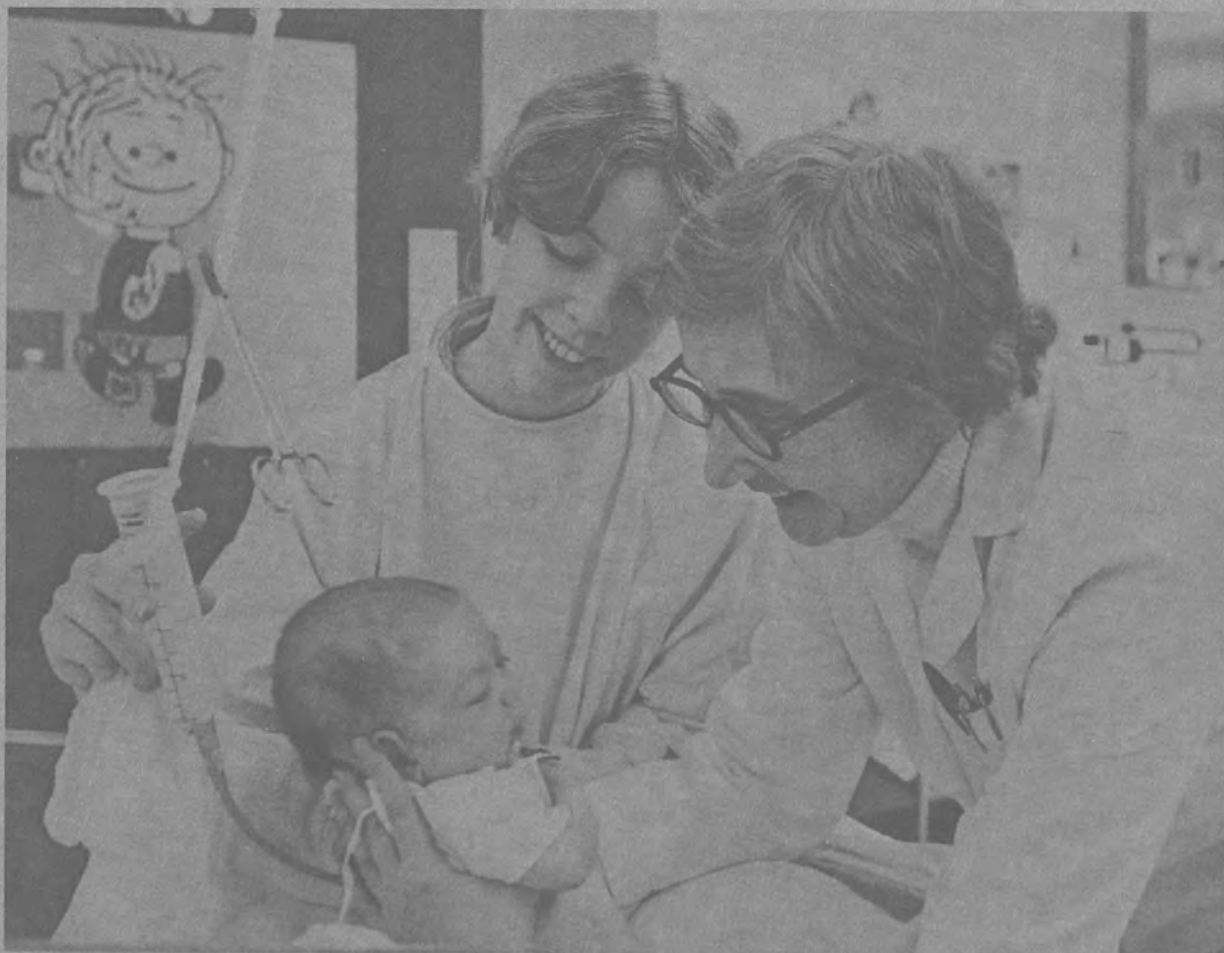
Alfred North Whitehead

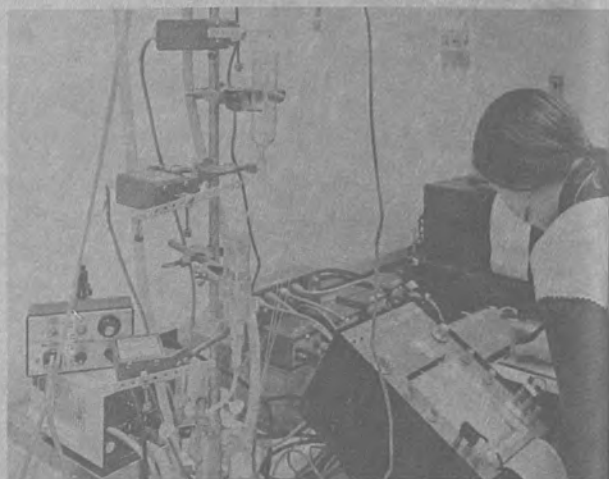




Scientific problems are never disposed of by a single worker, however ideal his opportunity, however great his ability, for the questions to be put to nature vary from one generation to another.

Joseph Erlanger





Come, let us work, and in this little time do
some new thing that no one on this earth has
ever thought to do. Split from the world's
eternal truth some atom of the everlasting! Then
let us die, and leave for coming generations one
bit of knowledge by which we'll be remembered
until some later one shall show the truth we
found was but a grain gleaned from some vast
store we'd hardly touched and we shall be forgot
and he remembered—but we, out where the
absolute is near, shall smile seeing how little a
beach of sand resembles the granite cliff from
which it weathered.

Sam M. Clark, Sr.



Medicine is a jealous god expecting to receive from its votaries all of their talent and energy. It lavishes no rewards upon those who are not fully consecrated to its service.

Evarts A. Graham



Bulletin of
Washington University
St. Louis

School of Medicine
76/77

Contents

Calendar	4
Historical Perspective	6
The Study of Medicine	
Philosophy and Objectives	9
Curriculum	9
Degree Programs	12
Tutorials, Individualized Programs	15
Grades	15
Promotions	16
Student Research Fellowships	17
Internships and Residencies	18
Postdoctoral Training	18
Admission	
Entrance Requirements	19
Application Procedure	20
Advanced Standing	21
Financial Information	
Tuition and Fees	22
Refunds	22
Estimate of Expenses	23
Financial Assistance, Awards, Prizes	23
Student Life	
Housing, Parking	29
Student Health Service	30
Recreational and Cultural Opportunities	30
Medical Center Alumni Association	31
Lectureships and Visiting Professorships	32
Teaching Facilities	
The School of Medicine	33
The Medical Center	34
Other Institutions	37
Departments of the School	
Anatomy and Neurobiology	40
Anesthesiology	44
Biological Chemistry	47
Genetics	51
Medicine	53
Microbiology and Immunology	71
Neurology and Neurological Surgery	75
Obstetrics and Gynecology	79

Ophthalmology	85
Otolaryngology	89
Pathology	92
Pediatrics	99
Pharmacology	109
Physiology and Biophysics	112
Preventive Medicine and Public Health	115
Psychiatry	123
Radiology	131
Surgery	136
Teaching and Research Divisions	
Biomedical Computer Laboratory	146
Child Psychiatry	149
Health Care Research	151
Tumor Services	152
Neurology	153
Rehabilitation	153
Graduate Training	
Biology and Biomedical Sciences	155
Biomedical Engineering	165
Allied Health Professions	
Health Care Administration	167
Nurse Anesthesia	171
Pediatric Nurse Practitioners	172
Interinstitutional Physician's Assistant Training Program	173
Occupational Therapy	173
Physical Therapy	175
Radiologic Technology	177
Administration	
Board of Trustees	178
School of Medicine	178
Medical Center	179
Officers and Committees of the Faculty	180
Register of Students	183
Index of Staff Members	204
Index	219
Schools of the University	224

Calendar

1976

June

- 7 *Monday*. Summer quarter begins.
15, 16 *Tuesday, Wednesday*. National Board Examination, Part I.

July

- 5 *Monday*. Independence Day, holiday.

August

- 25 *Wednesday*. Orientation and registration for all new students.
26, 27 *Thursday, Friday*. Registration for upperclass medical and graduate students.
28 *Saturday*. Summer quarter ends.
30 *Monday*. First semester classes begin. Fall quarter begins.

September

- 6 *Monday*. Labor Day, holiday.
8, 9 *Wednesday, Thursday*. National Board Examination, Part I.
28, 29 *Tuesday, Wednesday*. National Board Examination, Part II.

November

- 20 *Saturday*. Fall quarter ends.
22 *Monday*. Winter quarter begins.
25 *Thursday*. Thanksgiving Day, holiday.
26 *Friday*. Thanksgiving holiday for freshman and sophomore classes.

December

- 18 *Saturday*. Christmas recess begins at 1:00 p.m.
23, 24, 25 *Thursday, Friday, Saturday*. Christmas, holiday.
31 *Friday*. New Year, holiday.

1977

January

- 1 *Saturday*. New Year, holiday.
3 *Monday*. Christmas recess ends at 8:00 a.m.
10 *Monday*. Registration for all medical and graduate students, second semester.
17 *Monday*. Second semester classes begin.

February

- 26 *Saturday*. Winter quarter ends.
28 *Monday*. Spring quarter begins.

March

- 11 *Friday*. Spring recess begins at 5:00 p.m. for freshman and sophomore classes.
21 *Monday*. Spring recess ends at 8:00 a.m.

April

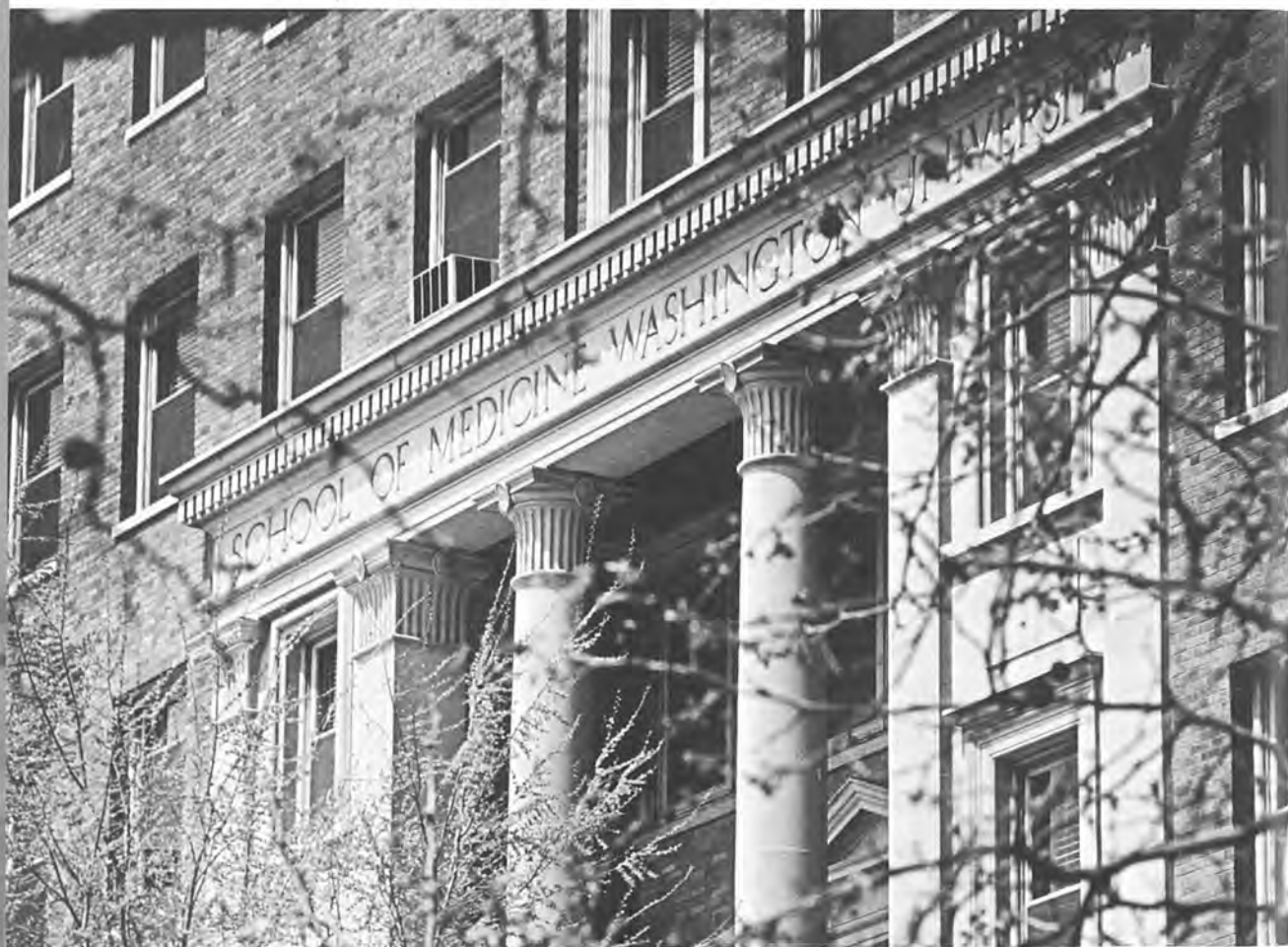
- 8, 9, 10 *Friday, Saturday, Sunday*. Easter holiday for upperclass medical students.
12, 13 *Tuesday, Wednesday*. National Board Examination, Part II.

- May**
- 19 *Thursday*. Spring quarter ends.
- 20 *Friday*. Commencement.
- 21 *Saturday*. Academic year ends for junior class.
- 25 *Wednesday*. Academic year ends at 5:00 p.m. for freshman and sophomore classes.
- 30 *Monday*. Memorial Day, holiday.
-

Clerkship and Elective Period Intervals

Period	Begins	Ends
I	June 7, 1976	July 17, 1976
II	July 19, 1976	August 28, 1976
III	August 30, 1976	October 9, 1976
IV	October 11, 1976	November 20, 1976
V	November 22, 1976	January 15, 1977
VI	January 17, 1977	February 26, 1977
VII	February 28, 1977	April 7, 1977
VIII	April 11, 1977	May 19, 1977

Historical Perspective



The Washington University School of Medicine was formed in 1899 by the union of the first two medical schools established west of the Mississippi River: the Missouri Medical College and the St. Louis Medical College.

Such pioneer colleges set high standards for medical education during the heyday of the medical diploma mills, when there were three times as many medical schools operating in St. Louis as there now are in the entire state of Missouri. They raised their graduation requirements, so that at the time they became associated in 1899, each required its students to complete satisfactorily

a four-year graded course for the M.D. degree.

Both colleges were particularly fortunate in attracting men of energy, integrity, and skill. Members of their faculties were well known at home and abroad. Charles A. Pope at thirty-six became the youngest president in the first hundred years of the American Medical Association, and his successor as professor of surgery at the St. Louis Medical College, E. H. Gregory, was elected president in 1886. John T. Hodgen, a graduate of the Missouri Medical College and later dean and professor of surgical anatomy at the St. Louis Medical College,

was president of the American Medical Association in 1880. Hodgen originated the splint, which is still used today, for hip fractures.

From their beginnings, each college sought university affiliation. The St. Louis Medical College was established as the Medical Department of St. Louis University, became independent in 1855, and affiliated with Washington University in 1891, although it retained its name until the union with the Missouri Medical College in 1899. The Missouri Medical College, first established as the Medical Department of Kemper College, was later the medical department of the University of Missouri. It became independent in 1857. In 1899, the Missouri Medical College affiliated with the St. Louis Medical College, and thus formed the Medical Department of Washington University.

In 1909, Abraham Flexner began a survey of 155 medical schools in the United States and Canada for the Carnegie Foundation for the Advancement of Teaching. A similar survey by the American Medical Association and Flexner's survey, the famous Bulletin Number Four on the state of medical education in the United States and Canada, created a national sensation. Some schools collapsed, others pooled their resources, while still others reorganized.

The Medical School of Washington University did not escape criticism. In the report Flexner made to Dr. Henry Pritchett, president of the Carnegie Foundation for the Advancement of Teaching and former professor of astronomy at Washington University, he said that one of two courses must be adopted: "the department must be either abolished or reorganized."

Dr. Pritchett mailed the report to Robert S. Brookings, a St. Louis merchant who was president of the Board of Directors of Washington University. Mr. Brookings was shocked and immediately went to New York to see Flexner, demanding proof that the conditions were as bad as described.

Mr. Flexner returned to St. Louis with Mr. Brookings, and the two men went through the School. In less than two hours Mr. Brookings was convinced that drastic action was necessary if the School were to be of highest caliber.

The meeting in 1909 of Robert S. Brookings and Abraham Flexner was of unsurpassed significance in the history of the Washington University School of Medicine, for it led to the complete reorganization of the School and the establishment of the present Medical Center. Abraham Flexner inspired the dream of a model medical school. Robert S. Brookings accepted the challenge, and with the energy and vision shown in all his enterprises, made the dream a reality.

No time was lost in making changes. The Bulletin of the Medical School for July, 1910, makes the following general statement: "The Corporation of the University, becoming convinced that in no other direction could greater service be rendered than through a great, modern medical school, determined to reorganize the School and to place it in the front rank of American medical institutions. It has called to the heads of a number of the leading departments the ablest men it could secure, who shall give their time to teaching and research, providing each with a staff of permanent assistants, who likewise give their time to instruction and research, and has associated with this staff groups of the strongest men in the medical profession in St. Louis."

When Robert A. Barnes died in 1892, he left a will which directed that the trustees of his estate should use \$800,000 for the erection and equipment of a hospital "for sick and injured persons, without distinction of creed, under the auspices of the Methodist Episcopal Church, South." Investigation by the trustees into the cost of building a modern hospital convinced them that the sum was not large enough to build an efficient, fireproof building, and they therefore invested the trust. By 1912, the value had in-

creased to two million dollars, a sum which permitted the building of a hospital and left an endowment greater than the original fund. The trustees were studying hospital construction at the time Mr. Brookings was studying medical schools.

It was apparent to everyone concerned that the two projects, the building of a medical school and the construction of a modern hospital, were so interrelated that the purpose of each would be more successfully fulfilled by an affiliation. A medical school would provide a highly trained staff and would assure the most modern methods and superior laboratory facilities for the hospital. A teaching hospital would give the patient superior care and provide the essential clinical experience consistent with modern medical teaching methods.

During the spring of 1912, construction was begun on the medical school and hospital buildings which form the nucleus of the present Medical Center. The laboratories were moved from their old quarters in down-

town St. Louis into the new buildings on Euclid and Kingshighway during the summer of 1914, and late in the fall of the same year the activities of the Washington University Hospital were transferred to the Barnes Hospital. Concomitantly, the St. Louis Children's Hospital, then located on Jefferson Avenue, became affiliated with the Medical School and moved to its new quarters in the Medical Center.

In April of 1915, exercises were held to celebrate the completion of this group of buildings designed to promote the practice, the teaching, and the progress of medicine. The dedication ceremonies marked what Dr. William H. Welch, of Johns Hopkins University, called "one of the most significant events in the history of medical education in America." Robert S. Brookings, the one man most responsible for the reorganization, voiced the hope that "our efforts will contribute, in some measure, to raising the standard of medical education . . . and that we will add, through research activities, our fair quota to the sum of the world's knowledge of medicine."

These prophetic words of Mr. Brookings have been realized. Local, national, and international recognition has come to the School and to members of the faculty. Members of the faculty have received numerous awards; eleven Nobel Laureates have worked in the laboratories of the School's medical science departments.

In the ensuing years, the Medical Center has continued to grow and to provide excellent facilities. With the increase in the physical plant there has also occurred a great increase in the size of the faculty; the expansion has been made without compromise in the standards which marked the early development of the Medical Center. As a result, significant achievements in both research and clinical areas have been consistently recorded, and the School of Medicine has continued to attract students and faculty of the highest caliber.



The Study of Medicine



PHILOSOPHY AND OBJECTIVES

The efforts of the School of Medicine are directed toward providing able students with a stimulating and challenging milieu in which they may acquire a thorough background in scientific medicine, as well as a deep understanding of the meaning of comprehensive medical care. In a field that is developing as rapidly as is medicine, education begun in medical school must serve as the foundation for a life-long course of learning. As Sir William Osler pointed out some decades ago, a faculty, no matter how talented, can "only instill principles, put the student in the right path, give him methods,

teach him how to study, and early to discern between essentials and non-essentials." The faculty's mission is to preserve the joy of learning and to foster a spirit of discrimination and creativity, for today's student is preparing to cope with a changing world; to contribute, in a constructive, considered way, to resolving problems of medicine and of health care. It is hoped that each student may achieve this grounding during his years in the School of Medicine.

CURRICULUM

The curriculum is the product of prolonged and continuing study, by both faculty and students, of the present and probable future

course of medical science and medical practice, and of the ways in which medical education can be kept abreast of this course. It is planned to provide students, who enter medical school with diverse backgrounds and interests and who will undertake a wide variety of careers, with the basic knowledge and skills essential for their further professional development. Modern medical education can no longer hope to be comprehensive; it must be selective. Yet students must develop facility in the understanding and use of several related technical languages: those of anatomy, chemistry, physiology, and clinical medicine. They must share responsibility for the care of the patient. They must also learn how these areas of endeavor are interrelated, how the organization and needs of society influence the methods of providing medical care, and how new knowledge is acquired and old knowledge re-evaluated.

The curriculum includes a core experience based upon a sequence of courses that will introduce the student to the broad panorama of medicine. The principles, the methods of investigation, the problems, and the opportunities in each of the major disci-

plines of medical science and medical practice are presented in such a way as to help the student select the career best suited to his abilities and goals.

The elective program helps the student to decide where his major interests lie. It also enables him to benefit from the wide range of specialized knowledge and skills found in the faculty. As there is not enough time for each student to be introduced to each of today's areas of specialization, the elective program permits him to select, according to his own desires, the areas he wishes to explore or to study in depth.

Table of Required Hours 1976-77

As reported to the Liaison Committee on Medical Education, representing the Council on Medical Education of the American Medical Association and the Executive Council of the Association of American Medical Colleges, credit hours for courses are expressed in terms of clock hours—the scheduled hours per year of actual lecture and laboratory contact between faculty and students. These clock hours are not to be interpreted as semester or quarter hours.

First-year courses are taught during the 36-week (September to June) academic year.

Gross Anatomy	216
Biochemistry*	
General	69
Advanced	63
Microbiology	180
Social Aspects of Medicine	36
Physiology	198
Microscopic Anatomy	162
Neural Sciences	126
Genetics	36
Topics in Clinical Medicine	36
Biostatistics	18
Total clock hours for the year	1077

*Student's course level determined by Department of Biochemistry.



Second-year courses are taught during the 36-week (September to June) academic year.

Pathology	312
Pharmacology	180
Pathophysiology	
Infectious Diseases	58½
Heart, Kidney and Lung	58½
Metabolism, Endocrinology and Gastrointestinal Disorders	60½
Oncology and Hematology	55½
Nervous System Disorders	60
Developmental Biology	40
Introduction to Clinical Medicine	126
Introduction to Clinical Psychiatry ...	42
Radiology	36
Surgery	36
Ophthalmology	9
Otolaryngology	9
Total clock hours for the year	1083

Clinical Clerkship (Third) Year is a 48-week (June to June) academic year.

Medicine	462
Surgery	462
Obstetrics and Gynecology	231
Pediatrics	231
Psychiatry	231
Neurology	115½
Otolaryngology	77
Ophthalmology	38½
Total clock hours for the year	1848

Elective (Fourth) Year is a 48-week (June to June) academic year. Students are required to attend only 36 weeks.

At least two-thirds of the minimum required time for the Elective Year must be taken exclusively in residence in the Washington University School of Medicine elective course program; any exceptions to this must be approved by the Assistant Dean for Curriculum and the standing subcommittee of the Committee on Academic Review and Promotions—III. This subcommittee reviews students taking more than twelve weeks at other schools and all individual questions

about what merits elective credit. If the faculty or administrator of the elective program has any question about what should receive elective credit, this subcommittee should judge and report to the CARP—III for final action.

To qualify for the Doctor of Medicine degree from the Washington University School of Medicine, a student must take a total of at least 36 weeks of type "B" (full-time) courses or approved research. Full academic credit will be granted for any successfully completed elective that fulfills the following criteria:

Type B (full-time) course electives must:

1. be approved by a recognized school of medicine and have a designated course-master who will evaluate the student's performance;
2. be taken when the student is enrolled at the Washington University School of Medicine; and
3. be a planned educational program that deals with some aspect of clinical medicine or biological science and encompasses at least three consecutive weeks.

Type B research electives must:

1. be sponsored by a designated investigator who will outline the project, oversee the student's progress, and evaluate the student's performance;
2. be accomplished while the student is enrolled at the Washington University School of Medicine; and
3. be a project in which the student has worked full time for a total of at least twelve weeks. Full-time investigative work on such a project prior to enrollment at the Washington University School of Medicine can be used for the twelve-week minimum requirement but will not be credited toward the 36 weeks needed for elective credit.

Students are encouraged to take type "A" electives, lecture-seminar courses, but such offerings are optional.

Total clock hours for the year1188

Total clock hours for four years5196

DEGREE PROGRAMS

The Washington University School of Medicine offers three programs leading to the M.D. degree: a regular four-year program, a special five-year program, and a combined M.D./Ph.D. program.

The Washington University Graduate School of Arts and Sciences, through the Division of Biology and Biomedical Sciences, offers programs in cellular and developmental biology, evolutionary biology and ecology, molecular biology, neural sciences, and plant biology leading to the Ph.D. degree. Study is organized on an interdepartmental basis using the faculty of the seven preclinical departments of the School of Medicine, as well as the Biology Department of the Graduate School. Additional information and the application for admission may be obtained by writing to:

Office of Graduate Student Affairs
Box 8072
Washington University School of Medicine
660 South Euclid Avenue
St. Louis, Missouri 63110

Doctor of Medicine, Four-Year Program

By conferring the M.D. degree, the School certifies that the student is competent to undertake a career as a Doctor of Medicine. It certifies further that, in addition to medical knowledge and skills, the graduate possesses qualities of personality—compassion, emotional stability, and a responsible attitude—essential to an effective professional life.

A course of medical education for the M.D. degree ordinarily consists of a minimum of four years of study. Students recommended

for the degree of Doctor of Medicine must be of good moral character, they must have completed an entire academic course of instruction as matriculated medical students, they must have passed all required subjects or the equivalent and have received satisfactory grades in the work of the full academic course, and they must have discharged all current indebtedness to the University. Individuals applying for licensure must be twenty-one years of age and must have completed four entire academic years in the study of medicine.

At the end of the final academic year, students who have fulfilled these requirements will be eligible for the M.D. degree.

Doctor of Medicine, Five-Year Program

In addition to the regular four-year program leading to the M.D. degree, this program permits the student to spend one additional year in an investigative or research concentration. The program must be arranged subject to the approval of the Committee on Medical Education.

M.D./Ph.D. Medical Scientist Training Program

The School of Medicine offers a combined M.D./Ph.D. program within the Division of Biology and Biomedical Sciences (see p.155), designed for selected students who are interested in a research career and whose undergraduate education has placed major emphasis on science. The program permits the student to obtain both the M.D. and the Ph.D. degree, usually within six years of study. The major purpose of the program is to prepare medical scientists, skilled in the study of modern biology, for clinical and preclinical faculties of medicine. Financial support in the form of stipends and tuition remission will be available for a period of six years to all students admitted to the program. A stipend of \$3,900 per year for each of the six years will be paid. This stipend is obtained from National Institutes of Health

grants and is subject to their policies governing funding.

Eligibility

Applicants must meet the requirements for admission to both the School of Medicine and the Graduate School of Arts and Sciences. In addition to the minimum requirements established for acceptance into both schools, students planning to concentrate in disciplines related to the chemical or physical sciences should have completed mathematics through calculus, physics and physical chemistry (with calculus as a prerequisite), and advanced organic chemistry.

A course in differential equations is also recommended. For students whose major interests are in the biologic areas of medical sciences, the requirements for chemistry are less rigorous, but a strong background in mathematics and physics is essential. Although most individuals will enter the program as first-year students, applications will be accepted from students in residence. Only students who have spent the equivalent of one summer in a research laboratory should apply to the program.

The Program

The program consists of three segments: (1) two years of the usual medical curriculum, (2) three or more years of work in preparing a thesis to satisfy requirements for the Ph.D. degree, and (3) a final year which is the usual clinical year of the medical curriculum, individually adjusted to each student's requirements and career goals. This sequence may be adjusted to fit individual requirements. In particular, students who wish to begin their research after the first year in the School of Medicine may do so after consultation with the Medical Scientist Training Program Committee. Since the fourth year of medical school is completely elective, the medical scientist will have taken the equivalent of that year while preparing his thesis,



and thereby he will have completed the total requirements for the M.D. degree.

While the Medical Scientist Training Program includes all those medical courses required for the M.D. degree, it incorporates a high degree of flexibility for individual students through a wide range of electives and the large number of thesis programs available at Washington University.

The members of the Medical Scientist Training Program Advisory Committee are available to students to help them decide in which elective courses and laboratories they will participate.

Usually the following courses will be taken in the first two years.

Year 1

First Semester: Gross Anatomy, Biochemistry, Microbiology, Social Aspects of Medicine.

Second Semester: Microscopic Anatomy, Physiology, Neural Sciences, Genetics, Topics in Clinical Medicine, Biostatistics.

Year 2

Third Semester: Pathology, Pathophysiology, Pharmacology, Introduction to Clinical Medicine.

Fourth Semester: Pathology, Pathophysiology, Pharmacology, Radiology, Neurology, Surgery, Ophthalmology, Otolaryngology, Introduction to Clinical Psychiatry, Introduction to Clinical Medicine.

Students begin their training on July 1 of the year they enter the School of Medicine. The first two weeks of the summer will be spent visiting the various departments in the School of Medicine in order to select a laboratory for summer research. Students will also spend the summer between their first and second years doing research. The laboratories selected for summer research need not be the same laboratory ultimately chosen for the Ph.D. portion of the program.

A student who passes a qualifying examination in any of the regularly offered preclinical courses will be allowed to substitute either advanced course work or laboratory research in the time made available. In this way many students will have an opportunity to begin supervised research immediately after entry. Research can be continued in free periods during the first two years.

The courses differ from the usual medical courses with respect to the laboratory training periods and the availability of additional electives. As students enrolled in the program will have begun laboratory work during the summer and will receive additional intensive laboratory training, they may elect, with approval of the Medical Scientist Student Advisory Committee, to omit the laboratory component of a course or to take selected parts of a laboratory component. The time not utilized in the normal laboratory components will be spent in research laboratories and in elective tutorial courses which are offered to supplement in depth the normal course material. These courses

include advanced biochemistry, microbial genetics, immunology, neurobiology, biophysics, cell biology and cytology, advanced pharmacology, and pathobiology. In addition, the formal graduate courses are available to the more advanced students.

The performance of each student will be reviewed annually, and he will be expected to maintain a high scholastic standing.

Years 3, 4, 5

The student will spend the third, fourth, and fifth years, and possibly a sixth year, in satisfying the requirements of the Graduate School of Arts and Sciences for the Ph.D. degree. Before beginning the third year, the student will select a faculty adviser under whom he will do his thesis research and the training program or department in which he will obtain his Ph.D. degree.

The formal requirements for the Ph.D. degree include (1) completion of course work, (2) successful performance in a qualifying examination, usually at the end of the third year, (3) execution of original research suitable for a dissertation, and (4) defense of the thesis. Students are also required to do a teaching assistantship for a semester in one course.

For purposes of graduate training, the Division of Biology and Biomedical Sciences is divided into the following programs: cellular and developmental biology, molecular biology, neural sciences, plant biology, and population biology and ecology. The programs are taught by faculty from all of the preclinical departments of the School of Medicine and from the Department of Biology of the Faculty of Arts and Sciences. These programs provide maximum flexibility for student training and, by providing for interdepartmental teaching, not only avoid duplication but assure that each course is taught by the most qualified faculty, regardless of departmental affiliation. Therefore, course requirements reflect the student's background and interests rather than a rigid

course sequence. Students may also receive their graduate training by special arrangement in other graduate science departments within the University.

A detailed listing of the various courses available in the Division of Biology and Biomedical Sciences can be found on page 143 as well as in the sections describing the various departments of the School of Medicine.

A program of special monthly seminars will be arranged for students during the research years. Conducted by medical scientists of the clinical departments of the School of Medicine, these seminars are aimed at stimulating student interest in clinical medicine and at increasing awareness of major research problems in clinical medicine.

Final Year in Clinical Medicine

The sixth year is the clinical year of the normal medical curriculum. The intensive clinical training provided in this year is the last formal requirement for the M.D. degree. The Ph.D. and M.D. degrees will be granted simultaneously at the end of the final clinical year.

TUTORIALS AND INDIVIDUALIZED PROGRAMS

The educational program is designed to meet the needs of all medical students in an individual and a personalized way. To help students who may be having academic difficulty or who may wish to reinforce their studies, individual tutorials are offered. The School's experience is that tutorials enable students to handle course work with improved proficiency. Students who are found to have difficulties in handling the normal academic course load will be asked to take an individualized program which would require five rather than four years to complete.

GRADES

In order to assist the student in evaluating his progress, he is graded in each course by

the faculty. In the clinical and elective years, grades are accompanied by detailed descriptive comments characterizing each student's performance. This type of evaluative data is of considerable assistance to the student when applying for internship or residency training, since it permits the Assistant Dean for Post-Graduate Training to give each hospital to which the student has applied a meaningful, comprehensive summary of the student's attributes, abilities, and performance.

A Pass/Fail grading system is employed for the first semester of the freshman year. At the end of every academic year each student receives a grade report that indicates achievement in each course taken. The official transcript, in addition to listing courses and grades achieved, gives the grade distribution in each course with the exception of elective courses.

Grades are:

- H = Honors
- HP = High Pass
- P = Pass
- F = Fail
- DF = Deferred
- INC = Incomplete

"Honors" is given for a truly outstanding performance, "High Pass" for very good work, and "Pass" for satisfactory work. "Fail" signifies clearly unsatisfactory performance, "Deferred" indicates a marginal performance with some deficiency that must be removed, and "Incomplete" denotes that course work has not been completed.

If a departmental coursemaster submits a grade of "Incomplete," "Deferred," or "Fail" for a medical student duly enrolled in any medical school course, the coursemaster will include an accompanying statement which contains the following information:

1. Student's name.
2. Course title.
3. Inclusive dates of course.

4. Grade.
5. Description of extent of academic encumbrance.
6. Remedial action recommended to remove the academic encumbrance.

This type of statement will be submitted to the Office of the Registrar at the time student grades are reported and prior to the scheduled meetings of the various committees on academic review and promotions.

PROMOTIONS

A faculty Committee on Academic Review and Promotions reviews the records of all students by curriculum level.

First-Year Curriculum

The Committee on Academic Review and Promotions-I meets several times each year, near the middle and at the end of each semester, to review and evaluate the academic performance of all medical students in the first year of the preclinical curriculum and to take appropriate action on individualized programs, reexaminations, repeat of course(s), leave(s) of absence, dismissal from the class, and promotion to second-year class status in accordance with specific rules.

1. All students with failing, deferred or incomplete grades shall be informed, as soon as possible, of the Committee's decision and of the remedial action required. Where necessary, reexaminations will be held in mid-August, following the spring semester of the first year. All grade encumbrances must be changed to a passing or failing level by the beginning of the next fall semester.

2. Students who still have failing grades in two major courses by the beginning of the fall semester will be dropped from the School or, if there are extenuating circumstances, from the class. For this purpose, Biological Chemistry, Microbiology, Gross Anatomy, Physiology, Microscopic Anatomy, and Neural Sciences are considered major courses. In the case of a student who still

has one failure in a major course by the beginning of the fall semester, the Committee, on the advice of the department concerned, shall determine when and how the encumbrance must be removed.

3. During or at the end of the first year, the Committee may recommend that a student take an additional year to complete the first year's work. A student who chooses not to accept this recommendation will be permitted to complete the normal course work of the first year and, if necessary, to take reexaminations during the following August in courses failed. However, if such student, after reexamination, still has failing grades in two or more major subjects, he will be dropped from the School. A student who has taken two years to complete the first year's work and still has a failing grade in any major subject at the beginning of the fall semester will be dropped from the School.



Second-Year Curriculum

The Committee on Academic Review and Promotions—I meets approximately every twelve weeks during the academic year to review and evaluate the progress of students within its curricular aegis and to take appropriate action on individualized programs, reexaminations, repeat of course(s), leave(s) of absence, dismissal from the class, and promotion to the status of Candidate for M.D. Degree (signifies that the student has completed all requirements in the preclinical curriculum in the School of Medicine and is qualified to begin the clinical teaching period) in accordance with specific rules.

1. In major courses all grades below passing (fail, deferred, or incomplete) shall be accompanied by a written statement from the coursemaster indicating the amount and kind of remedial action that is considered necessary in order to bring the student's knowledge of the subject to an acceptable level.

2. All students with grades below passing shall be informed as quickly as possible of the Committee's decision and the remedial action required. The Committee may require a student with fail, deferred, or incomplete grades to take reexamination(s) at the end of the first six or twelve weeks of the summer term following the second year, postponing the start of the third year until the academic encumbrance(s) is(are) removed. All such encumbered grades must be changed to the pass or fail level by the beginning of the fall semester. If a student still has a failing grade(s), the Committee may drop the student from the School or permit him to repeat the second year. A student who fails a major course or courses after repeating the second year shall be dropped from the School.

The Committee on Academic Review and Promotions—II will neither promote a student to the status of Candidate for the Doctor of Medicine Degree nor permit a

student to begin a Clinical Clerkship until all first- and second-year course work has been satisfactorily completed.

Beyond the Second-Year Curriculum

The Committee on Academic Review and Promotions—III meets at least twice each year to review the academic progress of all students who have been promoted or admitted to the status of Candidate for M.D. Degree. This includes students in the regular four-year degree program, students taking a five-year degree program, students in the clinical portion of the Medical Scientist Training Program, those selected students with a prior Ph.D. degree who have been approved by the Medical Science Training Placement Curriculum Committee for individualized curricula and are now in the clinical training period of their program (having previously been promoted to the status of Candidate for M.D. Degree), and all others who have successfully completed all aspects of the School's preclinical curriculum. Just prior to the end of each academic year, the Committee meets and recommends to the Executive Faculty those students who, in the opinion of the Committee, are qualified to receive the degree of Doctor of Medicine. Specific rules are as follows:

1. All academic encumbrances must be removed in order for a student to be recommended for graduation.

2. A candidate having failures in two subjects may, at the discretion of the Committee, be dropped from the School or may continue with an individualized program.

STUDENT RESEARCH FELLOWSHIPS

No matter what medical career an individual chooses, it will be essential for him to evaluate and use fresh knowledge as he moves through his professional life. Student Research Fellowships, awarded each year to selected students who undertake research projects under the direction of faculty members, are an important part of the educa-

tional program. These fellowships offer students an opportunity to attempt original work, thus adding another dimension to their experience as investigators. This research allows students to discover at first hand the problems of obtaining and assessing new information. Selected faculty members serve as advisers to students interested in special research opportunities.

Fellowships are available to students after admission to the School. They are granted for a minimum of two months. The research



must be undertaken during the student's free time or a vacation period. A number of studies conducted by students are significant enough to be reported in scientific journals.

INTERNSHIPS AND RESIDENCIES

Although not required by all states for licensure, an internship in an approved hospital is considered essential preparation for the practice of medicine, and most graduates seek additional experience by serving as residents, and perhaps later as fellows, for periods up to five years.

In order to aid students in obtaining desirable intern appointments, an active counseling program is maintained by the Assistant Dean for Post-Graduate Training. Thus, in their junior year, students are provided with general background information about the kinds of internships available. Since many more internships exist than there are candidates in any given year, students are able to exert a considerable measure of selection.

The Assistant Dean for Post-Graduate Training maintains an open file of brochures and other descriptive data regarding internships throughout the country. Included are evaluations of their own internships obtained from our recent graduates. The School participates in the National Intern and Resident Matching Program, which offers distinct advantages to applicants.

The School maintains an active interest in its graduates and is pleased to assist them in subsequent years as they seek more advanced training or staff appointments in the communities in which they settle.

POSTDOCTORAL TRAINING

Those departments which offer Postdoctoral Fellowships individualize such educational activity up to a maximum of 36 months of academic time. Such fellowships lead integrally to certification by the appropriate specialty and/or subspecialty boards of the American Medical Association.

Admission



The Washington University School of Medicine selects students on the basis of character, attitude, interest, intellectual ability, motivation, and superior scholastic achievement. Applications are reviewed and independently evaluated by members of the Committee on Admissions. Final decisions are made by the sixteen-member faculty committee as a whole. All applicants are interviewed prior to their acceptance.

University policies and programs are non-discriminatory. Washington University encourages application from and gives full consideration to all applicants for admission and financial aid without respect to sex, race,

color, creed, or national origin. University policies and programs are non-discriminatory. The School of Medicine is committed to recruiting, enrolling, and educating an increased number of students from racial minority and educationally deprived groups.

ENTRANCE REQUIREMENTS

Entrance requirements to the School of Medicine are:

1. evidence of superior intellectual ability and achievement;
2. completion of at least 90 semester hours of college courses in an approved college or university;



3. completion of the Medical College Admission Test of the Association of American Medical Colleges;
4. evidence of character, attitude, and interests suitable for a career in medicine.

Chemistry, physics, and mathematics provide the tools for modern biology, for medicine, and for the biological basis of patient care. Thus, a firm grounding in these subjects is essential for the study of medical sciences. Entering students are expected to have had at least the equivalent of one-year courses at the undergraduate level in physics and biology; to have studied mathematics through integral calculus; and to have a background in chemistry, including organic chemistry. A course in physical chemistry (with calculus as a prerequisite) is strongly recommended. In selected instances, one or more of these prerequisites may be waived by the Committee on Admissions, but applicants are strongly advised to pursue their interests in these and in other areas of science.

A major goal of college should be develop-

ment of the intellectual talents of the individual. This often involves the pursuit of some area of knowledge in depth, whether in the humanities, social sciences, or natural sciences. At the same time, a diversity of background is encouraged in order to provide a necessary foundation for cultural development. Specific courses, other than the few in the natural sciences, are not presented as prerequisite because a great variety of courses may prepare the student for the many roles he may play in his medical career.

APPLICATION PROCEDURE

The Washington University School of Medicine participates in the American Medical College Application Service (AMCAS) of the Association of American Medical Colleges. AMCAS is a centralized procedure for applying to any participating medical school with only one application and one set of official transcripts of academic work.

The AMCAS Application for Admission, common to all participating medical schools, is distributed solely by the AMCAS. For this reason, individuals requesting an application and a *Bulletin* from Washington University will receive an AMCAS Application Request Card and a brochure which describes the School of Medicine. The *Bulletin* is mailed to candidates upon receipt of their application credentials from AMCAS. Applicants are urged to file their applications as early as possible.

Early Decision Admission

This is an optional program for the applicant whose first choice school of medicine is Washington University and who desires an admission decision on his application no later than October 1, 1976. To receive this special consideration, the applicant must agree: (1) to apply only to this School prior to receiving its admission decision; (2) to accept a position in the class if offered; (3) to submit all required credentials to AMCAS

by August 15, 1976, and (4) to visit the Medical Center for interviews on a mutually convenient date prior to September 1, 1976. The academic record must show either completion or plans for completion of all courses required for admission, 90 semester hours of course work, and a cumulative grade-point average above 3.70. Medical College Admission Test scores must be above 600. There is no quota on the maximum number of positions in the class of 120 to be filled by Early Decision applicants. The AMCAS Application for Admission contains complete instructions regarding "Early Decision" programs.

Regular Admission

Other than special handling and processing of Early Decision applicants, all applicants for admission to the Washington University School of Medicine are treated initially with equal consideration. The deadline for receipt of the application at AMCAS is November 1, 1976.

The Committee on Admissions promptly evaluates the AMCAS application and advises the applicant whether or not he appears to be competitive for a position in the first-year class. The most highly qualified candidates in the applicant pool are encouraged to complete the required additional credentials. At this stage, a nonrefundable Application Service Fee of \$20 is charged by the University. Selected applicants are strongly encouraged to visit the Washington University Medical Center and to have interviews. Applicants are notified as soon as a final admission decision has been made on their application.

Personal Interview

The Committee on Admissions would like to interview every applicant who passes the initial evaluation screening process, but since this involves several thousand applicants, it is physically impossible to accomplish. Therefore, selected applicants are in-

vited to visit the Washington University Medical Center for an interview, as well as a tour of the School of Medicine and its hospitals. This visit will provide an opportunity for the applicant to meet and talk with students and faculty members.

If an applicant is planning an interview trip which will include the St. Louis area, it is entirely appropriate for him to write the Office of Academic Records and Admissions and inquire if an interview will be requested of him. The inquiry should be made at least three weeks in advance of the anticipated travel. From September to June, the Office of Admissions is open on week days and until noon on Saturday. During the summer months, the office is closed on Saturday.

During November and December, 1976, members of the Committee on Admissions usually visit various parts of the country to interview selected applicants. However, an on-campus interview in St. Louis is deemed highly preferable.

ADVANCED STANDING

Applicants who have satisfactorily completed one or two years of study toward the M.D. degree at an approved medical school in the United States may be accepted for admission to the second- or third-year class when vacancies exist, provided that

1. they comply with the requirements for admission to the first-year class;
2. they have satisfactorily completed courses equivalent in general content and duration to those in this School in the years for which credit is asked;
3. they pass any examinations required by the Committee on Admissions in subjects already covered.

An applicant for admission to an upper class must have studied as a matriculated medical student in an approved medical school for a period equivalent to that already spent by the class to which admission is sought.

Financial Information



TUITION AND FEES

The following fees are applicable to the 1976-77 academic year:

Application (nonrefundable)	\$ 20
Acceptance deposit (to reserve a place in class; applied to first-semester tuition; refundable upon written request)	100
Tuition (including health fee)	3,450

The University reserves the right to change the fees herein stated at any time without notice. However, if a change is made, it will not become effective until the next academic year.

REFUNDS

A student who withdraws from the School will receive a prorata refund of tuition and appropriate fees. The refund will be based on the ratio of the class days enrolled (from the first day of classes to the day withdrawal permission is granted) to the total number of class days in the term for which tuition and fees were paid. If tuition and fees were paid entirely or in part by financial aid from the School, the refund will be applied first to the total repayment of the accounts from which financial aid was drawn, with any remaining refund balance given to the student. Financial aid received in excess of the

costs of tuition and fees must be refunded by the student to the School on the same prorata basis as calculated for the tuition refund outlined above.

ESTIMATE OF EXPENSES 1976-77

An estimate of the expenses of a single student for one academic year is given below. The total of these figures suggest a basic minimum budget of approximately \$5,511 for a first-year single student. Allowances for entertainment, travel, clothing, and other miscellaneous items must be added to this estimate.

Tuition (including student health fee)	\$3,450
Microscope rental	90
Books and supplies	350
Housing (Olin Residence Hall)	621
Board (Medical Center Cafeterias)...	1,000

FINANCIAL ASSISTANCE

The ability to finance a medical education at Washington University does not influence the student selection process. At the time accepted students indicate they will matriculate in the School of Medicine, they may request an application for financial aid.

As all students accepted for admission have proven scholastic ability, financial assistance is awarded on a basis of documented financial need which cannot be met by student and family resources. Many students who consider themselves independent of their parents arrange loans from parents with specific terms of repayment and interest.

The 1976-77 Application for Financial Aid is divided into two portions: Part one, Applicant Data, concerns biographical and financial information on the applicant and spouse (or spouse-to-be). Family Data, the second portion, is sent to the applicant's parents, with the applicant's knowledge, to expedite the processing and to maintain the confidentiality of the information. An official

copy of the parents' and the applicant's U.S. individual income tax return completes the data required for financial aid consideration.

The School asks that both portions of the application be returned to the Committee on Student Financial Aid within one week from the date the materials were sent from the School. The Committee makes an award decision normally within two weeks from the date the complete Application for Financial Aid (Applicant Data, Family Data, and appropriate income tax returns) is received. All information is evaluated by the Committee on Student Financial Aid and is held in strict confidence. Awards are in the form of scholarship or grants and loans.

All awards are made for a given academic year; however, students may renew financial assistance in succeeding years of medical school if they remain in good academic and personal standing, and if there is continued financial need. Awards made to a student may vary from year to year, depending upon the student's needs and upon the availability of funds to the Committee. Students are responsible for filing applications for renewal of awards in the spring of each year. Medical students married to schoolmates should submit individual applications, together with financial statements from each student's parents. First- and second-year students are urged not to accept employment during the academic year. A number of third- and fourth-year students find employment in hospitals within the Medical Center. The Personnel Office provides assistance to students' spouses seeking employment.

The Committee holds that students receiving assistance have an obligation to notify the Committee if their financial situation changes, for example, through employment or receipt of a scholarship not anticipated at the time the application was submitted.

Students are not permitted to travel outside continental United States during the aca-

demie year in which they receive financial aid from the School.

Scholarship Funds

Gilbert L. Chamberlain, M.D., Scholarship Fund. Created in 1971 by Dr. Gilbert L. Chamberlain to be used to aid worthy students in acquiring their medical education.

Cecil M. Charles—Nu Sigma Nu Medical Student Scholarship Fund. Established by the Nu Sigma Nu Medical Fraternity in memory of Dr. Charles.

Grace Strong Coburn Scholarship Fund. Created in 1962 through the bequest of Mrs. Grace Strong Coburn for scholarships in the School of Medicine.

T. Griswold Comstock Scholarships. Established under the will of Marilla E. Comstock for students who would otherwise be unable to obtain a medical education.

Anna M. DuBois Scholarship Fund. Established in 1973, with the bequest of Mrs. DuBois, to aid students in training to be physicians.

Dr. Charles Drabkin Scholarship Fund. Created in 1964 to provide financial assistance to medical students.

George F. Gill Scholarship Fund. Instituted in memory of a former clinical professor of pediatrics.

Harvielle-Bailey Scholarship. Established in 1970 under the will of Miss Isabel Bailey Harvielle as a memorial to Dr. Charles Poplin Harvielle and Dr. Steele Bailey, Jr., alumni of the School.

Health Professions Scholarship Grant. Established by federal legislation to enable students from low income families to undertake the course of study required to become physicians.

Dr. Grace Huse Memorial Fund. Provides scholarship awards for deserving Washington University medical students.

Insurance Medical Scientist Scholarship Fund. Established for the training of promising scholars intent upon a career in research and academic medicine.

Jackson Johnson Scholarship Fund. Provided through a bequest in 1930 from Jackson Johnson.

George D. Kettelkamp Scholarship Fund. Established in 1969 by Mrs. Kettelkamp in memory of her husband, an alumnus of the School of Medicine.

Eliza McMillan Scholarship Fund. Provides assistance to young women in any of several schools of the University to secure an education.

Medical Center Alumni Scholarship Fund. Awarded on the basis of academic achievement and financial need.

Roy B. and Viola Miller Memorial Fund. Created in 1963 through the bequest of Roy B. Miller to provide scholarships for medical students and for postgraduate students engaged in study and research in the medical sciences.

Mr. and Mrs. Spencer T. Olin Fellowships for Women. Provides for annual stipend and cost of tuition to women in any of several disciplines. Application deadline is February 1.

Henry and Louise Reller Scholarship. To be given to medical students in the name of the parents of Louise Reller.

Samuel Jennings Roberts Scholarship Fund. Created to provide scholarships for any students engaged in study leading to the degree Doctor of Medicine.

Robert Allen Roblee Scholarship Fund. Established in 1948 through the gift of Mrs. Joseph H. Roblee for students in the School of Medicine.

Thomas W. and Elizabeth J. Rucker Scholarship Fund. Created in 1956 under the will of Eugenia I. Rucker, in memory of her mother and father.

Joseph H. Scharf Scholarship Fund. Provided in 1949 through the bequest of Dr. Joseph H. Scharf.

School of Medicine Scholarship Fund. Created in 1970 to provide financial assistance for medical students.

Dr. John B. Shapleigh Scholarship Fund. Established in 1926 with the bequest of Dr. John B. Shapleigh and supplemented by contributions from Mrs. Shapleigh and Miss Margaret Shapleigh.

Alexander Balridge Shaw Scholarship Fund. Created in 1958 through the bequest of Roy A. Shaw in memory of his father, Dr. Alexander Balridge Shaw.

Beulah B. Strickling Scholarship Fund. Established in 1960 with a bequest from Mrs. Beulah B. Strickling.

The Marleah Hammond Strominger Scholarship. Established in 1971 by the family and friends of Marleah Hammond Strominger. The recipient shall be a motivated student with need for financial assistance and shall come from a disadvantaged background.



Dr. Earl W. Sutherland Memorial Scholarship Fund. Established by the graduating class of 1941 as a memorial to their classmate and Nobel Laureate.

Edwin H. and Virginia M. Terrill Scholarship Fund. Established in 1964 with the bequest of Dr. Edwin H. Terrill, an alumnus. It was Dr. Terrill's hope that scholarship recipients would repay into the Fund the amount of the award.

Hiromu Tsuchiya Scholarship Fund. Created to provide scholarships in the School of Medicine.

The Tuholske - Jonas - Tuholske Medical Scholarship Fund. Established in 1974 by Rose T. Jonas in memory of her father, husband, and brother. The recipient shall be a senior student preparing to enter the field of surgery, obstetrics and gynecology, or internal medicine.

Scholarship and Loan Funds

Isabel Vallé Brookings Scholarship and Loan Fund. Established in 1957 by Isabel Vallé Brookings (Mrs. Robert S.) for scholarships and loans in the School of Medicine.

Danforth Foundation Loan and Scholarship Fund. Provides financial assistance for medical students.

Danforth Medical Foundation Fund. Created through gifts from the Danforth Foundation and the late William H. Danforth to furnish loans, scholarships, or outright grants to talented and promising young men and women engaged in study or research in basic medical or clinical sciences.

Robert Wood Johnson Foundation Fund. Created in 1972 to provide financial assistance for students who are from rural backgrounds, members of specified minority groups, and women.

William H. and Ella M. Schewe Fund. Established to provide financial assistance to worthy students in the medical school.

School of Medicine Loan and Scholarship Fund. Created in 1970 to provide financial assistance for medical students.

Wilkinson Scholarship Fund. Created in 1968 by the bequest of Anna J. Wilkinson in honor of her husband, Dr. George E. Wilkinson. Medical and postdoctoral students are eligible for Wilkinson scholarships or loans.

Loan Funds

American Medical Association Loan Program. Makes available bank loans without collateral to eligible medical students, interns, or residents who are citizens of the United States. Applications for such loans are made through the Education and Research Foundation of the American Medical Association.

Ruth Elizabeth Calkins Scholarship Loan Fund. Established by Dr. Delevan Calkins in honor of his granddaughter.

Health Professions Student Loan Fund. Established by federal legislation for medical students with a demonstrated financial need. Loans are available for long terms at favorable rates.

Ursula Hecker Loan Fund. Established in 1967 by a bequest from Ursula Lee Hecker for the use and benefit of worthy, deserving, and needy medical students.

W. K. Kellogg Foundation Loan Fund. Provides financial assistance to medical students in need of such aid.

Gustel and Edith H. Kiewitt Scholarship Loan Fund. Provides loan funds for medical students.

Ophelia H. Kooden and Violet G. Sachs Loan Fund. Created in 1970 to provide loans for medical students in memory of the donors' brother, Jess Klement Goldberg.

G. H. Reinhardt Memorial Scholarship Loan Fund. Established in 1947 through the bequest of G. H. Reinhardt.

The Aline Rixman Loan Fund. Created in 1940 by William Rixman in memory of his wife, the fund is used to alleviate unexpected financial emergencies of medical students.

Caroline O. Schlesinger Loan Fund. Established in 1969 to provide financial support for medical students.

FELLOWSHIP AND OTHER FUNDS

Alexander and Gertrude Berg Fellowship Fund. Created in 1952 through the bequest of Gertrude Berg to provide a fellowship in the Department of Microbiology.

Glover H. Copher Fellow in Surgical Research. Established in 1971 to support a postdoctoral fellow in surgery.

William H. Danforth Loan Fund for Interns and Residents in Surgery. Provides financial assistance in the form of loans for postdoctoral students in surgery.

J. Albert Key Fellowship Fund. Provides a stipend for a fellow in orthopedic surgery.

Louis and Dorothy Kovitz Fellowship in Surgical Research. Established in 1970 by an alumnus and his wife to encourage medical students to pursue their interest in surgery.

George W. Merck Memorial Loan Fund. Established in 1959 through the Merck Company Foundation to encourage deserving interns and residents to seek the best possible post-doctoral training.

The Esther and Morton Wohlgemuth Foundation Fellowship. Established to support a fellow in the Division of Cardiovascular Diseases.

Student Research Fellowships. Awarded each year to students who undertake special research projects under the direction of a faculty member. They carry a stipend. Application should be made to the Committee on Fellowships and Awards, which supervises the program.

AWARDS AND PRIZES

Alpha Omega Alpha Book Prize. Awarded at the end of the fourth year to a member of that class who has performed outstandingly for the entire medical course.

Alexander Berg Prize. Awarded to the student presenting the best results in research in bacteriology.

The Jacques J. Bronfenbrenner Prize. Provided by Dr. Bronfenbrenner's students in memory of his inspiration as a teacher and scientist, and awarded to the member of the graduating class who, in the judgment of the Chairman of the Department of Medicine, has done the most outstanding work in infectious diseases or related fields.

Dr. Richard Brookings and Dr. Robert Carter Medical School Prizes. Provided for medical students through a bequest of Robert S. Brookings.

The Kehar S. Chouke Prize. Awarded at the end of the first year to a medical student who has demonstrated superior scholarship in anatomy.

CIBA Award for Outstanding Community Service. Recognizes a sophomore student who has performed laudable extracurricular activity within the community.

The Carl F. and Gerty T. Cori Prize in Biochemistry. Awarded at the end of the first year to the member of the class who has demonstrated superior scholarship in biochemistry.

Edmund V. Cowdry Prize in Histology. Established in 1969 to honor Dr. Cowdry; awarded to a freshman medical student who has performed meritoriously in microscopic anatomy.

Antoinette Frances Dames Prize in Physiology and Biophysics. Awarded annually to a member of the first-year class who has demonstrated superior scholarship in these fields.

George F. Gill Prizes. One prize awarded at the end of the first year to a member of the

class who has demonstrated superior scholarship in anatomy; one prize awarded to a member of the graduating class who has demonstrated superior scholarship in pediatrics.

Dr. Alfred Goldman Book Prize. Created in 1972 as an annual award to be given to a student in the School of Medicine who, in the opinion of the Faculty, has done outstanding clinical or research work in diseases of the chest or pulmonary physiology.

Dr. J. E. Kirk Medical Scholastic Award Fund. Established in 1975 and awarded to a graduating student of high scholastic standing.

Louis and Dorothy Kovitz Senior Prize in Surgery. Senior award prize in surgery recognizing a member of the senior class who has shown the most outstanding ability, zeal, and interest in surgical problems.

Lange Medical Publications Book Awards. Given to members of all four classes for high scholastic standing and achievement in research.

Howard A. McCordock Book Prize. Awarded at the end of the second year to a member of that class for general excellence in pathology.

Edward Massie Prize for Excellence in Cardiology. Awarded to the member of the graduating class who in the judgment of the Director of the Division of Cardiovascular Disease of the Department of Medicine has done the most outstanding clinical or basic research work in the field of cardiovascular

Medical Center Alumni Scholarship Prize. Given annually to a student who has shown excellence in his work during the preceding year.

Medical Fund Society Prizes. One prize awarded annually to a student of the senior class who has excelled in the study of internal medicine; one prize awarded annually to a student of the senior class who has excelled in the study of surgery. No individual is eligible for both prizes.

Missouri State Medical Association Award. A scroll and a U. S. Savings Bond presented annually to an honor graduate of the senior class.

C. V. Mosby Company Book Awards. Made to five members of the graduating class for high general scholastic standing and research achievement.

St. Louis Internists Club Book Prize. Awarded to the graduating senior who has done the most significant research in any area of internal medicine.

St. Louis Pediatric Society Senior Prize. Presented to the senior student showing the greatest promise in clinical pediatrics.

James Henry Yalem Prize in Dermatology. Established by Charles Yalem in memory of his son and awarded annually to a member of the senior class for outstanding work in dermatology.

AIDS IN ALLIED HEALTH PROFESSIONS

Frank R. Bradley Scholarship Loan Fund. Established in 1958 by the Alumni Association of the Graduate Program in Health Care Administration as a loan fund in honor of Dr. Frank R. Bradley.

W. K. Kellogg Foundation Loan Fund for Graduate Students in Hospital Administration. Established in 1958 and supplemented in 1964.

Mary A. Lennon Memorial Scholarship Loan Fund in Health Care Administration. Established in 1958 by Maureen Lennon Callaghan and Lieutenant Colonel David E. Callaghan to provide loans for students in the Graduate Program in Health Care Administration.

Washington University Health Care Administration Scholarship Fund. Started in 1968 to provide help on the basis of need without interest or expectation of repayment.

Foster G. McGaw Scholarship Fund. Awarded to two students entering the Graduate

Program in Health Care Administration. Selection is based on financial need and potential for contribution to the profession.

Bertha Reinhardt Green Memorial Fund. Created in 1954 by a bequest from Bertha Reinhardt Green as a loan fund for students enrolled in the Program in Occupational Therapy.

W. K. Kellogg Foundation Loan Fund for Students in Physical Therapy. Created in 1943 for students in the Program in Physical Therapy.

Gustel and Edith A. Kiewitt Scholarship Loan Fund. Provides loan funds for students in Physical and Occupational Therapy.

Sandoz Award. Given annually to a graduating student who has made a meritorious contribution to psychiatric research.

Sidney I. Schwab Book Prizes. Awarded at the end of the fourth year for general excellence in neurology and psychiatry.

Margaret G. Smith Award. Given to a woman medical student for outstanding achievement in the first two years of medical school.

Samuel D. Soule Award in Obstetrics and Gynecology. Presented to a member of the junior or senior class for meritorious achievement in either basic or clinical investigation in obstetrics and gynecology.

Upjohn Achievement Award. Given to the senior student who has done the most meritorious work during his medical school career in the field of metabolism.

Dr. Samson F. Wennerman Prize. Donated by his wife, Zelta E. Wennerman, and awarded annually to that senior student who has demonstrated promise in surgery.

Hugh M. Wilson Award for Meritorious Work in Radiology. Given annually to a graduating medical student in recognition of outstanding work in radiology-related subjects, either clinical or basic science.

Student Life



HOUSING

The Off-Campus Housing Office, located at 6924 Millbrook Boulevard on the main campus, Box 1059, Washington University, St. Louis, Missouri 63130, telephone (314) 863-0100, extension 4423, maintains listings of housing appropriate for married and single students.

The Spencer T. Olin Residence Hall has accommodations for approximately 300 single men and women. This building, made possible by generous gifts from Spencer T. Olin and alumni and friends of the School of

Medicine, is located at 4550 Scott Avenue in the Medical Center. Olin Hall is planned for the convenience of students in the medical or paramedical sciences. Every effort is made to provide an atmosphere that not only aids him in meeting his study obligations, but also recognizes his privileges as a graduate student.

The rates for rooms during 1976-77 are:

<i>School Year: September-June (Nine Months)</i>	
Two-room suite	\$819
Single room	747
Double room	621

Summer 1976: for Three Months

Two-room suite	273
Single room	249
Double room	207

Summer 1976: Weekly Rates for Student Visitor

Two-room suite	33
Single room	27
Double room	22

Daily Rates for Visitors

Two-room suite	13
Single room	12
Single room (prospective student)	10

Each occupant is required to pay a \$25 security fee in addition to the room rental charge. This fee will be held by the University until termination of residence to cover losses resulting from possible damage to the room or the furniture. Any portion not so used will be refunded.

PARKING

Parking is available on a lot behind Olin Hall and in other lots located near to and operated by the School of Medicine. The use of the Busch lot is free to students, but a permit is required. An annual permit must be purchased for use of University-owned lots other than the Busch lot.

STUDENT HEALTH SERVICE

Entering students are given a complete medical examination and are provided with medical care as long as they are enrolled in the School of Medicine. Physicians are available at the Student Health Service, and a physician is on call for emergency care at Barnes Hospital or in the student's room when necessary. Essential costs of hospitalization are covered. The student or his family is responsible for meeting the costs of hospital care in excess of those paid by the Health Service. The responsibility of the Student Health Service for hospitalization costs will end thirty days after a hospitalized individual ceases to be an officially enrolled student.

Except in certain emergencies, costs will not be covered for out-patient care that is not arranged through the Student Health Service.

RECREATIONAL AND CULTURAL OPPORTUNITIES

The City of St. Louis offers many cultural and recreational facilities. The St. Louis Symphony Orchestra, second oldest in the nation, presents a series of concerts during the season. Live professional productions flourish in several theaters.



Professional sports are an important part of the St. Louis scene. The football and baseball Cardinals play in the handsome Busch Stadium downtown. The St. Louis Blues hockey team and the Spirits of St. Louis basketball team play at the Arena, not far from the School of Medicine. Francis Field, on the West Campus of the University, is the home of the St. Louis Stars soccer team.

Forest Park, adjacent to the School of Medicine and the Medical Center, contains among its lagoons and forested areas, bike trails, tennis courts, handball courts, golf courses, baseball fields, football fields, a skating rink, soccer fields, the City Art Museum, the McDonnell Planetarium, the City Zoo, the Museum of the Missouri Historical Society, and the Municipal Opera.

Within the University community excellent concerts, theater, lectures, and other cultural activities are open to students in the School of Medicine. Facilities for indoor and outdoor sports, including tennis courts and the Wilson Pool, are available on the West Campus. Olin Residence Hall contains an excellent full-sized gymnasium for student use.

WASHINGTON UNIVERSITY MEDICAL CENTER ALUMNI ASSOCIATION

The Washington University Medical Center Alumni Association plays a significant part in the life of the School. It was organized to promote a spirit of class fellowship among its members, to further the aims and purposes of the School, and to stimulate interest in the advancement of medical and collateral sciences.

Membership is made up of all graduates of the School of Medicine, all members of the faculty, and all former house officers of the Medical Center. Each year the Association gives a welcoming party for the incoming freshman class and, prior to Commencement on Alumni Day, sponsors the annual

alumni banquet at which graduating seniors are guests. The Alumni Day reunion features a scientific program presented by graduates and faculty members and a buffet luncheon at which the alumni and senior students are guests of the School of Medicine and its faculty.

The Alumni Office prepares and distributes a schedule of departmental teaching conferences held each week in the Medical Center and open to physician attendance.

LECTURESHIPS AND VISITING PROFESSORSHIPS

Several established lectures enable the School to bring to the Medical Center each year distinguished guests who contribute significantly to the richness of student life.

Harry Alexander Visiting Professorship. Established by former house officers and friends of Dr. Harry Alexander to provide an annual visiting professor in the Department of Medicine.

Alpha Omega Alpha Lectureship. Given each year by a faculty member of the students' selection.

George H. Bishop Lectureship. Supported by funds made available by friends interested in the advancement of neurology.

The James Barrett Brown Visiting Professorship in Plastic and Reconstructive Surgery. Created by patients, friends, colleagues, and former students to honor Dr. Brown.

The Thomas H. Burford Lectureship in Thoracic Surgery. Founded in 1971 by friends of Dr. Burford.

Glover H. Copher Lectureship in Cancer. Founded in 1971 with endowment provided by Dr. Copher and friends.

Joseph J. Gitt Visiting Professorship in Clinical Neurology. Established in 1971 by his family and friends to honor Dr. Gitt.

Graham Colloquium. A gift from Mr. and Mrs. Evarts Graham, Jr., in 1963 enabled



the School to establish a series of informal discussions led by outstanding scholars from fields other than medicine and the biological sciences. Mr. and Mrs. Graham's purpose was concordant with that of the School: to encourage opportunities for students to expand their views on social, philosophical, artistic, and political topics. The Graham Colloquia guests, selected by the students, are planned to foster an informal, lively exchange of views.

Evarts A. Graham Memorial Lectureship. Established with a reserve fund left by Dr. Graham for his successors.

Evarts A. Graham Visiting Professorship of Surgery. Established by the Harry Freund Memorial Foundation to support an annual

lecture in honor of Dr. Graham's contributions to surgery.

Samuel B. Grant Visiting Professorship. Created to provide annually a visiting professor in the Department of Medicine.

Alexis F. Hartmann, Sr., Lectureship. Established by friends interested in pediatrics to provide an annual lecture in Dr. Hartmann's honor.

H. Relton McCarroll, Sr., Visiting Professorship in Orthopedic Surgery. Created by patients, friends, colleagues, and former students in honor of Dr. McCarroll.

Carl V. Moore Lectureship. Established by friends and patients of Dr. Carl V. Moore.

Rose and Samuel Pollock Surgical Lectureship. Established by Dr. Joseph H. Pollock in memory of his parents. The 1976 lecture will be held in November and will be presented by Professor Maurice Mercadier of Paris, an international authority in biliary and pancreatic disease.

Wendell G. Scott Memorial Lectureship. Established in 1972 by friends and colleagues of Dr. Wendell G. Scott.

Major G. Seelig Lectureship. Established in the field of surgery by friends of Dr. and Mrs. Seelig.

Philip A. Shaffer Lectureship. Founded by friends of Dr. Shaffer in recognition of his accomplishments in biochemistry.

St. Louis Football Cardinals Visiting Professorship in Orthopedic Surgery. Made possible by a donation from the St. Louis Football Cardinals.

Robert J. Terry Lectureship. Established by alumni "for the purpose of fostering greater appreciation of the study of human anatomy."

Mildred Trotter Lectureship. Established by friends and former students of Mildred Trotter to bring a distinguished woman scientist to the School of Medicine each year.

Teaching Facilities



THE SCHOOL OF MEDICINE

The Washington University School of Medicine and the Medical Center are located along the eastern edge of Forest Park in St. Louis. Along the western edge of the park is the West Campus of the University. A regularly scheduled shuttle bus, operated for the benefit of students and faculty, brings the two campuses within ten minutes of each other.

The McDonnell Medical Sciences Building was made possible by James Smith McDonnell, a benefactor of Washington University. Dedicated in the fall of 1970, it is the prin-

cipal focus of activity for entering medical students. Rising nine floors above ground, it contains administrative offices and two lecture halls on the first floor. Multidisciplinary teaching laboratories for first- and second-year students, and offices and research laboratories for the seven existing basic science departments, as well as for the Division of Biology and Biomedical Sciences and the Department of Genetics, are located on upper floors. Modern, centralized animal quarters are housed in the basement.

The older structures—the West, North, and South buildings, in which centered the work of several Nobel Laureates—have been ex-

tensively renovated. Along with the Cancer Research Building, they will continue to provide space for laboratories, offices, the library, and some departmental facilities.

Biomedical Computer Laboratory

An outstanding group of computer scientists and engineers and their students are engaged in the development and application of computer technology to biomedical problems.

The Biomedical Computer Laboratory and the Computer Systems Laboratory are located in adjoining buildings at 700 and 724 South Euclid, which also house the Division of Biostatistics of the Department of Preventive Medicine and Public Health.

The Library

The School of Medicine Library is one of the largest medical libraries in the Midwest. It contains a collection of more than 150,000 volumes and subscribes to more than 2,000 serials. Special holdings include a rare book collection, the School's historical archives, memorabilia, and manuscript copies of the scientific papers of such outstanding men of medicine as Doctors William Beaumont, Joseph Erlanger, E. V. Cowdry, Evarts Graham, Leo Loeb, Philip Shaffer, Robert J. Terry, Carl V. Moore, and others.

The Library is deeply involved in computer research and use. It runs a serials control system for a number of medical libraries throughout the U.S. at cost and provides computer-produced indices to private collections of data for medical center faculty. Its cataloging is done in conjunction with the national computer group at the Ohio College Library Center in Columbus as an extension of its own computer cataloging. The Library provides services to local hospitals and is deeply involved in the seven-state Mid-Continental Regional Medical Library (National Library of Medicine).

A computer terminal in the main reading room is available for computer-assisted instruction and for searching remote computer data bases (including MEDLINE, Toxline, and Chemical Abstracts Condensates). A small collection of audio-visual materials is maintained.

Library hours are 8:30 a.m. to 12 midnight on weekdays; 8:30 a.m. to 6:00 p.m. on Saturdays; and 1:00 p.m. to 10:00 p.m. on Sundays. A student reading room is open twenty-four hours a day. In the summer and on holidays special hours are maintained.

THE MEDICAL CENTER, ITS HOSPITALS AND INSTITUTES

While the School of Medicine, from its beginnings, has maintained an association with local teaching hospitals, it was not until 1962 that the affiliated institutions were incorporated to form a central organization now known as the Washington University Medical Center.

In February, 1975, the Medical Center began a joint construction project of a "New Town in Town" surrounding the Center. In a three-stage, nine-year plan, the 36 block area will provide new and renovated apartments, single family homes, shops, restaurants, a neighborhood service center, office park area, street closures and public transportation.

The present Medical Center is a federation of several institutions owned by the University and five institutions owned independently. Students receive clinical instruction and gain experience in all divisions of the Medical Center.

The Barnes Group. Barnes Hospital is the largest hospital in the Medical Center. It is independently owned but, through a special agreement, operates all the hospitals and

clinics owned by the University. These contiguous facilities provide the chief source of clinical experience for medical students. The Group has a capacity of approximately 1,204 beds—teaching facilities for all clinical departments except Pediatrics. All activities of the School of Medicine and the Barnes Group are closely integrated, and the hospital staffs are composed exclusively of members of the Faculty of Medicine. The eighteen-story Queeny Tower has five nursing floors and two self-care floors, plus five floors of doctors' offices. A large central diagnostic laboratory provides modern diagnostic patient services.

The East Pavilion is a fourteen-story in-patient hospital owned jointly by Washington University and Barnes Hospital. This multidisciplinary patient-care center contains 64 private and 200 semi-private rooms, 30 beds for intensive care, obstetrical delivery suites, and 22 operating rooms for neurosurgery, ophthalmology, otolaryngology, and gynecology.

Facilities Owned by Washington University and Operated by Barnes Hospital

Renard Hospital provides 104 beds for patients with psychiatric disorders, and affords laboratories and offices for the Department of Psychiatry.

David P. Wohl, Jr., Memorial Hospital, opened in 1953, contains facilities for 76 medical and surgical patients. Offices and laboratories for the departments of Medicine and Surgery are also situated in Wohl Hospital.

David P. Wohl, Jr., Memorial—Washington University Clinics handle about 150,000 outpatient visits a year. Five floors of the building are devoted to the Clinics and five floors to research, including the Division of Health Care Research.

Other Facilities Owned by Washington University

William Greenleaf Eliot Division of Child Psychiatry. The Division conducts an ad-



vanced teaching program in child psychiatry and is the focus for research and treatment in child psychiatry.

Edward Mallinckrodt Institute of Radiology, one of the largest and best equipped in the world, houses the diagnostic, therapeutic, and research activities of the Department of Radiology. It is connected on most of its floors with the adjoining Barnes and Barnard hospitals, and through them with other hospitals of the group, thus providing easy access for all inpatients.

St. Louis Maternity Hospital houses offices and research laboratories for the Department of Obstetrics and Gynecology. A new Perinatal Center and laboratories for research in the physiology of reproduction are located in this building.

Irene Walter Johnson Institute of Rehabilitation is a center for training personnel in rehabilitation procedures, for treatment of disabled persons in the St. Louis metropoli-

tan area, and for research related to chronic diseases.

Oscar Johnson Institute for Medical Research. Occupying the top five floors of the McMillan Hospital, it provides office space and research facilities for the departments of Neurology and Neurological Surgery, Ophthalmology, and Otolaryngology.

McMillan Hospital houses offices and research laboratories for the departments of Neurology and Neurological Surgery, Ophthalmology, and Otolaryngology.

Other Institutions Formally Associated with the Medical Center

Barnard Free Skin and Cancer Hospital is independently owned but is operated by Barnes Hospital. It is a 44-bed hospital for the care and treatment of patients who suffer from skin diseases and cancer or who are



undergoing special tests in the Clinical Research Center.

St. Louis Children's Hospital. From its earliest days, the Children's Hospital, governed by its own directors, has been an integral part of the Medical Center and a leader in the development of academic pediatrics. All professional staff are members of the Faculty of Medicine, and the medical director is also professor and head of the Department of Pediatrics at Washington University. Considerable clinical service and research are conducted at Children's. Of particular interest is the recently created Ranken-Jordan Center for Metabolic Diseases.

Jewish Hospital of St. Louis contains 628 beds. Its departments represent each of the major specialties except pediatrics. The Aaron Waldheim Outpatient Clinics provide all facets of health care to the community, while the Yalem Research Building contains important research facilities for the Hospital and School of Medicine. The new nine-story Sydney M. Shoenberg Pavilion provides inpatient rooms, surgical suites, and facilities for radiology.

Central Institute for the Deaf. This nationally known institution provides facilities for research into hearing problems, maintains a school for deaf and speech-handicapped children, provides outpatient clinics for children and adults, and engages in a program of professional education for scholars in the fields of audiology and otolaryngology.

OTHER INSTITUTIONS

In addition to the above facilities which make up the Washington University Medical Center proper, the following hospitals are affiliated with the School of Medicine, and various members of the staffs hold University appointments.

The four City hospitals:

Max C. Starkloff Hospital, with 550 beds.

Homer G. Phillips Hospital, with 466 beds.

Robert Koch Hospital, with 778 beds.

Harry S. Truman Restorative Center, with 440 beds.

Malcolm Bliss Mental Health Center, with 250 beds.

Ellis Fischel State Cancer Hospital, Columbia, Missouri, with 113 beds.

St. John's Mercy Hospital, with 606 beds.

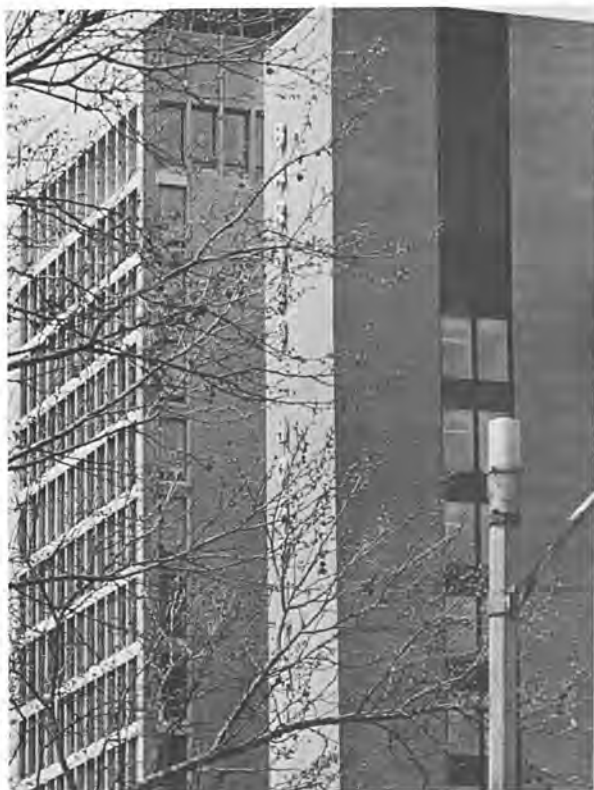
St. Louis Veterans Administration Hospitals, with 991 beds.

St. Louis County Hospital, with 220 beds.

St. Louis Shriners Hospital for Crippled Children, with 100 beds.

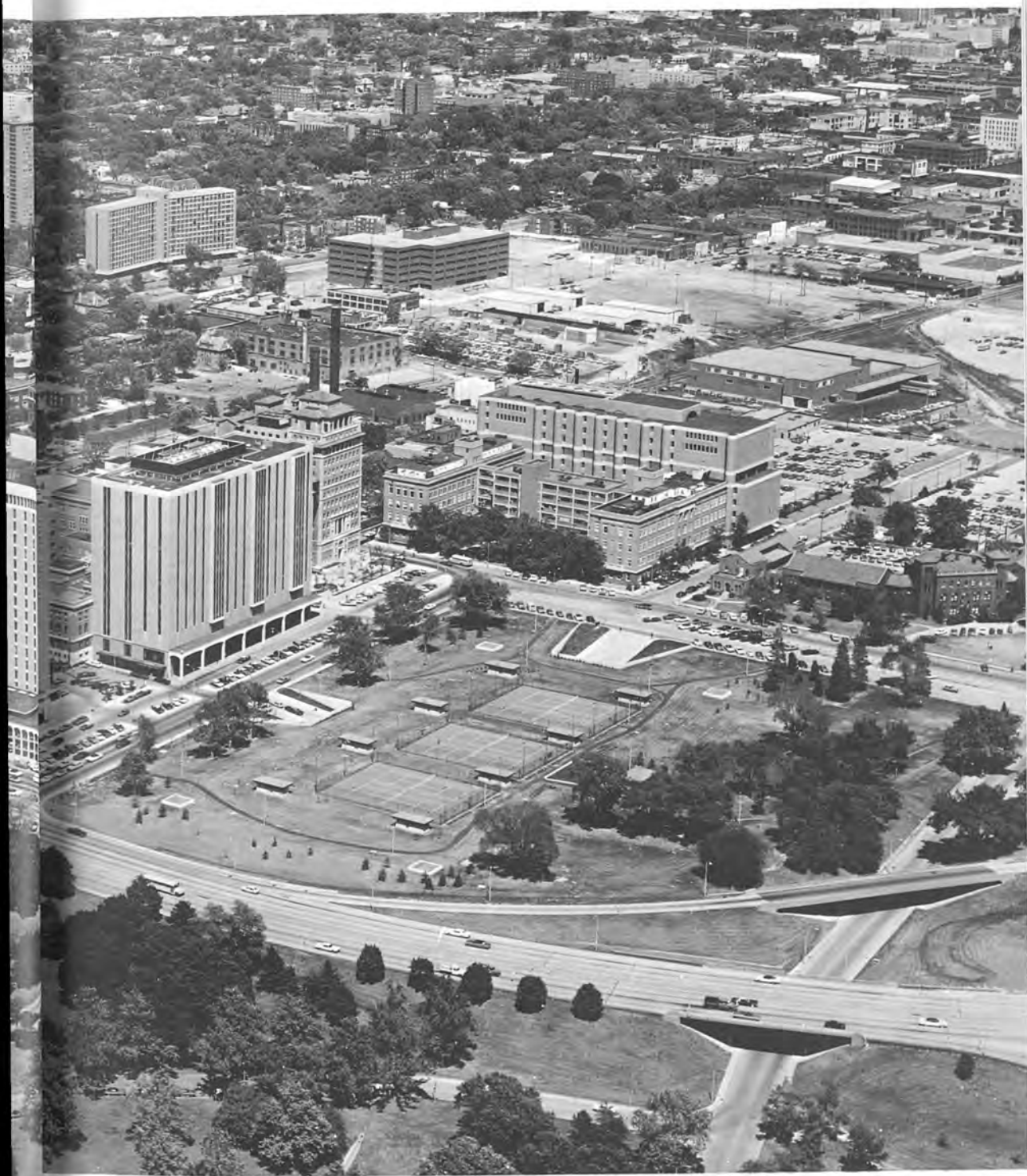
St. Louis State Hospital, with 1,429 beds.

St. Luke's Hospitals, with 502 beds.



Departments of the School of Medicine





Department of Anatomy and Neurobiology



The anatomical sciences are presented in three required courses: gross anatomy, offered in the first semester; and microscopic anatomy and neuroanatomy, taught in the second semester. The course in neuroanatomy is taught conjointly with the Department of Physiology and Biophysics. In addition, the Department offers a series of graduate courses which may be taken as electives by senior students. Gross anatomy is taught essentially as a laboratory course, but with some lectures dealing with anatomical principles and with human growth and development. The course in microscopic

anatomy consists largely of cell and tissue biology, with laboratory sessions paralleling the lectures in these areas. Neuroanatomy is taught mainly from an experimental point of view, with particular emphasis upon the development and organization of selected neural systems. Throughout all three courses, attention is paid to the results of recent investigations and to major developments in each field. The Department is well equipped for special work in several areas, including gross anatomy, electron microscopy, tissue culture, neuroanatomy, cell biology, and developmental and reproductive biology.

FIRST YEAR

Bio 501. Human Anatomy. The course is based on the dissection of the human body. An extensive collection of dissected specimens is housed in the dissecting rooms so that students may easily compare their dissections with museum specimens. X-ray films are used to complement the current dissections; cineradiographs are presented regularly. Fresh organs are provided for demonstration and dissection at appropriate times. Occasional attendance at autopsies is recommended. Frequent discussions are held with small groups of students. Credit 6 units.

Bio 506. Microscopic Anatomy. The structure of cells, tissues, and organs is studied with regard to the functional significance of the morphological features. The laboratories consist of the study of prepared slides, of preparations of fresh tissues, and of electron micrographs. Each student is required to rent a microscope from the School or have his own. Credit 6 units.

Bio 554. Neural Sciences. This course, taught conjointly by the Departments of Anatomy and Neurobiology and of Physiology and Biophysics, provides a broad introduction to modern neurobiology. The neuroanatomical aspects deal primarily with the tissues of the central nervous system from an experimental point of view. The course occupies approximately one day a week throughout the second semester. Credit 5 units.

RESEARCH

Bio 590. Research opportunities are offered in the following areas:

- The cell cycle and cellular differentiation. (Dr. Bischoff)
- The history of medicine. (Dr. Brodman)
- The cytology of neural tissues. (Dr. M. Bunge)
- The growth and maturation of neural tissues *in vitro*. (Dr. R. Bunge)

Cutaneous sensibility and electrophysiology of cultural neurons. (Dr. Burton)

The fine structure of the retina. (Dr. Cohen)

Neural growth and development. (Dr. Cowan)

Growth and differentiation of neuroblastoma and other cultured cell lines. (Dr. Goldstein)

Cell-cell recognition. (Dr. Gottlieb)

The anatomy of the somatosensory and auditory systems. (Dr. Jones)

The transport of materials across the placenta. (Dr. King)

The organization of the mammalian spinal cord. (Dr. Loewy)

The structure and function of the skin. (Dr. Menton)

Postnatal growth and development. (Dr. Peterson)

The organization of the olfactory system. (Dr. Price)

The physiology of the cerebellum. (Dr. Thach)

Cell growth and radiation effects. (Dr. Tolmach)

Computer applications to neuroanatomy. (Dr. Wann)

Axonal transport. (Dr. Willard)

The organization of the somatosensory cortex. (Dr. Woolsey)

ELECTIVES

The Department offers a number of graduate-level courses which may be taken as electives by medical students. The Department participates in the Division of Biology and Biomedical Sciences, which also offers courses relevant to anatomy. These course descriptions are presented in the section on Biology and Biomedical Sciences.

502. History of Anatomy. Seminar on historical problems in anatomy. Credit 2 units.

508. *Anatomy of Head and Neck.* Detailed dissection, with emphasis on maxillo-facial, auditory, and laryngeal structures. Credit variable, maximum credit 7 units.

510. *Special Anatomy of the Head and Neck.* Lectures and dissection, with particular emphasis on the face and oral structures. Credit 3 units.

Bio 428. *Developmental Neurobiology.*

Bio 455. *Neurocytology.*

Bio 457. *Somatosensory System.*

Bio 503. *Biology of Cultured Cells.*

Bio 512. *Human Growth and Development.*

Bio 513, 514. *Cell Biology.*

Bio 523. *Functional Anatomy of the Mammalian Integument.*

Bio 551, 552. *Topics in Neurobiology.*

Professor and Head of Department

W. Maxwell Cowan, B.Sc. (hon.), Witwatersrand University, 1952; Ph.D., Oxford University, 1956; M.B.B.Ch., 1958. (Also Director, Division of Biology and Biomedical Sciences)

Professor Emeritus and Lecturer

Mildred Trotter, A.B., Mount Holyoke College, 1920; Sc.M., Washington University, 1921; Ph.D., 1924; Sc.D. (hon.), Western College, 1956; Sc.D (hon.), Mount Holyoke College, 1960. (See Department of Radiology)

Beaumont-May Institute of Neurology Scholar in Anatomy and Professor

Richard P. Bunge, B.A., University of Wisconsin, 1954; M.S., 1956; M.D., 1960.

Note—The number preceding the course title indicates that the course is offered by the Division of Biology and Biomedical Sciences and carries credit in the Graduate School of Arts and Sciences.

Professors

Estelle Brodman (Medical History in Anatomy), A.B., Cornell University, 1935; B.S., Columbia University, 1936; M.S., 1943; Ph.D., 1953.

Adolph I. Cohen, B.S., City College of New York, 1948; M.A., Columbia University, 1950; Ph.D., 1954. (See Department of Ophthalmology)

Edward G. Jones, M.B., Ch.B., University of Otago, 1962; Ph.D., Oxford University, 1968; M.D., University of Otago, 1970.

Roy R. Peterson, A.B., University of Kansas, 1948; Ph.D., 1952.



Leonard J. Tolmach, B.S., University of Michigan, 1943; Ph.D., University of Chicago, 1951. (See Department of Radiology)

Research Professor

Donald F. Wann, B.E., Yale University, 1953; M.S., Washington University, 1957; D.Sc., 1961. (Also School of Engineering and Applied Science)

Associate Professors

E. Richard Bischoff, A.B., Knox College, 1960; Ph.D., Washington University, 1966.

Mary B. Bunge, B.S., Simmons College, 1953; M.S., University of Wisconsin, 1955; Ph.D., 1960.

Harold Burton, B.A., University of Michigan, 1964; Ph.D., University of Wisconsin, 1968. (See Department of Physiology and Biophysics)

Theodore J. Cicero, B.S., Villanova University, 1964; M.S., Purdue University, 1966; Ph.D., 1968. (See Department of Psychiatry)

Milton N. Goldstein, B.S., Western Reserve University, 1946; M.S., 1947; Ph.D., 1952. (See Department of Pathology)

Boyd K. Hartmann, A.B., University of Kansas, 1962; M.D., 1966. (See Department of Psychiatry)

David N. Menton, B.S., Mankato State College, 1959; Ph.D., Brown University, 1966. (See Department of Pathology)

Joseph L. Price, B.A., University of the South, 1963; Ph.D., Oxford University, 1969.

W. Thomas Thach, Jr., A.B., Princeton University, 1959; M.D., Harvard University, 1964. (See Department of Neurology and Neurological Surgery)

Thomas W. Tillack, A.B., University of Rochester, 1959; M.D., Yale University, 1963. (See Department of Pathology)

Assistant Professors

William A. Frazier, A.B., Johns Hopkins University, 1969; Ph.D., Washington University, 1973. (See Department of Biological Chemistry)

David I. Gottlieb, B.A., State University of New York, Binghamton, 1964; M.A., University of Wisconsin, 1969; Ph.D., Washington University, 1971. (See Department of Biological Chemistry)

Joseph Hanaway, B.A., McGill University, 1956; M.D., 1960; C.M., 1960. (See Department of Neurology and Neurological Surgery)

Joseph E. Harvey, B.A., University of California, Berkeley, 1954; M.A., 1964; Ph.D., 1968. (See Department of Otolaryngology)

Barry F. King, B.A., University of Minnesota, 1965; M.A., University of Nevada, 1967; Ph.D., Washington University, 1970.

Lorraine F. Lake, B.S., Washington University, 1950; M.A., 1954; Ph.D., 1962. (See Irene Walter Johnson Institute of Rehabilitation, Program in Physical Therapy, and Department of Preventive Medicine and Public Health)

Arthur D. Loewy, B.A., Lawrence University, 1964; Ph.D., University of Wisconsin, 1969.

Mark B. Willard, B.A., Oberlin College, 1965; Ph.D., University of Wisconsin, 1971. (See Department of Biological Chemistry)

Thomas A. Woolsey, B.S., University of Wisconsin, 1952; M.D., Johns Hopkins University, 1969.

Research Instructors

Anthony H. Jebb, M.B.B.S., University of Sydney, 1969.

Mary I. Johnson, B.S., Washington State University, 1964; M.D., Johns Hopkins University, 1968. (See Departments of Neurology and Neurological Surgery and Pediatrics)

Francis A. Mithen, B.S., Tufts University, 1967; M.D., Columbia University, 1971.

Larry W. Swanson, B.A., Pomona College, 1968; Ph.D., Washington University, 1972.

Patrick M. Wood, A.B., Centre College of Kentucky, 1961; M.S., Purdue University, 1965; Ph.D., 1968.

Research Assistants

Mark A. Connelly, A.B., Washington University, 1971; A.M., University of Missouri, 1976.

Oliver H. Duggins, B.S., Northwestern University, 1934; M.S., 1936; Ph.D., Washington University, 1953.

Paul R. Myers, A.A.S., M.T. (A.S.C.P.), Rochester Institute of Technology, 1957.

Lynn A. Rogers, B.A., Augustana College, 1967; M.A., Washington University, 1972.

Alice R. Schlessinger, B.A., Brooklyn College, 1956; M.S., Cornell University, 1958.

Department of Anesthesiology



According to the American Board of Anesthesiology, this specialty may be described as a practice of medicine which encompasses (1) the management of procedures for rendering a patient insensible to pain during surgical procedures, (2) the support of life functions under the stress of anesthetic and surgical manipulations, (3) the clinical management of the patient, unconscious from whatever cause, (4) the management of problems in pain relief, (5) the management of problems in cardiac and respiratory resuscitation, (6) the application of specific methods of inhalational therapy, and (7) the clinical management of various fluid, elec-

trolyte, and metabolic disturbances.

With these objectives in mind, this department is dedicated to presenting to the student, as opportunities develop (1) clinical applications of certain anatomic relationships, e.g., regional nerve blocks, (2) applications of principles of respiratory physiology, e.g., mechanics of ventilation under various circumstances, cardiorespiratory resuscitation, (3) application of pharmacologic knowledge related to sedative, narcotic, and anesthetic drugs, and to compounds affecting the autonomic nervous system, (4) clinical problems related to acid-base, fluid, and

electrolyte balance in surgical patients, and (5) principles underlying the approaches to the emerging concept of "acute medicine."

After the second year of medical school, preceptorships in anesthesiology are available for eight-week periods by individual application. Each preceptee is assigned to a staff anesthesiologist and gains experience in the performance of clinical anesthesia, participates in conferences and seminars, and joins in ward rounds in the recovery room and intensive care unit.

An elective in clinical anesthesiology is offered every six weeks for up to ten students. The pharmacology of inhalation, intravenous, and local anesthetic drugs is demonstrated by practical application by the student in the operating room. The importance of blood gas determinations in evaluating the efficacy of ventilation is shown.

Opportunities to develop proficiency in techniques such as endotracheal intubation are available. Special sessions on cardiopulmonary resuscitation are conducted and students are expected to attend the regular anesthesia conferences and seminars.

Henry E. Mallinckrodt Professor of Anesthesiology and Head of Department

C. Ronald Stephen, B.Sc., McGill University, 1938; M.D., C.M., 1940.

Professors

Leonard W. Fabian, B.S., University of Arkansas, 1951; M.D., 1951.

Albert Roos, M.D., University of Groningen, 1940. (See Department of Physiology and Biophysics)

Associate Professors

James D. Jones II, B.S., Louisiana State University, 1940; D.D.S., Loyola University of the South, 1945; M.D., University of Alabama, 1957.

Lewis J. Thomas, Jr., B.S., Haverford College, 1953; M.D., Washington University, 1957. (See Department of Physiology and Biophysics and Biomedical Computer Laboratory)

Assistant Professors

Milton L. Cobb, B.A., Baylor University, 1964; M.D., University of Texas (Southwestern) Medical School, 1968.

Jack R. Collins, A.B., University of Missouri, 1958; M.D., 1965. (Jewish Hospital)

Donald J. Dickler, B.A., New York University, 1942; M.D., 1945. (Jewish Hospital)

James A. Felts, B.S., DePauw University, 1943; M.D., Northwestern University, 1946.

Bela L. Haffalvi, B.S., M. Kir. Real-Gymnazium of Kisvarda, 1930; M.D., M. Kir. Tisza Istvan Tudományegyetem, 1938.

Sara T. Jones, B.A., University of North Carolina, 1958; M.D., Bowman Gray School of Medicine, 1962.

Elsie F. Meyers, B.A., Indiana University, 1947; M.D., 1950.

William D. Owens, B.A., Westminster College, 1961; M.D., University of Michigan, 1965.

Glenn R. Weygandt, B.S., University of Missouri, 1945; M.D., Washington University, 1947.

Instructors

Nabil Abboud, B.A., Christian Brothers College, 1963; M.D., St. Joseph's University, 1970. (Jewish Hospital)

Donald W. Claeys, B.A., St. Ambrose College, 1946; M.D., Loyola University, 1970. (Jewish Hospital)

David A. Cross, B.A., Oklahoma City University, 1964; M.D., University of Oklahoma, 1968. (Jewish Hospital)

Marye H. Godinez, B.S., Gonzaga University, 1967; M.D., St. Louis University, 1971.

Louise S. Grove, R.N., St. Mary's Memorial Hospital School of Nursing, 1946; C.R.N.A., Barnes Hospital, 1960.

Robert B. Holloway, B.S., LeMoyne College, 1952; M.D., Meharry Medical College, 1956. (St. Louis V.A. Hospitals)

Akira Iwane, M.D., Nihon University, 1966.

James J. Jenkins, B.A., Duke University, 1966; M.D., University of North Carolina, 1970. (Jewish Hospital)

A. Ercument Kopman, M.D., Istanbul University, 1947.

Necita L. Roa, B.S., University of the Philippines, 1964; M.D., 1969.

Instructors (Clinical)

Sedat M. Ayata, B.S., Istanbul Lyceum, 1949; M.D., University of Istanbul, 1955.

Charles R. Blackwell, M.D., Meharry Medical College, 1965.

Frances G. Duffy, M.D., B.Ch., B.A.O., University College of Dublin, 1951.

Robert C. Engelhardt, B.S., University of South Carolina, 1946; M.D., University of Missouri, 1950.

Paul L. Friedman, A.B., Washington University, 1953; M.D., 1957.

Hugh F. S. Keister, A.B., Washington University, 1955; M.D., 1959.

George E. Lucas, B.S., John Carroll University, 1953; M.D., St. Louis University, 1958.

Daniel W. Platt, M.D., Chicago Medical College, 1949.

William A. Sims, Jr., A.B., University of Missouri, 1954; B.S.Med., 1955; M.D., Washington University, 1957.

Fellow

Richard A. E. Assaf, M.D., University College of Dublin, 1968.



Department of Biological Chemistry



The Department offers a general introductory course, an advanced course relating the subject to biology and medicine, and several specialized courses in the major aspects of biochemistry. Students of medicine and in the Graduate School of Arts and Sciences may enroll in the courses or pursue research work under the direction of the staff. Facilities in research are provided in carbohydrate, lipid, nucleic acid, protein, and steroid biochemistry, with varying emphasis on enzymology, metabolism, physical chemistry, structural studies, or biochemical genetics. Some summer research scholarships are offered to students of medicine.

FIRST YEAR

Bio 451. *General Biochemistry.* Involves the basic concepts of biochemistry. Designed for qualified undergraduates, medical, and graduate students, the course is required of all graduate students in the Department, and either this course or an equivalent course is a prerequisite for advanced courses. Lectures only. Credit 4 units.

Bio 531. *Advanced Biochemistry.* A discussion of the biochemistry of organized systems, with special emphasis on problems relevant to medicine. Extensive reading of original literature will be required. The

course will consist of four parts: (1) metabolic regulation, including a study of hormonal control; (2) structure and function of membranes and organelle biogenesis; (3) gene expression in higher organisms, including malignant transformation; (4) biochemistry of specialized organs or tissues, for example, connective tissue, bone, blood clotting, etc. Credit 4 units.

RESEARCH

Bio 590. *Research opportunities* are offered in the following general areas of biochemistry:

Biochemical studies in lipid metabolism; structure and function of biological membranes. (Staff)

X-ray analysis of enzyme structure; structure and mechanism of enzymes.

(Dr. Banaszak)

Structure-function relationships in protein and enzymes. (Dr. Bradshaw)

Biochemical investigation of metabolic disorders of carbohydrate metabolism.

(Dr. B. Brown)

Studies of pathways of carbohydrate metabolism in mammalian tissues.

(Dr. D. Brown)

Mechanism of enzyme reactions.

(Dr. Drysdale)

Relationship of protein structure and enzyme activity. Kinetic theory and applications to enzyme reactions. (Dr. Frieden)

Biosynthesis of cell wall structures and mechanism of sugar transformations in microorganisms. (Dr. Glaser)

Biochemical studies of protein-lipid interactions; mechanism of blood clotting.

(Dr. Jackson)

Nucleic acid biochemistry of eukaryotes in relation to development and differentiation.

(Dr. Roeder)

Investigation of fatty acid metabolism and

membrane biochemistry through techniques of biochemical genetics. (Dr. Silbert)

Regulation of protein synthesis in prokaryotic and eukaryotic organisms; synthesis and structure of nucleic acids. (Dr. Thach)

Computer methods in biochemistry.

(Dr. Holmes)

Biochemistry of collagen. (Dr. Jeffrey)

Research on the structure, function, and biosynthesis of complex oligosaccharides present on mammalian cell surfaces and in serum glycoproteins. (Dr. Kornfeld)

Mechanisms of biosynthesis of lipids in mammalian systems. (Dr. Majerus)

Conformation and chemistry of polypeptide hormones. (Dr. Marshall)

Crystal structure and conformation of proteins. (Dr. Mathews)

Studies of proteins specific to the nervous system; their localization, physical and chemical properties. (Dr. B. Moore)

Mass spectrometric studies on molecules of biochemical interest. (Dr. Sherman)

Sex steroid metabolism. (Dr. Warren)

Biochemical transformations of steroid hormones; hormone effects at the cellular level.

(Dr. Wiest)

ELECTIVES

Descriptions of the following courses are listed under the Division of Biology and Biomedical Sciences.

Bio 532. *Mechanism of Regulation of Protein Synthesis.*

Bio 535. *Physical-Chemical Basis of Techniques in Molecular Biology.*

Bio 536. *Physical Chemistry of Macromolecules.*

Bio 537. *Protein Chemistry and Enzyme Mechanisms.*

Bio 538. *Structure and Function of Cell Membranes and Surfaces.*

Bio 539. *Molecular Biology of Animal Viruses.*

Bio 544. *Mechanisms of Disease (Cancer).*

Note—The number preceding the course indicates that the course carries credit in the Graduate School of Arts and Sciences.

Professor and Head of Department

Luis Glaser, B.A., University of Toronto, 1953; Ph.D., Washington University, 1956.

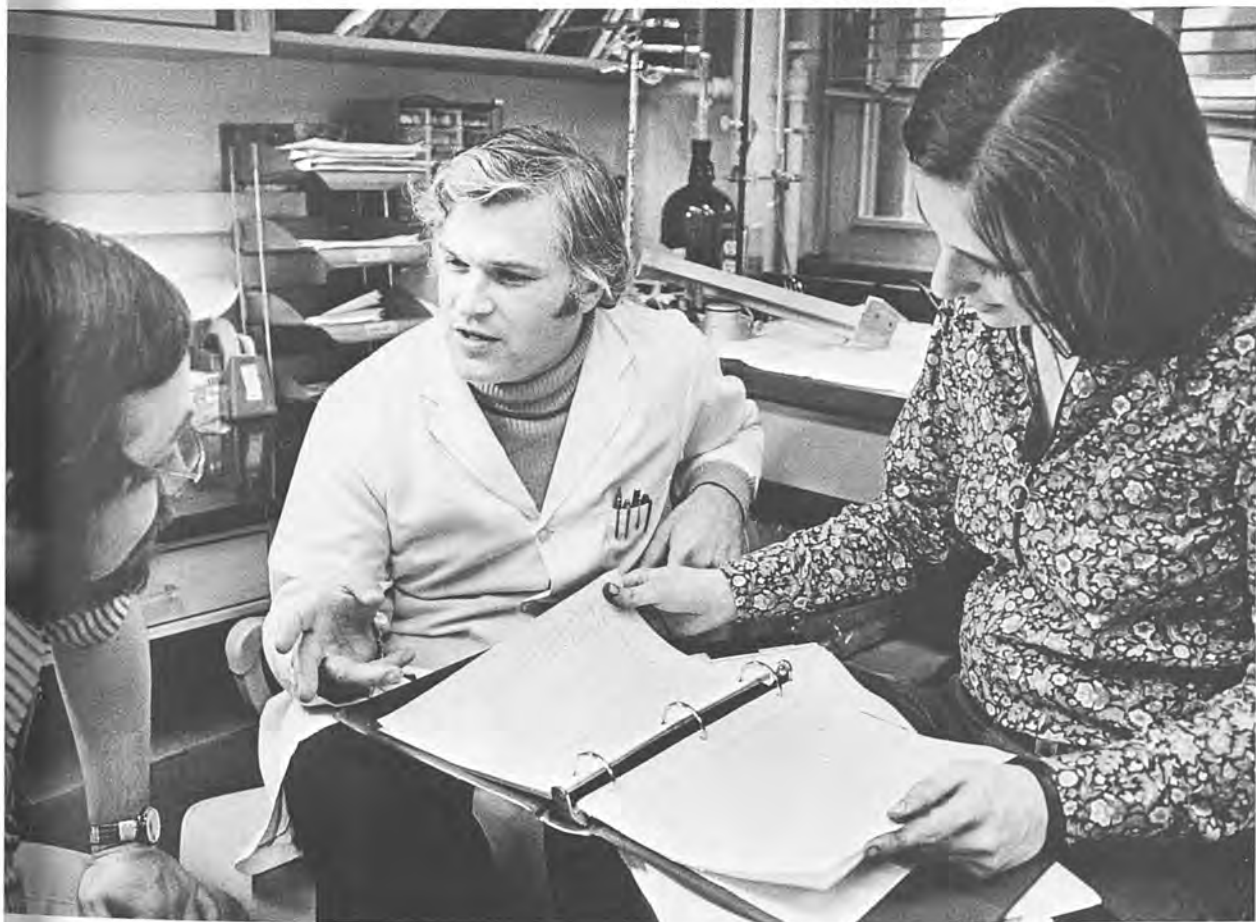
Distinguished Service Professor Emeritus

Carl F. Cori, M.D., University of Prague, 1920; Sc.D. (hon.), Yale University, 1946; Sc.D. (hon.), Western Reserve University, 1946; Sc.D. (hon.), Boston University, 1948; Sc.D. (hon.), Cambridge University, 1949; Sc.D. (hon.), Washington University, 1966.

Professors

Leonard J. Banaszak, B.S., University of Wisconsin, 1955; M.S., Loyola University, 1960; Ph.D., 1961. (See Department of Physiology and Biophysics)

Ralph A. Bradshaw, B.A., Colby College, 1962; Ph.D., Duke University, 1966.



Barbara I. Brown, B.A., Smith College, 1946; Ph.D., Yale University, 1950.

David H. Brown, B.S., California Institute of Technology, 1942; Ph.D., 1948. (See Administration)

George R. Drysdale, B.S., Birmingham-Southern College, 1948; M.S., University of Wisconsin, 1950; Ph.D., 1952.

Carl Frieden, B.A., Carleton College, 1951; Ph.D., University of Wisconsin, 1955.

Stephen C. Kinsky, A.B., University of Chicago, 1951; Ph.D., Johns Hopkins University, 1957. (See Department of Pharmacology)

Stuart A. Kornfeld, A.B., Dartmouth College, 1958; M.D., Washington University, 1962. (See Department of Medicine)

Philip W. Majerus, M.D., Washington University, 1961. (See Department of Medicine)

Garland R. Marshall, B.S., California Institute of Technology, 1962; Ph.D., Rockefeller University, 1966. (See Department of Physiology and Biophysics)

Robert E. Thach, A.B., Princeton University, 1961; Ph.D., Harvard University, 1964.

James C. Warren, A.B., University of Wichita, 1950; M.D., University of Kansas, 1954; Ph.D., University of Nebraska, 1961. (See Department of Obstetrics and Gynecology)

Associate Professors

Oscar P. Chilson, B.S., Arkansas State Teachers College, 1955; M.S., University of Arkansas, 1958; Ph.D., Florida State University, 1963. (Also Faculty of Arts and Sciences)

William F. Holmes, A.B., Princeton University, 1953; Ph.D., University of Pennsylvania, 1960. (See Biomedical Computer Laboratory)

Craig M. Jackson, B.S., Washington State University, 1963; Ph.D., University of Washington, 1967.

Blake W. Moore, B.S., University of Akron, 1948; Ph.D., Northwestern University, 1952. (See Department of Psychiatry)

Robert G. Roeder, M.S., University of Illinois, 1965; Ph.D., University of Washington, 1969.

William R. Sherman, A.B., Columbia University, 1951; Ph.D., University of Illinois, 1955. (See Department of Psychiatry)

David F. Silbert, A.B., Harvard College, 1958; M.D., 1962.

Assistant Professors

William A. Frazier, A.B., Johns Hopkins University, 1969; Ph.D., Washington University, 1973. (See Department of Anatomy and Neurobiology)

David I. Gottlieb, B.A., State University of New York-Binghamton, 1964; M.A., University of Wisconsin, 1969; Ph.D., Washington University, 1971. (See Department of Anatomy and Neurobiology)

John J. Jeffrey, Jr., B.S., College of the Holy Cross, 1958; Ph.D., Georgetown University, 1965. (See Department of Medicine)

F. Scott Mathews, B.S., University of California, 1955; Ph.D., University of Minnesota, 1959. (See Department of Physiology and Biophysics)

Stuart W. Weidman, A.B., Washington University, 1957; M.A., 1963; Ph.D., University of Chicago, 1965. (See Department of Preventive Medicine and Public Health)

Mark B. Willard, B.A., Oberlin College, 1965; Ph.D., University of Wisconsin, 1971. (See Department of Anatomy and Neurobiology)

Research Assistant Professor

Michael K. Hoffman, B.S., University of Pennsylvania, 1963; Ph.D., Bryn Mawr College, 1965.

Instructors

William H. Holland, A.B., Washington University, 1950. (See Department of Psychiatry)

Walter L. Nulty, Jr., B.A., Southern Illinois University, 1956.

Lecturer

Walter G. Wiest, A.B., Brigham Young University, 1948; Ph.D., University of Wisconsin, 1952. (See Department of Obstetrics and Gynecology)

Department of Genetics



The James S. McDonnell Department of Genetics was newly formed in the fall of 1975 to offer a program of preclinical and graduate instruction in genetics. A medical genetics course in the second semester of the first year is designed to provide the student with a background in the basic principles of genetics and to introduce a number of more advanced aspects of human and medical genetics. (Clinical training in genetics is offered in the fourth year by the Division of Medical Genetics of the departments of Medicine and Pediatrics.)

The faculty of this new department is still small. Presently its research and graduate

training programs are concentrated primarily in the areas of immunogenetics and mammalian biochemical genetics. However, a substantial growth of the Department is planned. As the Department expands, other areas of active genetic investigation and interest will be represented and a broader and more comprehensive program of research and graduate training opportunities will be developed. An advanced course in immunogenetics will be offered for the first time in the second semester of 1977. Additional courses will be developed in subsequent years. Opportunities for research training and experience are available at all levels.

FIRST YEAR

Medical Genetics. An initial segment covers the fundamental principles of genetics. Later segments introduce more advanced topics, including statistical and behavioral genetics, clinical cytogenetics, biochemical genetics, counseling and immunogenetics. Lectures only. Credit 2 units.

RESEARCH

Bio 590. *Research opportunities* are offered in the following areas of genetics:

Structure and genetic control of cell membrane alloantigens. (Dr. Cullen)

Immunogenetics of products of the major histocompatibility complex. (Dr. David)

Genetics of immune response. Mammalian biochemical genetics. (Dr. Shreffler)

Note—The number preceding the course title indicates that the course carries credit in the Graduate School of Arts and Sciences.

ELECTIVE

Immunogenetics. Genetic and immunologic aspects of variant systems detected by immunologic methods: blood groups, allotypes, histocompatibility antigens. Genetic dissection of immunologic mechanisms.

Professor and Acting Head of Department

Donald C. Shreffler, B.S., University of Illinois, 1954; M.S., 1958; Ph.D., California Institute of Technology, 1962.

Associate Professor

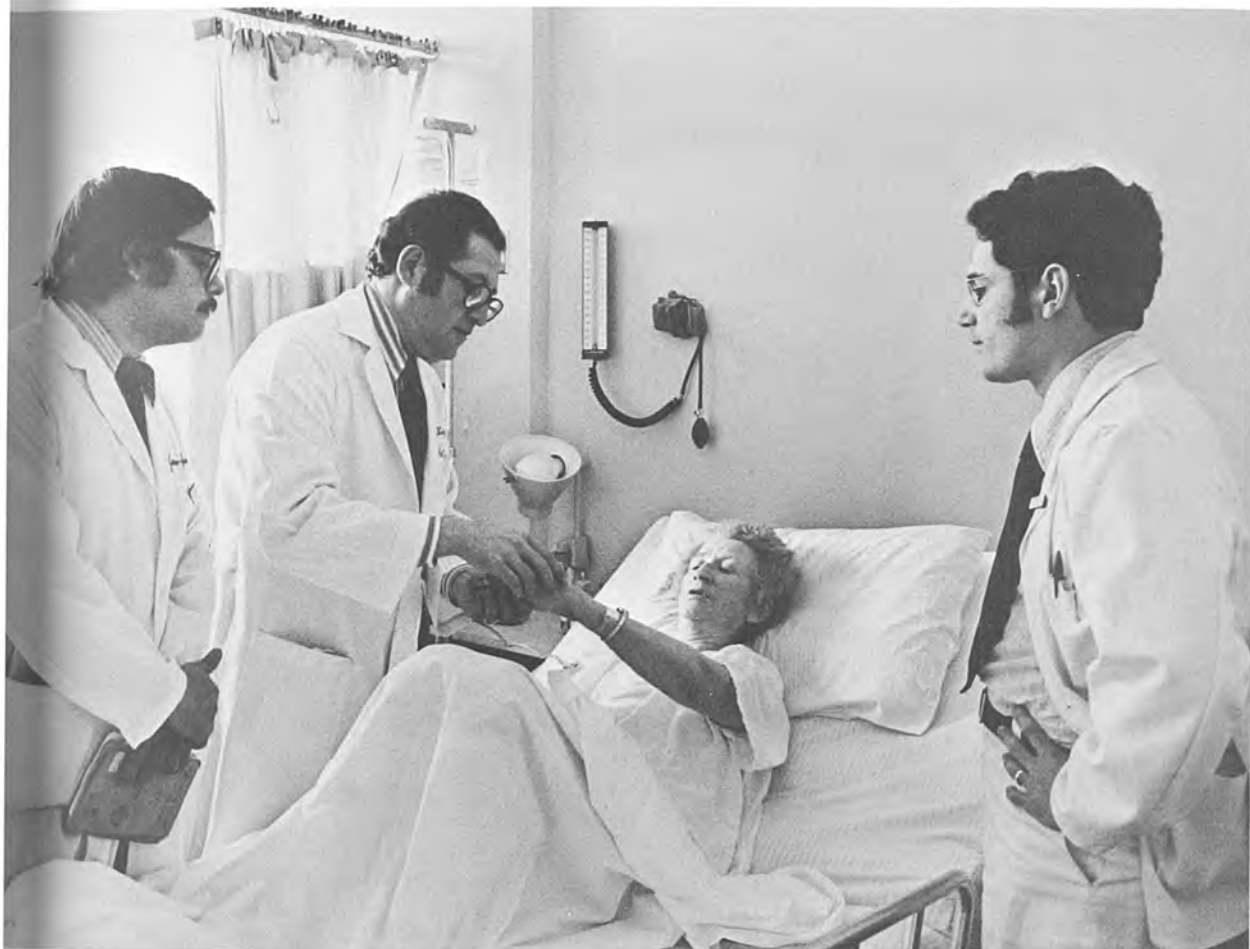
Chella S. David, B.S., Berea College, 1961; M.S., University of Kentucky, 1962; Ph.D., Iowa State University, 1966.

Assistant Professor

Susan E. Cullen, B.S., College of Mount St. Vincent, 1965; Ph.D., Albert Einstein College of Medicine, 1971. (See Department of Microbiology and Immunology)



John Milliken Department of Medicine



The general medicine teaching services of the Department are located at Barnes Hospital, Jewish Hospital, St. Louis City Hospital (Starkloff Division), and Veterans Hospital (John Cochran Division) under the following directors:

Barnes Hospital

Dr. Kipnis

House Staff Training Program

Dr. Aach

Jewish Hospital

Dr. Peck

St. Louis City Hospital

Dr. Vavra

Veterans Hospital

Dr. Chase

In addition, for the purposes of both teaching and research, the Department of Medicine is divided into specialty divisions at Barnes Hospital and Jewish Hospital under the following directors:

Bone and Mineral Diseases

Dr. Avioli

Cardiovascular Diseases

Drs. Sobel, Oliver

Dermatology

Dr. Eisen

Endocrinology and Metabolism

Dr. Daughaday

Gastroenterology

Dr. Alpers

Health Care Research

Dr. Perkoff

Hematology

*Dr. Majerus*Immunology and Allergy
Diseases*Drs. C. Parker, Little*

Infectious Diseases

Drs. Medoff, Liebhaber

Laboratory Medicine

Dr. Jarett

Medical Genetics

Dr. Sly

Oncology

Drs. Kornfeld, Reinhard

Pulmonary Diseases

Drs. Pierce, Senior

Renal Diseases

Drs. Klahr, Lubowitz

Rheumatology

Dr. Atkinson

Instruction in Medicine is provided during all four years of the medical curriculum beginning with human genetics and an introductory course in the first year. Teaching in the second year has two main objectives: the correlation of the basic sciences with the clinical aspects of disease, and training in the technical methods of physical examination and laboratory diagnosis. By the beginning of the third year, the student is prepared for supervised clinical study of individual patients. A junior clerkship of twelve weeks, divided into two six-week periods, is served on one of the medical services supervised by the Department. In the final year, students may elect a sub-internship in general medicine or select any of a series of elective courses offered in the various medical subspecialties.

FIRST YEAR

Topics in Clinical Medicine. This interdepartmental course is designed to stimulate student interest in clinical medicine through carefully selected and presented discussions of both the clinical and basic science features of a number of illnesses. The course director involves faculty from the several clinical departments in structuring the direction, content, and presentation of the subject. (Dr. Kipnis and Staff)

SECOND YEAR

Teaching by the Department of Medicine is designed to (a) prepare the student for the transition from the preclinical sciences to the study of the sick patient at the bedside, (b) help him analyze the manifestations of disease in terms of the altered mechanisms responsible for these manifestations, and (c) introduce him to the techniques of examination which are used regularly on all clinical services with the beginning of junior clerkships. This instruction is at times undertaken jointly with members of other clinical departments, and is coordinated when practicable with subject matter presented by the Department of Pathology.

(a) *Pathophysiology.* Selected topics in clinical medicine are discussed in detail to illustrate the application of biochemical, physiological, and anatomical information in the understanding of pathological states. Infectious, cardiovascular and renal, neurological, gastrointestinal, hematological, metabolic, nutritional, and developmental diseases are reviewed by an interdepartmental faculty. Emphasis is placed on the use of fundamental information in approaching clinical problems as a way of thinking in preparation for a lifetime of medicine, during which much new information will constantly be acquired.

(Drs. Arias, Feigin, Eliasson, Haddad, Hahn, Hoffstein, Majerus, Marshall)

(b) *Introduction to Clinical Medicine.* Di-



rected toward the development of skills in the bedside data collection process, learning sessions in the format of lectures, smaller supervised self-examination laboratories, and small group bedside sessions are employed. Emphasis is given to the understanding of the patient, his interaction with disease, and the importance of the physician-patient relationship. At the completion of the course the student is expected to have the skills necessary to profitably participate in the third year activities as a member of the health care team. (Dr. Tuteur and Staff)

THIRD YEAR

General Medicine. Supervised study of patients on the medical nursing divisions of Barnes Hospital (both Blue and Red), Jewish Hospital, Starkloff City Hospital, and St. Louis Veterans Administration Hospital. Students are assigned in rotation as clinical clerks to the patients admitted to these services. Teaching is provided by attending physicians, house officers, consultants, and at regularly scheduled conferences. Formal instruction will be given in medical therapeutics during the junior clerkship. Students serve for six weeks on two of the five services. (Drs. Aach, Chase, Kipnis, Peck, Vavra, and Staff)

(a) *Friday Noon Medical Clinics.* Patients who have been studied by students working in the wards of Barnes Hospital are presented before the third- and fourth-year classes to illustrate medical problems of particular interest. (Dr. Kipnis and Staff)

(b) *Clinical Pathological Conference.* Abstracts of the clinical records of patients upon whom postmortem examinations have been performed are presented in advance to members of the third- and fourth-year classes and to members of the medical staff. At each conference the diagnosis is discussed in detail by the clinical staff before the anatomical findings are presented by the pathologists.

(Dr. Kipnis and Medical Staff,
Dr. Kissane and Pathology Staff)

FOURTH YEAR

Electives

Medical Sub-Internship. Medical sub-internships, in multiples of six weeks, are offered to a limited number of students on the following medical services: Barnes Hospital Blue Service, Jewish Hospital, Starkloff City Hospital, St. Louis Veterans Administration Hospital, and St. Luke's Hospital. Duties and responsibilities, including nights on call, will be those of an intern with the pro-

viso that requirements of Missouri state law must be met (e.g., orders must be countersigned by a licensed physician, etc.). The work load will be lighter than that for interns to insure ample time for reading about patients. Instruction and supervision will be provided by the appropriate chief of service, attending physicians, consultants, and house officers. Attendance at scheduled teaching conferences is required. The sub-internship should be especially valuable to students who plan to take straight medical internships and to those who plan to go directly into a specialty residency program without first serving an internship of any kind (e.g., neurology, psychiatry, etc.).

(Drs. Aach, Chase, Kipnis, Peck, Vavra, and Staff)

Friday Noon Medical Clinics. Medical problems of particular interest.

(Dr. Kipnis and Staff)

Clinical Pathological Conference. Thursdays, 12-1 p.m., September to June.

(Dr. Kipnis and Medical Staff, Dr. Kissane and Pathology Staff)



Arthritic and Rheumatic Diseases. Clinical rheumatology. Students will participate in consultations, clinic, and inpatient practice. Laboratory experience also available.

(Dr. B. Hahn and Staff)

Cardiovascular Disease

(a) Clinical Cardiology. Barnes Hospital, 6 weeks, all day. Students are assigned to cardiac consultation service, coronary care unit, and heart station.

(Dr. Ruwitch and Staff)

(b) Clinical Cardiology. St. Luke's Hospital, 6 weeks, all day. Students are assigned to intensive care service, the heart station, and the Radiology Department.

(Dr. Paine)

(c) Clinical Cardiology. Jewish Hospital 6 weeks, all day. Students have experience in seeing patients in consultation, reading electrocardiograms, and participating in activities of the Coronary Care Unit and the Graphics Laboratory. In addition, students may observe procedures in the cardiac catheterization laboratory.

(Drs. Kleiger, Krone, Oliver, Salimi)

(d) Electrocardiography, Elementary Vectorcardiography. An "A" elective, seventh rotation. Lectures and practical demonstration designed to provide a solid base of electrocardiographic knowledge.

(Dr. A. Weiss)

(e) Research. Minimum of 12 weeks, all day.

1. Myocardial contractile proteins and assessment of metabolism and function in anoxic and ischemic isolated perfused hearts. (Dr. Henry)
2. Hemodynamics, myocardial mechanics and ventricular function (cardiac catheterization). (Dr. Ludbrook)
3. Protection of ischemic myocardium in the experimental and clinical setting. (Dr. Roberts)

4. Detection, quantification, and assessment of the mediation of myocardial ischemic injury. (Dr. Sobel)
5. Ultrasonic assessment of cardiac metabolism. (Dr. A. Weiss)
6. Assessment of myocardial metabolism with short-lived positron emitting isotopes. (Dr. E. Weiss)
7. Biochemistry and measurement of cardiac glycosides; studies of the enterohepatic circulation of digitoxin. Applications of radioimmunoassays to cardiology. (Dr. Oliver)
8. Application of digital computers for measuring left ventricular function and contractility. (Drs. Hieb, Krone, Oliver)

Dermatology

- (a) Clinical Clerkship. Students participate in both inpatient and outpatient care. Stress is placed on the dermatologic variations normally encountered, identification of common skin diseases, dermatologic clues to systemic disease, etc. Instruction is given in cutaneous histopathology and clinical mycology. (Dr. Eisen and Staff)
- (b) Research. Minimum of twelve weeks, all day.
1. Connective tissue, macromolecular organization, degradation, and related problems. (Drs. Bauer, Eisen, Jeffrey, Seltzer)
 2. Physiology and immunology of pathogenic fungi; molecular basis of morphogenesis and cellular differentiation in *Histoplasma capsulatum*; host-parasite interaction and experimental therapeutics in the systemic mycotic infections. (Dr. Kobayashi)
 3. Inherited disorders of collagen metabolism. (Dr. Lichtenstein)

Gastroenterology

- (a) Clinical Gastroenterology. Six weeks, all day. Students participate in the study of patients on whom consultations have been requested, receive instruction in specialized diagnostic techniques, and participate in the conferences and clinics run by the Division. (Dr. Zuckerman)
- (b) Research. Minimum of twelve weeks, all day.
1. Clinically applied research on the hepatitis-associated antigen (HAA). (Dr. Aach)
 2. Research on intestinal protein metabolism. (Dr. Alpers)

Genetics

- (a) Clinical Genetics. Six weeks, all day. Students participate in evaluation of patients on whom consultations are requested, receive instructions in interpreting cytogenetics and other specialized laboratory information, and in techniques used in genetic counseling. (Dr. Sly and Staff)
- (b) Research. Minimum 12 weeks, all day.
1. Investigation of inherited amino acid transport defects. (Dr. Hillman)
 2. Enzyme replacement therapy and lysosomal storage diseases. (Dr. Sly)
 3. Chromosome disorders. (Dr. Sekhon)

Hematology and Oncology

- (a) Clinical Hematology and Oncology. Six weeks, all day. Students receive intensive instruction in morphology, specialized diagnostic techniques, management of patients with hematologic and oncologic disorders. Two separate clerkships are offered. (Drs. Kornfeld, Majerus, Reinhard)
- (b) Hemostasis, thrombosis, blood coagulation, and fibrinolysis. An "A" elective, sixth period. (Dr. Fletcher)

(c) Research. Minimum twelve weeks, all day.

1. Biochemical studies of vitamin B₁₂ binding proteins. (Dr. Allen)
2. Biochemical studies of the regulation of DNA synthesis in normal and transformed mammalian cells. (Dr. Berger)
3. Normal and deranged iron metabolism. (Dr. Brown)
4. Investigation in fields of coagulation, thrombosis, fibrinolysis and hemostasis. (Dr. Fletcher)
5. Biochemistry of mammalian cell membranes. (Drs. R. Kornfeld, S. Kornfeld)
6. Biochemistry of platelets, regulation of lipid metabolism in tissue culture; mechanism of platelet thrombus formation. (Dr. Majerus)

Hypertension

Research. Individualized research project and/or participation in a community hypertension program. (Dr. Perry)

Immunology

(a) Clinical Immunology. An "A" elective, fifth period. Series of twelve lectures on immunologic mechanisms in disease. (Dr. C. Parker and Staff)

(b) Research. Minimum 12 weeks, all day.

1. Research in areas of experimental immunotherapy of murine leukemias or detection and quantitation of cell membrane antigens by radioimmunoassay. (Dr. Little)
2. Research in clinical or basic immunology (cellular immunity, tumor immunity, lymphocyte and mast cell biochemistry). (Dr. C. Parker)



Infectious Disease

(a) Clinical infectious diseases. Study of ward and private patients. Barnes Hospital, six weeks, all day.

(Drs. Gelb, Marr, Medoff)

(b) Research.

1. Integration-function of oncogenic virus DNA. Properties/localization of hepatitis B specific nucleic acids. Properties of varicella-zoster virus DNA and detection in latent infections. (Dr. Gelb)
2. Evaluation of experimental antineoplastic drugs for antimicrobial activity. (Dr. Marr)
3. Effective therapy for fungal infections, control of membrane permeability of fungi, normal and transformed animal cells, alteration and control of immunologic response to infection and tumors, drug studies on bacterial pathogens. (Dr. Medoff)

Laboratory Medicine

(a) Topics in Laboratory Medicine. An "A" elective, second period. A series of twelve seminars over a six-week period covering topics intended to demonstrate the role of laboratory medicine in the diagnosis and therapeutic management of disease.

(Dr. Jarett and Staff)

(b) Clinical Laboratory Medicine. A "B" elective, periods 4 and 6. Designed to acquaint the student with the proper use of the laboratory in clinical medicine and to expose the student to the basic operation of each area of the laboratory.

(Dr. Jarett and Staff)

(c) Research.

1. Mechanism of insulin action particularly as it relates to the adipocyte.

(Dr. Jarett)

2. Tumor associated antigens of human lung cancers and immunological studies of human B-glucuronidase deficiencies and replacement therapy in man.

(Dr. Bell)

3. Clinical and analytical enzymology and computerized instrumentation.

(Dr. Davis)

4. Studies of platelets and platelet function.

(Dr. Joist)

5. Elaboration of physiological rationale for differences between activity and concentration of electrolytes, particularly calcium.

(Dr. Ladenson)

6. Application of computer technology to Laboratory Medicine.

(Dr. J. Lewis)

7. Evaluation of experimental antineoplastic drugs for antimicrobial activity.

(Dr. Marr)

8. RNA metabolism in cultured fibroblasts.

(Dr. Mauck)

9. Metabolism of coagulation moieties, in

particular fibrinogen and platelets of thrombus localization and of applied blood banking. (Dr. L. Sherman)

Metabolism and Endocrinology

(a) Clinical clerkship. Students see patients with endocrine and metabolic disease in the out-patient Metabolism Clinic and Barnes and Jewish Hospitals. Six weeks, all day.

(Drs. Avioli, Daughaday, and Staff)

(b) Research. Minimum of twelve weeks, all day.

1. Mineral homeostasis: calcitonin, parathyroid and vitamin D.

(Drs. Avioli, Birge, Haddad, Hahn)

2. Mechanism of action of polypeptide hormones, particularly parathyroid hormone.

(Dr. Chase)

3. Pituitary physiology; growth hormone, prolactin.

(Drs. Daughaday, Jacobs)

4. Relationship of contractile proteins to hormone secretion.

(Dr. Ostlund)

5. Clinical research in disorders of carbohydrate metabolism, studying patients with reactive hypoglycemia, and laboratory research in insulin biosynthesis-cell-free synthesis, isolation of pro-insulin messenger RNA.

(Dr. Permutt)

(c) Atherosclerosis and Hyperlipoproteinemia. An "A" elective, periods 1, 3, 5, 6 and 7. Six lectures followed by discussion on concepts of atherogenesis, lipoprotein structure and production, lipoprotein catabolism and interactions with tissues, pathophysiology of dyslipoproteinemias, and diagnosis and treatment of hyperlipoproteinemia, coronary prevention programs.

(Dr. Schonfeld and Staff)

Pulmonary Disease and Function

(a) Medical Aspects of Pulmonary Disease. A "B" elective, periods 3 through 8. Elective

offered at both Barnes and Cochran VA Hospital. (Drs. Pierce, Tuteur and Staff)

(b) Pulmonary Medicine. Six weeks. Students will work up patients and participate in teaching conferences and work rounds, Jewish Hospital. (Dr. Senior)

(c) Research.

1. Clinical research in various aspects of chronic obstructive pulmonary disease. (Dr. Pierce)
2. Mechanisms of destruction and synthesis of pulmonary connective tissue. (Dr. Senior)

Renal Disease

(a) Clinical Nephrology. Six weeks, all day. Study of patients with renal disease and electrolyte disorders.

(Drs. Klahr, Slatopolsky, and Staff)

(b) Renal and Electrolyte Disorders. Jewish Hospital, six weeks, all day.

(Dr. Lubowitz and Staff)

(c) Mixed clinical and research electives.

1. Effects of phosphate depletion on glucose utilization, effects of PTH on carbohydrate intolerance of uremia, effects of PTH and phosphate depletion on peripheral glucose utilization, effect of uremia and dialysis on plasma catecholamine levels and gastrointestinal abnormalities associated with chronic renal disease, hemodialysis and renal transplantation. (Dr. Harter)
2. Pathogenesis of glomerulonephritis with emphasis on experimental animal models and prevention of disease. (Dr. Hoffsten)
3. Radioimmunoassay of parathyroid hormone metabolism and parathyroid hormone in health and disease. Studies on Ca and P metabolism in chronic renal disease and uremic osteodystrophy. (Drs. Slatopolsky, Hruska)

4. Methodology of ion transport and principles of energy transfer and ion transfer. (Dr. Klahr)

5. Pathophysiology of renal and electrolyte disorders, 12 weeks, all day. (Drs. Lubowitz, Mazumdar, Malone)

6. Methodology used in transmission and scanning electron microscopy. (Dr. Purkerson)



Busch Professor and Head of Department

David M. Kipnis, A.B., Johns Hopkins University, 1945; M.A., 1949; M.D., University of Maryland, 1951.

John E. and Adaline Simon Professor

William A. Peck, A.B., Harvard University, 1955; M.D., University of Rochester, 1960.

Sydney M. and Stella H. Shoenberg Professor

Louis V. Avioli, B.A., Princeton University, 1953; M.D., Yale University, 1957.

Professor Emeritus

Carl G. Harford, A.B., Amherst College, 1928; M.D., Washington University, 1933. (Also Lecturer)

Professors

Richard D. Aach, A.B., Washington University, 1955; M.D., 1959.

David H. Alpers, B.A., Harvard College, 1956; M.D., 1960.

Elmer B. Brown, Jr., A.B., Oberlin College, 1946; M.D., Washington University, 1950. (See Administration)

Hugh Chaplin, Jr., A.B., Princeton University, 1943; M.D., Columbia University, 1947. (See Department of Preventive Medicine and Public Health) (On leave of absence)

William H. Danforth, A.B., Princeton University, 1947; M.D., Harvard University, 1951. (See Administration)

William H. Daughaday, A.B., Harvard College, 1940; M.D., 1943.

Arthur Z. Eisen (Dermatology), A.B., University of Buffalo, 1951; Sc.M., Brown University, 1953; M.D., University of Pennsylvania, 1957.

Leonard Jarett, B.A., Rice University, 1958; M.D., Washington University, 1962. (See Department of Pathology) (Director of Diagnostic Laboratories, Barnes Hospital)

M. Kenton King, B.A., University of Oklahoma, 1947; M.D., Vanderbilt University, 1951. (See Administration and Department of Preventive Medicine and Public Health)

Saulo Klahr, B.S., College of Santa Librada, 1954; M.D., Universidad Nacional de Columbia, 1959.

Stuart A. Kornfeld, A.B., Dartmouth College, 1958; M.D., Washington University, 1962. (See Department of Biological Chemistry)

J. Russell Little, Jr., A.B., Cornell University, 1952; M.D., University of Rochester, 1956. (See Department of Microbiology and Immunology)

Philip W. Majerus, M.D., Washington University, 1961. (See Department of Biological Chemistry)

Gerald Medoff, A.B., Columbia College, 1958; M.D., Washington University, 1962. (See Department of Microbiology and Immunology)

Virginia Minnich, B.S., Ohio State University, 1937; M.S., Iowa State College, 1938.

G. Charles Oliver, A.B., Harvard College, 1953; M.D., 1957.

Charles W. Parker, M.D., Washington University, 1953. (See Department of Microbiology)

Gerald T. Perkoff, M.D., Washington University, 1948. (See Department of Preventive Medicine and Public Health and Division of Health Care Research)

H. Mitchell Perry, M.D., Washington University, 1946.

John A. Pierce, M.D., University of Arkansas, 1948.

Edward H. Reinhard, A.B., Washington University, 1935; M.D., 1939. (See Department of Radiology)

Robert E. Shank, A.B., Westminster College, 1935; M.D., Washington University, 1939. (See Department of Preventive Medicine and Public Health)

Eduardo Slatopolsky, M.D., University of Buenos Aires, 1959.

William S. Sly, M.D., St. Louis University, 1957. (See Department of Pediatrics)

Burton E. Sobel, A.B., Cornell University, 1958; M.D., Harvard University, 1962.

John D. Vavra, B.A., University of Colorado, 1950; M.D., Washington University, 1954. (See Administration, Department of Preventive Medicine and Public Health, and Division of Health Care Research) (Chief, Washington University Medical Service, Starkloff Hospital)

R. Dean Wochner, A.B., Arizona State University, 1956; M.D., Washington University, 1960. (Hospital Commissioner of St. Louis and Director of Health and Hospitals) (See Department of Preventive Medicine and Public Health)

Professor Emeritus (Clinical)

Clinton W. Lane (Dermatology), A.B., St. Mary's College, 1916; M.D., St. Louis University, 1921.

Professors (Clinical)

Bernard T. Garfinkel, M.D., Washington University, 1948.

Michael M. Karl, B.S., University of Wisconsin, 1936; M.D., University of Louisville, 1938.

Edward Massie, A.B., Washington University, 1931; M.D., 1935.

Robert Paine, M.D., Harvard University, 1944.

Associate Professors

Robert H. Allen, A.B., Amherst College, 1960; M.D., Washington University, 1966.

Bruce L. Brown, M.D., University of Rochester, 1947. (See Division of Health Care Research)

Lewis R. Chase, A.B., Princeton University, 1960; M.D., Harvard University, 1964. (Chief, Washington University Medical Service, Cochran VA Hospital)

Allen F. Delevett, A.B., Johns Hopkins University, 1938; M.D., 1940. (See Division of Health Care Research)

Anthony P. Fletcher, B.M., University of London, 1943; B.S., 1943; M.D., 1949.

Samuel B. Guze, M.D., Washington University, 1945. (See Administration and Department of Psychiatry)

John G. Haddad, Jr., B.A., Tulane University, 1958; M.D., 1962.

John J. Jeffrey, Jr. (Dermatology), B.S., College of the Holy Cross, 1958; Ph.D., Georgetown University, 1965. (See Department of Biological Chemistry)

Robert E. Kleiger, B.A., Yale University, 1956; M.D., Harvard University, 1960.

George S. Kobayashi (Mycology-Dermatology), B.S., University of California, 1952; Ph.D., Tulane University, 1963. (See Department of Microbiology and Immunology)

Harvey Liehaber, A.B., New York University, 1953; M.D., 1957. (See Department of Microbiology and Immunology)

Herbert Lubowitz, A.B., Clark University, 1954; M.D., Washington University, 1958.

J. Joseph Marr, B.S., Xavier University, 1959; M.D., Johns Hopkins University, 1964; M.S., St. Louis University, 1968. (See Department of Pathology)

William V. Miller (Visiting Staff), A.B., University of Missouri, 1962; M.D., 1966. (See Department of Pathology)

Calixto A. Romero, B.A., University of Pennsylvania, 1942; M.D., 1945. (See Division of Health Care Research)

Gustav Schonfeld, A.B., Washington University, 1956; M.D., 1960. (See Department of Preventive Medicine and Public Health)

Robert M. Senior, A.B., Oberlin College, 1957; M.D., George Washington University, 1961. (On leave of absence)

Laurence A. Sherman, B.A., B.S., University of Chicago, 1956; M.D., Albany Medical College, 1964. (See Department of Pathology)

Research Associate Professors

Norma A. Fletcher, M.S., Technical University, 1949; Ph.D., University of Copenhagen, 1965.

Irene E. Karl, B.S., University of Wisconsin, 1937; M.A., 1938; Ph.D., 1940. (Also Clinical Research Center)

Rosalind H. Kornfeld (Leukemia Society of America Scholar), B.S., George Washington University, 1957; Ph.D., Washington University, 1961.

Associate Professors Emeriti (Clinical)

William H. Olmsted, B.S., Coe College, 1909; M.D., Johns Hopkins University, 1913.

Harold Scheff, M.D., University of Toronto, 1931.

Associate Professors (Clinical)

Donald H. Finger, A.B., Washington University, 1949; M.D., 1950.

I. J. Flance, A.B., Washington University, 1931; M.D., 1935.

Ralph V. Gieselmann, M.D., Washington University, 1947.

Neville Grant, A.B., Yale University, 1950; M.D., Columbia University, 1954.

Paul O. Hagemann, A.B., Washington University, 1930; M.D., 1934.

Robert S. Karsh, A.B., Washington University, 1951; M.D., 1952.

Marvin E. Levin, A.B., Washington University, 1947; M.D., 1951.

Virgil Loeb, Jr., M.D., Washington University, 1944. (See Department of Pathology)

Morris D. Marcus (Dermatology), M.D., Washington University, 1934.

Mary L. Parker, B.S., Florida State University, 1946; M.S., 1949; M.D., Washington University, 1953. (See Department of Preventive Medicine and Public Health) (University Health Service)

William D. Perry, A.B., Northwest Missouri State College, 1943; B.S. Med., University of Missouri, 1945; M.D., Washington University, 1947.

Ernest T. Rouse, B.S., Alabama Polytechnic Institute, 1939; M.D., Washington University, 1943.

Llewellyn Sale, Jr., A.B., Yale University, 1936; M.D., Washington University, 1940.

Burton A. Shatz, A.B., Washington University, 1940; M.D., 1943.

Franz U. Steinberg, M.D., University of Berne, 1938. (See Departments of Preventive Medicine and Public Health and Surgery)

Assistant Professors

John P. Atkinson, A.B., Kansas University, 1965; M.D., 1969.

Eugene A. Bauer (Dermatology), B.S., Northwestern University, 1963; M.D., 1967.

C. Elliott Bell, Jr., B.S., Tulane University, 1960; M.D., 1964. (See Department of Pathology)

Nathan A. Berger, A.B., Temple University, 1962; M.D., Hahnemann Medical College, 1966.

Dennis M. Bier, B.S., Le Moyne College, 1962; M.D., New Jersey College of Medicine, 1966.

Clifford A. Birge, A.B., Amherst College, 1956; M.D., Washington University, 1961. (See Division of Health Care Research)

Stanley J. Birge, Jr. (Established Investigator of the American Heart Association), B.A., Amherst College, 1959; M.D., Washington University, 1963.

Joan Blondin, B.S., Louisiana Polytechnic Institute, 1959; M.S., Cornell University, 1961; M.D., Louisiana State University, 1969.

Robert M. Bruce, A.B., Washington University, 1964; B.S., University of Minnesota, 1968; M.D., 1968.

John E. Buerkert, B.S., University of San Francisco, 1963; M.D., Marquette University, 1968.

Richard B. Byrd, M.D., St. Louis University, 1954; M.S.Med., University of Minnesota, 1960.

Jon D. Cooksey, M.D., Tulane University, 1962. (See Department of Preventive Medicine and Public Health and Irene Walter Johnson Institute of Rehabilitation)

Philip E. Cryer, B.A., Northwestern University, 1962; M.D., 1965. (Also Clinical Research Center)

James E. Davis, B.A., Occidental College, 1965; M.S., Duke University, 1969; Ph.D., 1970. (See Department of Pathology)

Seth A. Eisen, B.A., Reed College, 1962; M.D., Washington University, 1966.

William A. Emerson, B.S., Massachusetts Institute of Technology, 1962; M.D., University of Washington, 1966.

Lawrence D. Gelb (Howard Hughes Medical Institute Investigator), B.S., University of Michigan, 1963; M.D., Harvard University, 1967. (See Department of Microbiology and Immunology)

Mohammad F. Ghani, F.Sc., Government College, 1962; B.Sc., University of Punjab, 1964; M.B., B.S., King Edward Medical College, 1967.

Richard H. Glew, A.B., Harvard College, 1965; M.D., Johns Hopkins University, 1969.

Bevra H. Hahn, B.Sc., Ohio State University, 1960; M.D., Johns Hopkins University, 1964. (See Department of Preventive Medicine and Public Health)

Theodore J. Hahn, Jr., A.B., Princeton University, 1960; M.D., Johns Hopkins University, 1964.

Herschel R. Harter, B.S., Marquette University, 1962; M.D., Georgetown University, 1966.

Philip D. Henry (Established Investigator of the American Heart Association), M.D., University of Berne, 1960.

Geoffrey P. Herzig (Leukemia Society of America Scholar), B.S., University of Cincinnati, 1963; M.D., Western Reserve University, 1967.

Phillip E. Hoffsten, B.S., Washington University, 1961; M.D., 1965.



John O. Holloszy, M.D., Washington University, 1957. (See Department of Preventive Medicine and Public Health and Irene Walter Johnson Institute of Rehabilitation)

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Laurence S. Jacobs, A.B., Harvard University, 1960; M.D., University of Rochester, 1965.

Johann H. Joist, M.D., University of Cologne, 1962. (See Department of Pathology)

Ronald Krone (John E. Simon Scholar in Medicine), M.D., University of Chicago, 1966.

Jack H. Ladenson, B.S., Pennsylvania State University, 1964; Ph.D., University of Maryland, 1971. (See Department of Pathology)

Jerrold J. Lander, A.B., Washington University, 1964; M.D., 1968.

Stephen S. Lefrak, A.B., Colgate University, 1960; M.D., State University of New York, Downstate, 1965.

Jack R. Lichtenstein (Howard Hughes Medical Institute Investigator in Medicine), M.D., University of Maryland, 1967. (See Department of Pediatrics)

Philip R. Ludbrook, M.B., B.S., University of Adelaide, 1963. (See Department of Radiology)

John D. G. Malone, L.R.C.P., S.I., Royal College of Surgeons, 1967.

John C. Mauck, B.S., Purdue University, 1967; Ph.D., Washington University, 1971. (See Department of Pathology)

Debesh Mazumdar, M.B., All India Institute of Medical Sciences, 1964; B.S., 1964.

Robert C. McKnight, B.S., Florida State University, 1957; M.D., Washington University, 1961. (See Department of Radiology)

Richard E. Ostlund, Jr., (Elliott P. Joslin Research and Development Award of the American Diabetes Association), B.S., University of Utah, 1966; M.D., 1970.

Anthony S. Pagliara, B.S., Union College, 1960; M.D., Albany Medical College, 1965. (See Department of Pediatrics)

Marshall A. Permutt (Howard Hughes Medical Institute Investigator in Medicine), B.A., Johns Hopkins University, 1961; M.D., Washington University, 1965.

Cary A. Presant, M.D., State University of New York at Buffalo, 1966.

Mabel L. Purkerson, A.B., Erskine College, 1951; M.D., Medical College of South Carolina, 1956. (See Department of Pediatrics)

Robert Roberts, B.Sc., Memorial University, 1961; M.D., Dalhousie University, 1965.

Alan M. Robson, M.B.B.S., University of Durham, 1959; M.D., 1964. (See Department of Pediatrics)

John C. Rogers (American Cancer Society Junior Faculty Clinical Fellow in Hematology), B.S., University of Nebraska, 1966; M.S., 1968; M.D., 1968.

W. Ernest Rutherford, B.A., Grinnell College, 1961; M.D., University of Colorado, 1965.

Joseph F. Ruwitch, Jr., M.D., Washington University, 1966.

Julio V. Santiago, B.S., Manhattan College,

1963; M.D., University of Puerto Rico, 1967.
(See Department of Pediatrics)

Benjamin D. Schwartz, B.A., Columbia College, 1965; Ph.D., Albert Einstein College of Medicine, 1971; M.D., 1972.

Isaias Spilberg, B.S., University of San Marcos, 1956; M.D., 1963. (See Department of Preventive Medicine and Public Health)

Timothy J. Sullivan III, A.B., Williams College, 1962; M.D., University of Miami, 1966.

Peter G. Tuteur, A.B., Johns Hopkins University, 1962; M.D., University of Illinois, 1966.

H. James Wedner, A.B., Cornell University, 1963; M.D., 1967.

Alan N. Weiss, B.A., Ohio State University, 1963; M.D., 1966.

Edward S. Weiss, B.A., Northwestern University, 1965; M.D., Chicago Medical School, 1969.

Joseph L. Witzum, A.B., Vanderbilt University, 1965; M.D., Washington University, 1969. (See Department of Preventive Medicine and Public Health)

Gary R. Zuckerman, B.S., St. Louis College of Pharmacy, 1958; D.O., Kansas City College of Osteopathic Medicine, 1963.

Research Assistant Professor Emeritus

Anna R. Dubach, A.B., Bryn Mawr College, 1919; M.S., University of Colorado, 1935; Ph.D., 1938.

Research Assistant Professors

Nancy L. Baenziger, B.A., St. Olaf College, 1967; Ph.D., Washington University, 1971.

Janina M. Brajtburg, M.S., University of Lodz, 1950; Ph.D., 1968.

Barry R. Hieb, B.A., Bethel College, 1966; M.D., Washington University, 1970.

Doris Rolf, A.B., Harris Teachers College, 1936.

Jean E. Russell, B.A., Cornell University, 1965; Ph.D., Rice University, 1970.

Barry C. Starcher, B.S., University of California, 1961; M.S., 1962; Ph.D., North Carolina State University, 1965.

Shiu Y. Yu, B.S., Provincial College, 1951; M.S., Oklahoma State University, 1956; Ph.D., St. Louis University, 1963.

Assistant Professors Emeriti (Clinical)

Samuel B. Grant, B.S., Washington University, 1918; M.D., 1920.

Morris Moore (Mycology-Dermatology), S.B., Boston University, 1928; A.M., Harvard University, 1929; Ph.D., Washington University, 1933.

Barrett L. Taussig, A.B., Harvard College, 1928; M.D., Washington University, 1932.

Ray D. Williams, A.B., Hampden-Sydney College, 1930; M.S., Emory University, 1931; M.D., Washington University, 1937.

Keith S. Wilson, A.B., Williams College, 1930; M.D., Washington University, 1934.

Assistant Professors (Clinical)

Morris Alex, B.S., University of Missouri, 1942; M.D., Washington University, 1943.

France Alexander, A.B., Indiana University, 1950; M.D., 1953. (Director, Medical Service, Homer G. Phillips Hospital)

Om P. Bahl, M.B.B.S., Punjab University, 1957; M.R.C.P., University of Edinburgh, 1960.

Jack Barrow, M.D., Washington University, 1946.

Robert W. Barton, B.S., University of Chicago, 1962; M.D.-Ph.D., 1967.

Grace E. Bergner, A.B., Washington University, 1939; M.D., 1943.

John W. Berry, B.S., University of Toledo, 1943; M.D., St. Louis University, 1946.

Morton A. Binder, B.S., Yale University, 1948; M.D., Columbia University, 1951.

Benjamin A. Borowsky, M.D., Washington University, 1958.

Francis J. Catanzaro, M.D., Washington University, 1948.

Adolph H. Conrad, Jr. (Dermatology), A.B., Washington University, 1934; M.D., 1938.

Stephen R. Crespín, A.B., Harvard College, 1960; M.D., 1965.

Arnold Dankner, M.D., Washington University, 1947.

John D. Davidson, A.B., Washington University, 1948; M.D., 1952.

Joseph C. Edwards, A.B., University of Oklahoma, 1930; M.D., Harvard University, 1934.

Melvin L. Goldman, A.B., Washington University, 1939; M.D., 1943.

- John M. Grant**, A.B., Princeton University, 1950; M.D., Washington University, 1954.
- William K. Hall** (Dermatology), B.S., Yale University, 1939; M.D., Harvard University, 1942.
- David T. Hammond**, A.B., Indiana University, 1957; M.D., Washington University, 1960.
- Stanley F. Hampton**, A.B., Washington and Lee University, 1930; M.D., Washington University, 1934.
- James N. Heins**, A.B., University of Louisville, 1957; M.D., 1961.
- Bernard Hulbert**, B.A., University of Wisconsin, 1938; M.D., 1941.
- James H. Hutchinson, Jr.**, B.S., Arkansas A. and M. College, 1942; M.D., University of Arkansas, 1945.
- Sidney Jick**, M.D., Washington University, 1949.
- Harold J. Joseph**, B.A., University of Texas, 1947; M.D., 1950.
- William G. Juergens, Jr.**, M.D., Washington University, 1961.
- Owen S. Kantor**, M.D., University of Missouri, 1968.
- Robert L. Kaufman**, A.B., Washington University, 1959; M.D., 1963.
- Robert W. Kelley**, A.B., Southwestern College, 1932; M.D., Washington University, 1936.
- John J. Kelly**, B.S., Rockhurst College, 1959; M.D., St. Louis University, 1963.
- Charles Kilo**, M.D., Washington University, 1959.
- Robert C. Kingsland**, A.B., Washington University, 1933; M.D., 1937.
- Norman P. Knowlton, Jr.**, B.S., Harvard University, 1942; M.D., 1945.
- Phillip E. Korenblat**, M.D., University of Arkansas, 1960.
- Joseph Levitt**, M.D., Washington University, 1949.
- David M. Lieberman**, M.D., Vanderbilt University, 1949.
- Douglas R. Lilly**, A.B., Princeton University, 1952; M.D., Washington University, 1956.
- William E. Magee**, M.D., Duke University, 1950.
- Thomas F. Martin**, B.S., St. Louis University, 1961; M.D., 1965. (See Biomedical Computer Laboratory)
- Robert S. Mendelsohn**, B.A., Washington and Lee University, 1950; M.D., Washington University, 1954.
- Edward J. Miller**, B.A., St. John's University, 1958; M.D., St. Louis University, 1962.
- J. Roger Nelson**, A.B., Washington University, 1949; M.D., 1953.
- Gordon Newton**, M.D., University of Arkansas, 1958.
- James F. Nickel**, A.B., University of Oklahoma, 1944; M.D., Washington University, 1948.
- Charles C. Norland**, B.S., Washington State University, 1955; M.D., Washington University, 1959.
- M. Norman Orgel**, B.S., College of the City of New York, 1929; M.A., Harvard University, 1930; M.D., Washington University, 1934.
- Robert C. Packman**, A.B., Washington University, 1953; B.S.Med., University of Missouri, 1954; M.D., Washington University, 1956.
- James C. Peden, Jr.**, A.B., Haverford College, 1951; M.D., Washington University, 1955.
- William J. Phillips**, B.A., Oklahoma State University, 1959; M.D., Washington University, 1963.
- Kenneth C. Price**, M.D., University of Washington, 1951.
- Lester T. Reese** (Dermatology), M.D., Tulane University, 1966.
- Harold K. Roberts**, B.A., Ohio State University, 1935; M.D., 1939.
- Shabbir H. Safdar**, F.Sc., Government College Jhang, 1954; M.D., Nishtar Medical College, 1961.
- James C. Sisk** (Dermatology), A.B., Washington University, 1943; M.D., 1946.
- Ross B. Sommer**, A.B., Miami University, 1949; M.D., Cornell University, 1949.
- Stanley M. Wald**, M.D., Washington University, 1946.
- Alvin S. Wencker**, A.B., Washington University, 1949; M.D., 1953.
- Gerald A. Wolff**, A.B., Harvard College, 1955; M.D., Washington University, 1961.
- Herbert B. Zimmerman**, M.D., Washington University, 1951.

Instructors

Khwaja S. Ahmed, M.B., Lucknow University,

1953; B.S., 1953; M.D., 1958.

Gail A. Ahumada, B.A., Stanford University, 1961; M.A., 1962; M.D., University of California-San Diego, 1972.

Ranjit M. Bagwe, B.M., B.S., University of Baroda, 1960; M.D., 1965.

Greta Camel, A.B., University of Wisconsin, 1946; M.D., 1949.

Nicholas V. Costrini, B.S., Georgia State University, 1967; Ph.D., Marquette University, 1970; M.D., Medical College of Wisconsin, 1973.

Vincent R. deMello, M.B., B.S., Seth G. S. Medical College, 1964.

Russell E. Eggebrecht, B.S., University of Illinois, 1967; M.D., Washington University, 1971.

K. S. Gowda, M.B., B.S., Medical College Bellary Mysore, 1969.

George A. Griggs, B.A., University of Delaware, 1954; M.D., Jefferson Medical College, 1958.

Diane M. Karl, B.S., Bucknell University, 1966; M.D., Cornell University, 1970.

John H. Kissel, B.S., Georgetown University, 1967; M.D., Harvard University, 1971.

Anthony Kulczycki, Jr., A.B., Princeton University, 1966; M.D., Harvard University, 1970.

Kenneth M. Ludmerer, A.B., Harvard College, 1968; M.A., Johns Hopkins University, 1971; M.D., 1973.

Paul A. Mennes, B.S., University of Wisconsin, 1966; M.D., Washington University, 1970.

James W. Mimbs, B.A., Emory University, 1965; M.D., Medical College of Georgia, 1969.

Aubrey R. Morrison, M.D., B.S., University of London, 1970.

Thomas Pavlovic, M.D., Northwestern University, 1967.

Richard Ratzan, B.A., Trinity College, 1967; M.D., Columbia University, 1971.

Hector J. Rodriguez, B.S., Universidad Nacional de Colombia, 1964; M.D., 1967. (On leave of absence)

Rodolphe Ruffy, M.D., University of Lausanne, 1968.

David A. Solomon, B.S., University of Maryland, 1965; M.D., 1969.

Elizabeth A. Stoddard, B.S., Montana State University, 1954; M.D., Washington University, 1957. (See Department of Preventive Medicine and Public Health)

Kongsak Tanphaichitr, M.D., Siriraj Hospital Medical School, 1970.

William M. Thomson, B.A., Davidson College, 1969; M.D., Johns Hopkins University, 1973.

Research Instructor Emeritus

Teofil Kheim, M.D., University of Budapest, 1934.

Research Instructors

P. Trueheart Burch, B.A., Radcliffe College, 1967; M.S., Harvard University, 1969; Ph.D., 1971.

Joseph D. Byrne

Elaine M. Carlson, B.A., Northeastern University, 1966; M.S., Massachusetts Institute of Technology, 1968.

Peter B. Corr (Trainee in Cardiology), B.S., Union University, 1971; Ph.D., Georgetown University, 1975.

Ida K. Mariz, A.B., Washington University, 1940.



Shigeru Okada, M.D., Okayama University, 1964; Ph.D., 1969.

B. Seetharam, B.S., Mysore University, 1961; M.S., Bangalore University, 1965; Ph.D., 1972.

Jo L. Seltzer (Dermatology), A.B., Washington University, 1963; Ph.D., 1969.

Akira Yoshida, M.D., Sapporo Medical College, 1965.

Instructors Emeriti (Clinical)

Louis F. Aitken, B.S., University of Illinois, 1923; M.D., Washington University, 1927.

Edward W. Cannady, A.B., Washington University, 1927; M.D., 1931.

Benjamin H. Charles, M.B., Ch.B., University of Edinburgh, 1934.

Julius Elson, M.D., Washington University, 1928.

Lee B. Harrison, A.B., University of Utah, 1925; M.D., Washington University, 1927.

J. Ted Jean, A.B., Indiana University, 1924; M.D., Washington University, 1928.

John W. Seddon, Ph.B., Yale University, 1931; M.D., Washington University, 1935.

David M. Skilling, Jr., B.S., Washington and Jefferson College, 1923; M.D., Washington University, 1928.

Instructors (Clinical)

Charles C. Abel, A.B., Westminster College, 1952; M.D., Washington University, 1956.

Oliver Abel III, Westminster College, 1951; M.D., Washington University, 1955.

Harry Agress, B.S., Washington University, 1932; M.D., 1932.

Jorge M. Alegre, M.D., San Marcos University, 1965.

James W. Bagby (Dermatology), A.B., University of Missouri, 1930; B.S.Med., 1931; M.D., Washington University, 1933.

Walter M. Baumgarten, Jr., A.B., Washington University, 1935; M.D., 1939.

Frederick D. Bauschard (Dermatology), A.B., Allegheny College, 1964; M.D., University of Pittsburgh, 1968.

Aaron Birenbaum, M.D., Washington University, 1948.

Benje Boonshaft, A.B., Washington University, 1957; M.D., 1961.

Dee C. Boswell, B.S., University of Illinois, 1959; M.D., 1963.

John M. Cary, A.B., Central College, 1954; M.D., St. Louis University, 1958.

Margaret Chieffi, M.D., University of New Zealand, 1937.

Frank Cohen, M.D., University of Toronto, 1939.

Philip Comens, B.S.Med., University of Missouri, 1949; M.D., Washington University, 1951.

Ralph Copp, Jr., A.B., Washington University, 1948; M.D., 1952.

Duane E. Cozart, Ph.B., University of Chicago, 1947; A.B., Washington University, 1949; M.D., Medical College of Virginia, 1959.

Thomas A. Dew, B.S., Arkansas A & M College, 1963; M.D., University of Arkansas, 1967.

Norman W. Drey, A.B., Princeton University, 1932; M.D., Washington University, 1936.

Royal J. Eaton, A.B., University of Missouri, 1959; M.D., 1964.

David Feldman, M.D., Washington University, 1943.

Alfred Fleishman, B.S., Washington University, 1935; M.D., 1935.

B. Todd Forsyth, M.D., Washington University, 1947.

Arthur H. Gale, B.S., Washington University, 1955; M.D., University of Missouri, 1959.

Kenneth W. Gentsch, A.B., Princeton University, 1954; M.D., Washington University, 1958.

Arnold M. Goldman, A.B., Harvard College, 1955; M.D., Washington University, 1959.

Benjamin M. Goldstein, B.A., Washington University, 1960; M.D., 1964.

Ronald K. Grady, B.S., Purdue University, 1956; M.S., 1957; M.D., Washington University, 1966.

Axel R. Gronau, M.D., University of Naples, 1935.

Jitendra K. Gupta, M.B., B.S., King George Medical College, 1964.

William E. Hinkley, B.A., Bowdoin College, 1965; B.M.S., Dartmouth University, 1967; M.D., Harvard University, 1969.

Bruce J. Hookerman (Dermatology), A.B., Dartmouth College, 1964; M.D., St. Louis University, 1968.

John L. Horner, A.B., Washington University, 1932; M.D., 1936.

Richard F. Huck, B.S., Notre Dame University, 1947; M.D., Washington University, 1948.

Myron H. Jacobs, B.A., Vanderbilt University, 1965; M.D., Louisiana State University, 1969.

Morris Joftus, M.D., University of Illinois, 1967.

David N. Kerr, A.B., University of Colorado, 1936; M.D., Washington University, 1941.

Melvin B. Kirstein, B.S., Indiana University, 1930; M.D., 1933.

Robert E. Koch, A.B., Washington University, 1936; M.D., 1940.

Robert C. Kolodny, B.A., Columbia University, 1965; M.D., Washington University, 1969.

Robert E. Kraetsch, B.S., University of Illinois, 1965; M.D., Washington University, 1969.

Ralph F. Kuhlman, M.D., University of Illinois, 1964. (Also Student Health Service)

Daniel K. Lane (Dermatology), B.A., Princeton University, 1955; M.D., Washington University, 1959.

Morton A. Levy, B.A., University of California at Los Angeles, 1957; M.D., Washington University, 1961.

Ellis S. Lipsitz, A.B., Yale University, 1940; M.D., St. Louis University, 1943.

Warren M. Lonergan, A.B., Westminster College, 1936; M.D., Vanderbilt University, 1940.

Carl A. Lyss, A.B., Washington University, 1952; B.S., 1952; M.D., 1956.

Richard W. Maxwell, A.B., Greenville College, 1932; M.D., University of Chicago, 1937.

Oliver A. McKee (Dermatology), L.R.C.P., Royal College of Physicians and Surgeons, 1949; S.M., 1949.

Austin F. Montgomery, M.D., University of Pittsburgh, 1954.

Arlen E. Morrison, A.B., Washington University, 1954; M.D., 1958.

Frede Mortensen, B.A., Wagner College, 1949; M.D., New York Medical College, 1953.

Leonard N. Newmark, A.B., Washington University, 1956; M.A., 1959; M.D., 1963.

Lamar H. Ochs, A.B., Washington University, 1941; M.D., 1944.

S. Michael Orgel, A.B., Washington University, 1960; M.D., St. Louis University, 1965.

Robert F. Owen, B.A., Princeton University, 1948; M.D., Yale University, 1952.

Vincent J. Proskey, B.S., University of Detroit, 1954; M.D., Marquette University, 1964.

Gary A. Ratkin, B.A., Rice University, 1963; M.D., Washington University, 1967.



Donald E. Riesenber, B.A., Drury College, 1964; M.D., University of Missouri, 1968.

Ernest T. Rouse III, B.A., Princeton University, 1967; M.D., Washington University, 1971.

Jack L. Saylor, B.A., Southern Illinois University, 1960; M.D., University of Illinois, 1964.

Samuel E. Schechter, M.D., Washington University, 1941.

John S. Schoentag (Dermatology), A.B., University of Missouri, 1956; M.D., Washington University, 1960.

John B. Shapleigh II, M.D., Washington University, 1946.

John S. Skinner, M.D., Washington University, 1940.

Alan R. Spivack, A.B., Washington University, 1960; M.D., St. Louis University, 1964.

Paul M. Stein, A.B., University of Rochester, 1967; M.D., St. Louis University, 1971.

Robert M. Taxman, A.B., Washington University, 1960; M.D., 1964.

J. Allen Thiel, B.S., Rockhurst College, 1956; M.D., St. Louis University, 1960.

James W. Walsh, A.B., Washington University, 1950; M.D., 1954.

Hugh R. Waters, B.S., Northwestern University, 1942; M.D., Washington University, 1945.

James R. Wiant, A.B., Princeton University, 1955; M.D., Jefferson Medical College, 1959.

Herbert C. Wiegand, A.B., Washington University, 1940; M.D., 1943.

Edward M. Wolfe (Dermatology), B.A., Hobart College, 1956; M.D., Washington University, 1960.

James A. Wood, A.B., Westminster College, 1947; M.D., Washington University, 1949.

Research Associates

Randolph L. Berens, B.S., University of California, 1967; Ph.D., 1975.

Anthony S. Hajek, B.A., Lewis College, 1966; M.S., De Paul University, 1969; Ph.D., University of Iowa, 1974.

Buddhiraju V. Kumar, B.S., Osmania University, 1963; M.S., 1965; Ph.D., 1972.

Charles W. Lee, B.S., University of Chicago, 1959; M.S., 1960; Ph.D., Texas A & M University, 1966.

Alice Robinson, A.B., University of California, 1962.

Research Assistants

Hans D. Ambos

Mary L. Baumann, B.S., Southeast Missouri State University, 1967.

Sharon E. Carmody, B.A., Webster College, 1960.

Margaret W. Erlanger, B.A., University of Iowa, 1932; M.S., 1938.

Walter T. Gregory, B.S., St. Louis University, 1960.

Shirley A. Hajek, B.S., Ball State University, 1964; M.S., University of Iowa, 1967; Ph.D., 1974.

Foster Harris, B.A., University of Missouri, 1969.

Kenneth O. Henderson (Dermatology), B.S., University of Missouri, St. Louis, 1971.

Paul F. Huebner, B.S., Southeast Missouri State College, 1963; M.S., 1968.

Mary C. Johnson, A.B., Washington University, 1938.

Mary A. Lavin, B.S., St. Louis University, 1964; M.S., 1970; M.S., Harvard University, 1974.

Yu-Chiang Lee, B.S., Taiwan Christian College, 1959; Ph.D., Oklahoma State University, 1969.

Arlene P. Loewy (Dermatology), B.S., University of Pennsylvania, 1967.

Odessa Owens

Audrey A. Painter, M.S., Northwestern University, 1956.

Claire K. Pedersen, B.S., Quincy College, 1948.

Betty F. Perry, A.B., Washington University, 1945.

Suresh D. Shah, M.S., Gujarat University, 1959; M.S., St. Louis University, 1972.

Shiu S. Yang, Ph.D., University of Iowa, 1969.

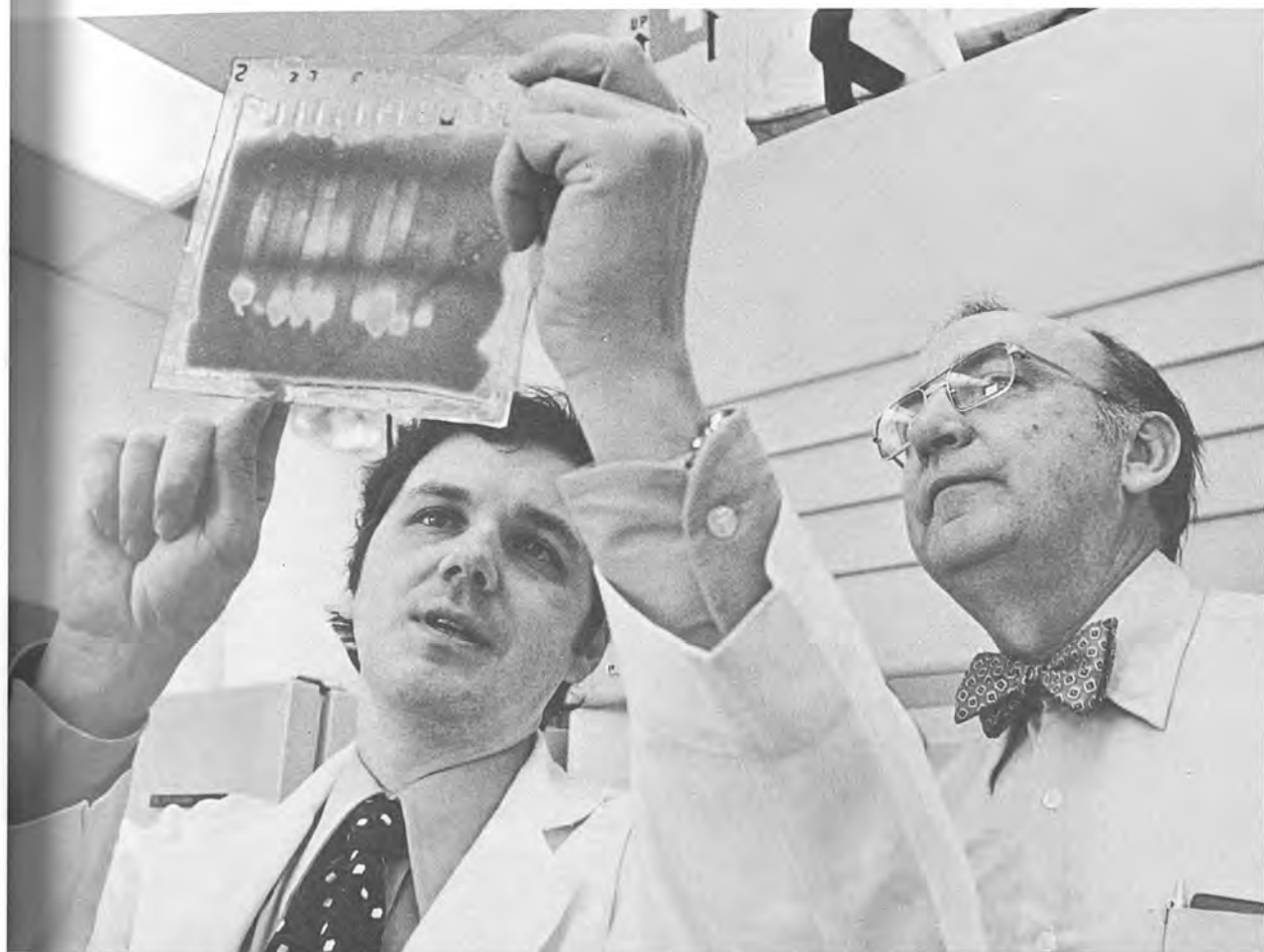
Jesse T. Yates, B.S., Fisk University, 1956.

Donald E. Yuhus (Trainee in Cardiology), B.A., Northwestern University, 1970; M.S., Washington University, 1974.

Assistant (Clinical)

John E. Mullins, A.B., Washington University, 1954; M.D., 1958.

Department of Microbiology and Immunology



The Department teaches a one-semester introductory course in microbiology for first-year medical students and for graduate students. The course is concerned particularly with principles of microbial physiology and genetics, and of immunology and, through a limited survey of pathogenic bacteria, viruses, and fungi, attempts to prepare medical students for more advanced study of infectious diseases later in the curriculum. The Department also offers a number of advanced elective research activities. A limited number of summer research fellowships are available.

FIRST YEAR

Bio 533. *Medical Microbiology.* Lectures and laboratory. This course presents the basic principles relating to the growth and reproduction of bacteria and viruses and to the immune responses of the host to diverse substances, including pathogenic microbes and their metabolic products. The sequence followed is: immunology, microbial physiology and genetics, virology, and a survey of pathogenic bacteria and fungi. The immunology part of the course emphasizes structure, function, and biosynthesis of antibodies, and provides an introduction to cell-mediated

immune responses. In terms of these concepts, specific groups of pathogenic organisms and viruses are considered. The interaction between host and parasite is studied by analyzing wherever possible the molecular basis for the pathogenicity of the microbe and for the immune reactions of man. The factors that make microorganisms vulnerable or resistant to chemotherapeutic agents are emphasized. Registration for individuals other than medical students requires the consent of the coursemaster. Credit, lectures 5 units; laboratory 1 unit. (Staff)

RESEARCH

Bio 590. These electives acquaint the student with the analyses that are used in present-day biomedical research, especially at the molecular level. (Staff)

Processing and decay of RNA in *E. coli* and mammalian cells, normal and malignant. Differentiation—activation of unexpressed genes in mammalian cells. (Dr. Apirion)

Lymphocyte receptor molecules; role of T lymphocytes in B cell differentiation. (Dr. Davie)

Structure and biosynthesis of antibodies; molecular genetics of antibody formation. (Dr. Fleischman)

Biochemistry of tumor viruses, varicella-zoster and hepatitis B virus. (Dr. Gelb)

The genetics and immunology of cancer and tissue transplantation. (Dr. Graff)

Biochemistry and genetics of macromolecule regulation: mRNA metabolism in bacteria; regulation of catabolism in cultured mammalian cells. (Dr. Kennell)

Immunology and chemistry of the medically important fungi; host-parasite interaction of opportunistic fungal diseases. (Drs. Kobayashi, Medoff)

The structure and biosynthesis of lymphocyte cell surface antigens and lymphocyte triggering mechanisms. (Dr. Little)

Origin and differentiation of mononuclear phagocytes. (Dr. Lin)

Development of therapy for intracellular bacterial and fungal infections. (Drs. Kobayashi, Medoff)

Tumor immunotherapy. Establishment of animal models of human malignancy. (Dr. Medoff)

Cellular immunology, drug hypersensitivity, immune tolerance, radioimmunoassays, tumor immunology, and immediate hypersensitivity. (Dr. Parker)

Biochemistry and replication of oncogenic adenoviruses. (Dr. Raskas)

Interactions between RNA animal viruses and their host cells. Emphasis on maturation and assembly of viral proteins. The immune response to viruses: formation and properties of infectious viral-antibody complexes. (Dr. M. Schlesinger)

Structure and replication of enveloped RNA animal viruses. (Dr. S. Schlesinger)

RNA processing and the balance of RNA synthesis and degradation in bacteria and mammalian cells. (Dr. D. Schlessinger)

The structure of the polymeric immunoglobulins, IgA, and IgM. Present emphasis is focused on the structure of J chain and its role in the polymerization of IgA. The effects of modification of tumor antigens on the induction of protective immunity to neoplasms. Effects of acute and chronic viral infections on immunocompetence. (E. Simms)

Clinical microbiology, anaerobes, endogenous infections. (Dr. Sonnenwirth)

ELECTIVES

At present the primary enrollees in these courses are students working for a Ph.D. degree in one of the basic sciences. However, these courses are recommended for interested medical students, especially those

who may be considering a career in medical research. Emphasis is placed on the organization and function of living systems at the molecular level. The courses combine formal lectures with student-directed seminars. In the latter, each student has an opportunity to integrate various disciplines of modern molecular biology into the area of biology or medicine that is of particular interest to him. Those courses most relevant to the field of microbiology are listed under the Division of Biology and Biomedical Sciences.

Bio 549. *Antibodies: Structure, Function, and Formation.* The principal features of the structure and function of antibody molecules will be examined in lectures, assigned reading of current research papers, and in student seminar presentations. Emphasis will be placed on the genetic and molecular events which govern the appearance of antibodies during the immune response.

(Drs. Fleischman, Little, Simms)

Bio 596. *Topics in Animal Virology* (Fall, 1976). Molecular Biology of DNA and RNA animal viruses, with emphasis on viral replication and viral-induced transformation of cells in tissue culture and slow viral diseases in animals. Credit 3 units.

(Drs. M. Schlesinger, S. Schlesinger)

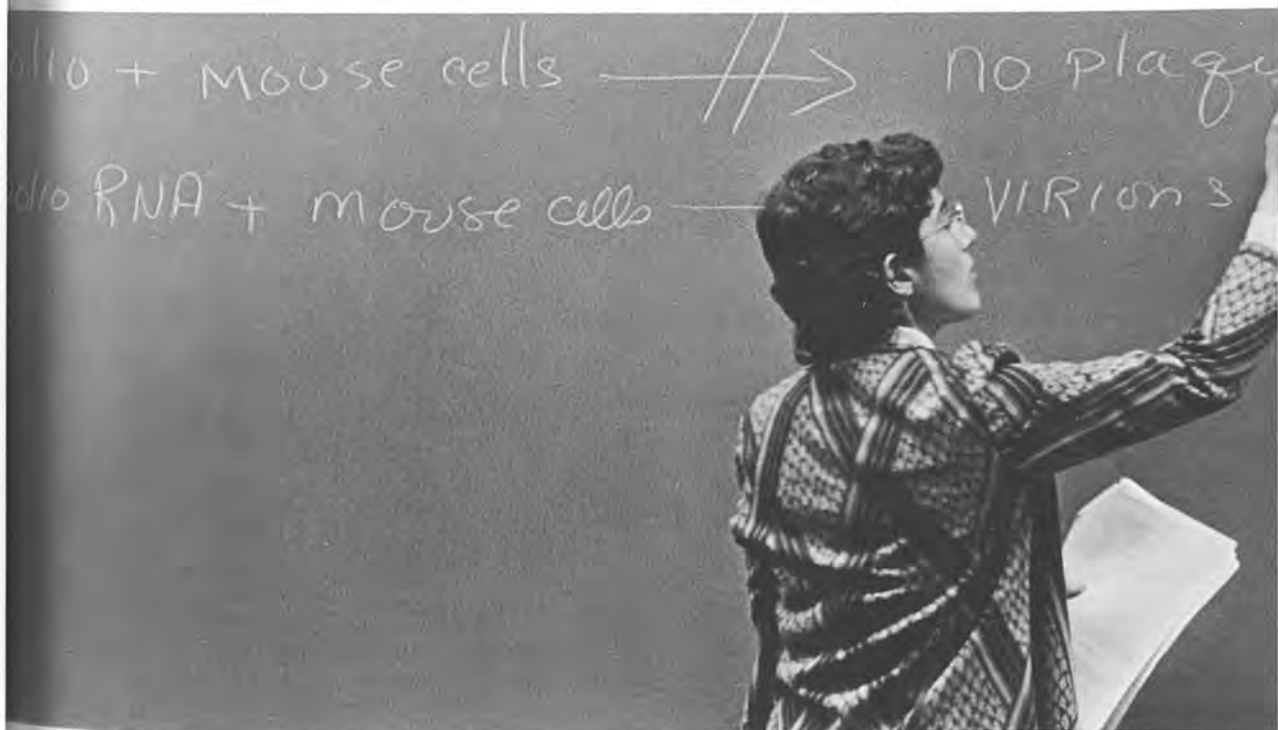
Professor and Head of Department

Joseph M. Davie, A.B., Indiana University, 1962; M.A., 1964; Ph.D., 1966; M.D., Washington University, 1968. (See Department of Pathology)

Professors

David E. Kennell, A.B., University of California, 1955; Ph.D., 1959.

Note—The number preceding the course title indicates that the course carries credit in the Graduate School of Arts and Sciences.



J. Russell Little, Jr., A.B., Cornell University, 1952; M.D., University of Rochester, 1956. (See Department of Medicine) (Jewish Hospital)

Charles W. Parker, M.D., Washington University, 1953. (See Department of Medicine)

Carl W. Pierce, A.B., Colgate University, 1962; Ph.D., M.D., University of Chicago, 1966. (See Department of Pathology) (Jewish Hospital)

Milton J. Schlesinger, B.S., Yale University, 1951; M.S., University of Rochester, 1953; Ph.D., University of Michigan, 1959.

David Schlessinger, B.A., University of Chicago, 1955; B.S., 1957; Ph.D., Harvard University, 1961.

Associate Professors

David Apirion, M.S., Hebrew University of Jerusalem, 1960; Ph.D., University of Glasgow, 1963.

Julian B. Fleischman, B.S., Yale University, 1955; Ph.D., Harvard University, 1960.

George S. Kobayashi, B.S., University of California, 1952; Ph.D., Tulane University, 1963. (See Department of Medicine)

Gerald Medoff, A.B., Columbia College, 1958; M.D., Washington University, 1962. (See Department of Medicine)

Heschel J. Raskas, B.S., Massachusetts Institute of Technology, 1962; Ph.D., Harvard University, 1967. (See Department of Pathology)

Sondra Schlesinger, B.S., University of Michigan, 1956; Ph.D., 1960.

Ernest S. Simms

Alexander C. Sonnenwirth, A.B., University of Nebraska, 1950; M.S., Purdue University, 1953; Ph.D., Washington University, 1960. (See Department of Pathology) (Jewish Hospital)

Assistant Professors

Susan E. Cullen, B.S., College of Mt. St. Vincent, 1965; Ph.D., Albert Einstein College, 1971. (See Department of Genetics)

Lawrence D. Gelb, B.S., University of Michigan, 1963; M.D., Harvard University, 1967. (See Department of Medicine)

Ralph J. Graff, A.B., Washington University, 1957; M.D., 1957. (See Department of Surgery)

Harvey Liebhaber, A.B., New York University, 1953; M.D., 1957. (See Department of Medicine) (Jewish Hospital)

Hsiu-san Lin, M.D., Taiwan University, 1960; Ph.D., University of Chicago, 1968. (See Department of Radiology)

Benjamin D. Schwartz, B.A., Columbia College, 1965; Ph.D., Albert Einstein College, 1971; M.D., 1972. (See Department of Medicine)

Research Assistant Professors

Judith A. Kapp-Pierce, B.A., Miami University, 1965; M.S., Indiana University, 1969; Ph.D., Harvard University, 1976. (See Department of Pathology) (Jewish Hospital)

Takashi Kasai, B.S., University of Tokyo, 1959; M.S., 1961; Ph.D., 1964.

Research Instructor

David E. Briles, B.A., University of Texas, 1967; Ph.D., Rockefeller University, 1973.

Research Associates

Leonard Keay, B.Sc., Queen Mary College, 1953; Ph.D., 1955; M.Sc., University College, 1956.

Maria C. Michaelides, B.A., Smith College, 1953; M.A., Radcliffe College, 1954; Ph.D., 1958.

Research Assistants

John Courtney, A.B., University of Illinois, 1953.

Richard J. McDonald

Department of Neurology and Neurological Surgery



Neurology and neurological surgery concern themselves with the diseases of brain, spinal cord, peripheral nerves, and muscles. An introduction to the anatomy and physiology of the nervous system is presented in the first-year course in neural sciences provided by the departments of Anatomy and Neurobiology and physiology and Biophysics. In the second year, the Department is the major contributor to an interdepartmental course in Pathophysiology of Nervous System Disorders. Here are demonstrated the interrelationships between knowledge derived from basic investigative and from clinical sources. In addition, there are lectures and exercises

with patients in neurological physical diagnosis. Third-year activities are based on a full-time inpatient and outpatient clerkship in clinical neurology. In the fourth year, there are opportunities for clinical externships and for investigation of nervous system functioning in every aspect.

SECOND YEAR

Neurological Examination in Clinical Diagnosis (part of interdepartmental course in clinical diagnosis). Lectures, demonstrations, and practice examinations of neurological patients. (Dr. Eliasson and Staff)

Pathology of Nervous System Disorders (part of course in Pathophysiology). A collaborative sequence with other clinical and basic science departments concerned with diseases of the nervous system. Lectures and seminar-symposia.

(Dr. Eliasson and combined Neurology-Neurosurgery Staff)

THIRD YEAR

Neurology. A full-time, three-week clerkship is provided on the neurology services at Barnes and City Hospital-Starkloff Memorial. Patients are assigned to students, who follow them with the resident staff and discuss them regularly in conferences with the senior staff. Students also work in the neurology clinics under staff supervision.

(Drs. Eliasson, Landau, and Staff)

FOURTH YEAR

Electives

Research. A twelve-week elective is available in many areas such as neuroanatomy, including electron microscopy, clinical and experimental neurophysiology, cerebral metabolism and circulation, neurochemistry, etc. Facilities are available for qualified students in any year to undertake original research in the laboratories of the Department or in the clinics and wards.

(Drs. Goldring, Landau and combined Neurology-Neurosurgery Staff)

Clinical Neurology. A six-week elective neurology clerkship is offered at Starkloff Hospital. There the student works as a member of the clinical team, assumes responsibility for patients, and works in the clinic. Formal teaching conferences are provided in addition to regular teaching rounds.

(Dr. Chesanow and Staff)

Another six-week elective is offered at Barnes Hospital. The student works directly with the chief resident and senior staff covering consultations at Barnes and Jewish hospitals.



Selected reading assignments on current topics in neurology are made.

(Dr. Black and Staff)

Clinical Neurosurgery. The goal of the six-week clerkship at Barnes Hospital is to provide an overview of neurological surgery. Responsibilities include patient workup, pre- and post-operative care, and attendance at selected neurosurgical operations. Daily teaching rounds are held with a member of the attending staff. Students also work in the Neurosurgical Clinic and attend the weekly staff conferences. (Dr. Goldring and Staff)

Staff Conferences. Students are invited to attend the Conjoint Neurological Conference (neuropathology, neuroradiology, medical neurology, pediatric neurology, and neurological surgery) held on Wednesday afternoon. The Conference is held in Clopton Amphitheatre at 1:30 p.m. except on the second Wednesday of each month, when it is held at City Hospital-Starkloff Memorial at 1:45 p.m. in the third floor conference room. The format of the conferences includes clinical presentations, symposia, and CPCs. Neurosurgery Grand Rounds are held weekly at 4:00 p.m. on Friday. Neuropathology brain cutting conferences are held

in the Pathology Department on Monday at 1:00 p.m. and in the Starkloff Hospital autopsy conference room on Thursday at 12:30 p.m.

Co-Heads of Department

Sidney Goldring, William Landau

NEUROLOGY

Professor and Head

William M. Landau, M.D., Washington University, 1947.

Allen P. and Josephine B. Green Professor of Pediatric Neurology

Arthur L. Prenskey, A.B., Cornell University, 1951; M.D., New York University, 1955. (See Department of Pediatrics)

Professors

Michael H. Brooke, M.B., B.Ch., Cambridge University, 1958.

Ronald M. Burde, B.S., Massachusetts Institute of Technology, 1960; M.D., Jefferson Medical College, 1964. (See Department of Ophthalmology)

Margaret H. Clare (Neurophysiology), B.S.Ed., Southeast Missouri State Teachers College, 1940; M.A., Washington University, 1951.

Philip R. Dodge, M.D., University of Rochester, 1948. (See Department of Pediatrics)

Sven G. Eliasson, Ph.D., University of Lund, 1952; M.D., 1954. (See Department of Preventive Medicine and Public Health and Irene Walter Johnson Institute of Rehabilitation)

Edward E. Vastola, B.S., Yale University, 1945; M.D., Columbia College of Physicians and Surgeons, 1947. (Starkloff Hospital)

Professor Emeritus (Clinical)

Irwin Levy, A.B., Cornell University, 1927; M.D., St. Louis University, 1931; D.M.S., Columbia University, 1935.

Professor (Clinical)

Leonard Berg, A.B., Washington University, 1945; M.D., 1949.

Seay Associate Professor of Clinical Neuropharmacology

James A. Ferrendelli, A.B., University of Colorado, 1958; M.D., 1962. (See Department of Pharmacology)

Associate Professors

Lawrence A. Coben, B.S., Western Reserve University, 1948; M.D., 1954; M.A., Northwestern University, 1951.

Darryl C. DeVivo, B.A., Amherst College, 1959; M.D., University of Virginia, 1964. (See Department of Pediatrics)

Marvin A. Fishman, B.S., University of Illinois, 1959; M.D., 1961. (See Departments of Pediatrics and Preventive Medicine and Public Health, and Irene Walter Johnson Institute of Rehabilitation)

Alan L. Pearlman, A.B., State University of Iowa, 1958; M.D., Washington University, 1961. (Gordon R. and Thelma B. Coates Scholar in Neurology) (See Department of Physiology and Biophysics)

Marcus E. Raichle, B.S., University of Washington, 1960; M.D., 1964. (See Department of Radiology)

W. Thomas Thach, Jr., A.B., Princeton University, 1959; M.D., Harvard University, 1964. (See Department of Anatomy and Neurobiology)

Joseph J. Volpe, B.A., Bowdoin College, 1960; M.D., Harvard University, 1964. (See Department of Pediatrics)

Associate Professor Emeritus (Clinical)

Andrew B. Jones, M.D., Vanderbilt University, 1916.

Associate Professors (Clinical)

Herbert E. Rosenbaum, B.S., University of Oregon, 1947; M.D., 1949.

Earl R. Schultz, A.B., Southeast Missouri State College, 1952; B.S.Med., University of Missouri, 1953; M.D., Washington University, 1955. (See Department of Psychiatry)

Stuart Weiss, A.B., Washington University, 1950; M.D., 1954.

Assistant Professors

Robert L. Chesanow, B.S., Union College, 1955;

M.D., Albany Medical College, 1960. (Starkloff Hospital)

Robert C. Collins, B.A., University of California-Berkeley, 1964; M.D., Cornell University, 1969. (Starkloff Hospital)

W. Edwin Dodson, A.B., Duke University, 1963; M.D., 1967. (See Department of Pediatrics)

Joseph Hanaway, B.A., McGill University, 1956; M.D., 1960; C.M., 1960. (See Department of Anatomy and Neurobiology)

Charles P. Hughes, B.A., Yale University, 1960; M.D., Case Western Reserve University, 1964.

John L. Trotter, A.B., DePauw University, 1965; M.D., Washington University, 1969.

Research Assistant Professor

Kenneth K. Kaiser, B.S., Colorado State University, 1968.

Assistant Professor Emeritus (Clinical)

Archie D. Carr, B.S., Washington University, 1918; M.D., 1921.

Assistant Professors (Clinical)

Joseph T. Black, B.A., University of Rochester, 1961; M.D., Upstate Medical Center, Syracuse, 1965.

Joseph M. Dooley, Jr., B.S., St. Louis University, 1954; M.D., 1958.

Richard S. Sohn, B.S., Brooklyn College, 1964; M.D., University of Chicago, 1968.

Instructors

Mary I. Johnson, B.S., Washington State University, 1964; M.D., Johns Hopkins University, 1968. (See Departments of Anatomy and Neurobiology and Pediatrics)

Jose H. Ribo, B.A., Colegio La Salle Bonanova, 1960; M.D., Facultad de Medicina de Barcelona, 1967. (Starkloff Hospital)

Shirley A. Sahrman (Neurobiology), B.S.P.T., Washington University, 1958; M.A., 1971; Ph.D., 1973. (See Departments of Preventive Medicine and Public Health and Physiology and Biophysics)

Narendrakumar B. Sodha, Inter Science, St. Xavier's College, 1965; M.B., B.S., Grant Medical College, 1970.

Instructor (Clinical)

Robert J. Mueller, M.D., Washington University, 1936; M.S., University of Michigan, 1942.

Research Associate

James E. Carroll, B.S., University of Louisville, 1966; M.D., 1969.

Research Assistants

Joseph Inukai (See Neurological Surgery)

JoAnne D. Scarpellini

Lloyd N. Simpson

Jeanne M. Smith

NEUROLOGICAL SURGERY

Professor and Head

Sidney Goldring, B.S., Washington University, 1943; M.D., 1947.

August A. Busch, Jr., Professor

Henry G. Schwartz, A.B., Princeton University, 1928; M.D., Johns Hopkins University, 1932.

Professor

William S. Coxe, B.S., Hampden-Sydney College, 1945; M.D., Johns Hopkins University, 1948.

Professor Emeritus (Clinical)

Leonard T. Furlow, B.A., Emory University, 1923; M.D., 1925.

Assistant Professors

Robert L. Grubb, Jr., A.B., University of North Carolina, 1961; M.D., 1965. (See Department of Radiology)

Robert A. Ratcheson, B.S., Northwestern University, 1962; M.D., 1965.

Instructor

Morris Pulliam, M.D., Washington University, 1966.

Research Assistants

Isaac A. Edwards

Joseph Inukai (See Neurology)

Carl S. Pieper

Department of Obstetrics and Gynecology



The student's involvement in obstetrics and gynecology consists of a thorough exposure to the basic concepts in reproductive biology and an active participation in the delivery of medical care to women with gestations normal or at risk, congenital anomalies of pelvic viscera, structural disorders secondary to difficult childbirth, reproductive endocrinopathies and infertility, and gynecologic malignancies. The entire junior clerkship is conducted in the East Pavilion of Barnes Hospital. Senior electives may be taken at Barnes Hospital or in the many affiliated hospitals in St. Louis. Regularly held conferences in reproductive biology, perinatal

medicine, Ob-Gyn pathology, and oncology supplement the student's education

SECOND YEAR

The sophomore is introduced to Obstetrics and Gynecology with lectures in reproductive biology touching on pelvic anatomy, physiology of tubal transport and ovarian control, myometrial function, placental perfusion, and steroidogenesis.

THIRD YEAR

Students are each assigned to a resident-senior staff team, and the residents and staff

physicians serve as preceptors during the students' six-week stay in the Department. Every woman seen in the office or cared for in the hospital by the team of physicians is considered in her entirety. Attention is paid to the manner in which her social and economic situation has modified her response to disease. Environmental manipulation, in addition to the traditional ways of medical care, is resorted to in attempting to improve her health. The team method ensures that personalized care is given by arranging for the same group of physicians to meet a woman's health needs during each visit. The residents in a team function like a group in obstetrics and gynecology practice, and the student works like an intern in the specialty. He sees patients in the office with his resident group, attends deliveries, assists in surgery, and goes to conferences and night call with them.

FOURTH YEAR

Seniors wishing to take an externship or research elective can choose from a variety of courses:

Ob-Gyn Externships

Endocrinology-Infertility Externship. In the office and hospital, the extern participates in the study and treatment of women with reproductive endocrine disorders and infertility. He presents patients in conferences, has assigned reading, and obtains experience in the techniques of steroid and gonadotropin quantitation as well as various manipulative procedures. (Dr. Warren)

Pathology Externship. The elective elucidates the principles of anatomic pathology as applied to operative material in obstetrics and gynecology. The extern examines gross and microscopic specimens in the Ob-Gyn Pathology. Laboratory and reviews pertinent literature with a senior pathologist. (Dr. Askin)

Gyn Oncology. This elective concerns itself with the diagnosis and treatment of malignant

tumors of the female reproductive tract. The extern is involved in all aspects of the care of women with gyn malignant tumors. This experience will include the surgical treatment, radiation therapy and chemotherapy. (Dr. Camel)

Perinatal Medicine. Electronic and biochemical surveillance of the human fetus and mother before and during parturition. The extern is involved in the care of women with gestations at risk (i.e., diabetes, hypertension, toxemia, renal disease, fetopelvic disproportion, etc.). (Dr. Sauvage)

Ob-Gyn Preceptorship. The student spends six weeks with a clinical faculty member who is in private practice. He makes hospital rounds and operates with his preceptor at Barnes and other community hospitals. He becomes familiar with the experiences of the private practitioner. (Dr. Warren)

General Ob-Gyn Externships

Homer G. Phillips Hospital (Dr. Monat)

Jewish Hospital (Drs. Soule, Burstein)

St. Louis County Hospital (Dr. Wulff)

The externship in each of these affiliated hospitals allows the student a greater degree of participation and responsibility in the care of patients. There is a wealth of clinical material in each of these facilities.

Research Electives

Molecular Aspects of Endocrinology and Population Control. The research involves the study of the topography of macromolecular steroid binding sites, evaluation of the role of steroid "receptor" proteins in molecular mechanisms of steroid action, and the synthesis of affinity-labeling steroids and anti-steroids and their application to disease states and population control. (Dr. Warren)

Steroids in Reproductive Physiology. The endeavor examines the qualitative and quantitative nature of steroidogenesis in the

ovary and the eventual secretion of steroid hormones from the gland. Definition of the role of progesterone in the establishment and maintenance of pregnancy in the human and in experimental animals is also attempted. (Dr. Wiest)

Regulation of Placental Hormone Synthesis. Our laboratory is concerned with studying the factors regulating the biosynthesis of protein hormones in the placenta, human placental lactogen (hPL), and human chorionic gonadotropin (hCG). The appearance of these hormones in maternal serum differs markedly. For these studies the template mRNAs have been isolated and we are generating complementary DNAs to the corresponding mRNAs. These DNA probes will be used to assay gene activities in normal and pathological tissues. Students will be concerned with the concepts and techniques of molecular biology as applied to the above research. (Dr. Boime)

Sperm Biochemistry and Andrology. Research is performed which is aimed at the

understanding and control of the molecular events which allow for sperm penetration of the ovum. Investigations into male infertility centering on sperm motility, bacteriological considerations, and freezing of semen are also conducted. (Dr. Polakoski)

Bio-Organic Chemical Endocrinology. The mechanism of steroid hormone action at the molecular level is approached by producing new progesterone and estrogen analogs by organic synthesis. The student can work at the organic synthetic or biochemical level. Isolation of uterine estrogen and progesterone receptor proteins by a newly synthesized affinity chromatography system is in progress. Also, new steroids containing alkylating functional groups are synthesized and have a dual research role: to serve as tools with which to probe the steroid-macromolecular binding phenomenon and to produce biologically active steroids with persistent hormone activity or hormone blocking action. Physico-chemical methods are used to study steroid-protein interaction. (Dr. Sweet)



Professor and Head of Department

James C. Warren, A.B., University of Wichita, 1950; M.D., University of Kansas, 1954; Ph.D., University of Nebraska, 1961. (See Department of Biological Chemistry)

Professor Emeritus

Willard M. Allen, B.S., Hobart College, 1926; M.S., University of Rochester, 1929; M.D., 1932; Sc.D. (hon.), 1977; Sc.D. (hon.), Hobart College, 1940.

Professors

Arpad I. Csapo, M.D., University of Szeged, 1941.

Walter G. Wiest, A.B., Brigham Young University, 1948; Ph.D., University of Wisconsin, 1952. (See Department of Biological Chemistry)

Professors Emeriti (Clinical)

A. Norman Arneson, B.S., Texas Christian University, 1924; M.D., Washington University, 1928. (See Department of Radiology)

John E. Hobbs, A.B., Southwest Missouri State Teachers College, 1923; M.D., Washington University, 1927.

Melvin A. Roblee, B.S., Washington University, 1923; M.D., 1925.

Grandison D. Royston, M.D., Washington University, 1907.

Samuel D. Soule, M.D., Washington University, 1928.

Professor (Clinical)

William H. Masters, B.S., Hamilton College, 1938; M.D., University of Rochester, 1943.

Associate Professors

Fernando Arias, M.D., National University at Bogota, 1958; Ph.D., Tulane University, 1965.

H. Marvin Camel, M.D., Creighton University, 1950.

Ernst R. Friedrich, M.B., University of Berlin, 1951; M.D., University of Heidelberg, 1954.

Jacques Sauvage, B.S., University of Liege, 1953; M.D., 1957.

George J. L. Wulff, Jr., A.B., Washington University, 1929; M.D., 1933.

Associate Professors (Clinical)

Robert Burstein, M.D., Washington University, 1948.

Charles R. Gulick, A.B., Central College, 1940; M.D., St. Louis University, 1943.

Norman K. Muschany, A.B., Westminster College, 1947; M.D., Temple University, 1951.

David Rothman, B.S., Washington University, 1935; M.D., 1935.

Assistant Professors

James P. Crane, A.B., Indiana University, 1966; M.D., 1970.

Ming-Shian Kao, M.D., National Taiwan University Medical College, 1961.

David W. Keller, B.S., Canisius College, 1960; M.D., University of Buffalo, 1964.

Bahij S. Nuwayhid, B.S., American University of Beirut, 1964; M.D., 1968.

Frederick Sweet, B.S., City University of New York, 1960; Ph.D., University of Alberta, 1968.

Research Assistant Professors

Irving Boime, B.S., St. Louis College of Pharmacy, 1964; M.S., Purdue University, 1966; Ph.D., Washington University, 1970. (See Department of Pharmacology)

Kenneth V. Polakoski, B.S., Wisconsin State University, 1966; M.S., University of Georgia, 1971; Ph.D., 1972.

Assistant Professors Emeriti (Clinical)

Kevin C. Morrin, M.B., B.Ch., National University of Ireland, 1921.

Willard C. Scrivner, B.S., Washington University, 1926; M.D., 1930.

Assistant Professors (Clinical)

William Berman, A.B., Washington University, 1931; M.D., 1935.

Arthur R. Bortnick, M.D., Washington University, 1935.

Robert S. Cohen, B.S., Union College, 1958; M.D., State University of New York, 1962.

Raymond C. Doucette, A.B., Bowdoin College, 1960; M.D., C.P.M., McGill University Faculty of Medicine, 1964.

Arthur T. Esslinger, M.D., Washington University, 1940.

S. Michael Freiman, A.B., Montana State University, 1951; M.D., Washington University, 1955.

Andrew Galakatos, B.S., St. Louis College of Pharmacy, 1960; M.D., University of Missouri, 1965.

Robert S. Goell, A.B., Middlebury College, 1949; A.M., University of Pennsylvania, 1950; M.D., Washington University, 1960.

A. Herman Hutto, A.B., University of Alabama, 1932; M.D., Washington University, 1935.

Frank B. Long, Jr., M.D., Washington University, 1947.

J. Barlow Martin, B.A., Amherst College, 1951; M.D., Washington University, 1955.

Laurence E. Maze, M.D., Washington University, 1948.

Seymour M. Monat, A.B., University of Pennsylvania, 1935; M.D., Long Island College, 1939.

James Pennoyer, B.S., Hobart College, 1933; M.D., University of Rochester, 1939.

Marvin Rennard, A.B., Washington University, 1947; B.S., University of Missouri, 1950; M.S., 1950; M.D., Washington University, 1952.

Melvin M. Schwartz, A.B., University of Nebraska, 1945; M.D., 1947.

William L. Smiley, A.B., Ohio State University, 1933; M.D., 1937.

Eugene D. Taylor, B.S., Virginia State College, 1948; M.D., Howard University, 1954.

M. Bryant Thompson, A.B., Eastern New Mexico University, 1957; M.D., University of California, 1961.

J. Leslie Walker, B.A., Vanderbilt University, 1957; M.D., University of Tennessee, 1960.

Helman C. Wasserman, A.B., Johns Hopkins University, 1928; M.D., Washington University, 1932.

Ronald P. Wilbois, B.S., University of Illinois, 1959; M.D., 1964.

Carol F. Williams, B.A., University of Tennessee, 1952; M.D., 1955.

Seth E. Wissner, A.B., Washington University, 1942; M.D., 1945.

Instructors

Pierre Asmar, M.D., French Faculty of Medicine, St. Joseph's University, 1971.

Y. Mohan Bhatnagar, M.D., All India Institute of Medical Sciences, 1970.

John D. Paulson, B.A., University of Virginia, 1968; M.D., 1971.

Salma Saifee, M.D., University of Sind, 1961.

Chotchai Srisuro, M.D., Faculty of Medical Sciences, 1967.

Research Instructors

Chang-chen Chin, B.S., National University, 1944; Ph.D., Oklahoma State University, 1967.

Instructors Emeriti (Clinical)

Hubert L. Allen, A.B., University of Kansas, 1932; M.D., Tulane University, 1936.

Paul F. Max, B.S., Washington University, 1932; M.D., 1932.

Frances H. Stewart, M.D., Washington University, 1927.

Instructors (Clinical)

Joe E. Belew, A.B., Central College, 1953; M.D., St. Louis University, 1957.

Bryce H. Bondurant, A.B., Northeast Missouri State Teachers College, 1936; D.O., Kirksville College of Osteopathy and Surgery, 1940; M.D., Washington University, 1943.

Robert H. Duemler, A.B., Washington University, 1952; M.D., 1956.

Ira C. Gall, B.S., University of Cincinnati, 1948; M.D., 1951.

Gordon M. Goldman, B.S., Toledo University, 1962; M.D., St. Louis University, 1966.

Godofredo M. Herzog, B.S., Louisiana State University, 1953; M.D., Washington University, 1957.

Jacob Klein, B.S., Muhlenberg College, 1964; M.D., Jefferson Medical College, 1968.

S. Robert Kovac, A.B., Washington University 1960; M.D., University of Missouri, 1964.

Justin F. Kraner, M.D., University of Michigan, 1949.

Theodore Merrims, A.B., Washington University, 1949; M.D., 1954.



Jerry N. Middleton, B.A., Westminster College, 1959; M.D., Washington University, 1963.

Sam Momtazee, M.D., Shiraz Medical School, 1961.

Nathaniel H. Murdock, B.S., Harvard University, 1958; M.D., Meharry Medical College, 1963.

Ivan T. Myers, B.A., University of Missouri, 1958; M.D., University of Missouri Medical School, 1963.

Gerald Newport, A.B., Washington University, 1948; M.D., 1953.

Joseph D. O'Keefe, A.B., University of Colorado, 1946; M.D., Washington University, 1950.

Jonathan R. Reed, B.A., Fisk University, 1956; M.D., Meharry Medical College, 1965.

Alexander M. Roter, A.B., University of Illinois, 1948; M.D., 1951.

Sudha R. Saha, M.D., Calcutta University, 1962.

James Sawyer, A.B., Ohio State University, 1949; M.D., 1951.

Arthur A. Smith, B.A., Southwest Missouri State University, 1952; M.S., University of Arkansas, 1954; M.D., St. Louis University, 1958.

Herman Taute, M.D., Philipps University, 1954.

Bernice A. Torin, A.B., Washington University, 1937; M.D., 1941.

Parker H. Word, B.S., Virginia State College, 1941; M.D., Howard Medical School, 1944.

Mitchell Yanow, M.D., Washington University, 1941.

Department of Ophthalmology



Instruction begins in the second year with methods of examination of the eye. Emphasis is placed on the use of the ophthalmoscope. During the second year a series of nine didactic lectures is given as an introduction to various aspects of ocular disease. During the third year students are assigned to an ophthalmology clerkship for one week. In the fourth year, a six-week ophthalmology elective is offered to senior students, which affords opportunity for work with patients under supervision.

SECOND YEAR

Ophthalmology. Lectures and demonstra-

tions in the basic principles of ophthalmology. (Staff)

THIRD YEAR

Ophthalmology. All students rotate through the Eye Clinic for a one-week clinical clerkship. (Staff)

FOURTH YEAR

Electives

Clinical Clerkship in Ophthalmology. One student rotates through the Department of Ophthalmology for six weeks. He is given instruction in the basic principles of an

ophthalmologic examination, including slit lamp biomicroscopy, motility evaluation, neuro-ophthalmologic evaluation, perimetry, ophthalmoscopy, tonometry, etc. He assists in the workup of eye patients at the St. Louis Veterans Administration Hospital and in the East Pavilion and attends all rounds and conferences. This elective is primarily geared to the student who plans to enter the specialty of ophthalmology.

Research Electives

Experimental and clinical research in glaucoma. (Drs. Krupin, Kass)

Experimental and diagnostic ophthalmic pathology. (Dr. M. Smith)

Experimental research in ocular physiology. (Dr. Moses)

Professor and Head of Department

Bernard Becker, A.B., Princeton University, 1941; M.D., Harvard University, 1944.

Professors

Ronald M. Burde, B.S., Massachusetts Institute of Technology, 1960; M.D., Jefferson Medical College, 1964.

Adolph I. Cohen, B.S., City College of New York, 1948; M.A., Columbia University, 1950; Ph.D., 1954. (See Department of Anatomy and Neurobiology)

Allan E. Kolker, A.B., Washington University, 1954; M.D., 1957.

James E. Miller, B.S., Tulane University, 1946; M.D., The Medical College of Alabama, 1949. (See Department of Pediatrics)

Morton E. Smith, B.S., University of Maryland, 1956; M.D., 1960. (See Department of Pathology)

Associate Professors

Robert A. Moses, A.B., Johns Hopkins University, 1938; M.D., University of Maryland, 1942.

Stephen R. Waltman, B.S., Massachusetts Institute of Technology, 1961; M.D., Yale University, 1964.

Research Associate Professor

Nigel W. Daw, B.A., Trinity College, 1956; M.A., 1961; Ph.D., Johns Hopkins University, 1967. (See Department of Physiology and Biophysics)

Associate Professors Emeriti (Clinical)

Bennett Young Alvis, B.S., St. Louis University, 1916; M.D., 1918.

Howard Rommel Hildreth, M.D., Washington University, 1928.

Theodore E. Sanders, B.S., University of Nebraska, 1931; M.D., 1933.

Frederick Oscar Schwartz, M.D., Washington University, 1910.

Associate Professors (Clinical)

Robert C. Drews, A.B., Washington University, 1952; M.D., 1955.

Benjamin Milder, M.D., Washington University, 1939.

Edward Okun, B.S., Dartmouth College, 1952; M.D., University of Vermont, 1956.

Assistant Professors

Michael A. Kass, B.S., M.D., Northwestern University, 1966.

Theodore Krupin, A.B., Washington University, 1964; M.D., St. Louis University, 1968.

Mitchel L. Wolf, B.A., Yeshiva College, 1964; M.D., Albert Einstein College of Medicine, 1968.

Assistant Professors Emeriti (Clinical)

Daniel Bisno, B.A., University of Wisconsin, 1927; M.D., Johns Hopkins University, 1931.

William H. Meinberg, B.S., Washington University, 1932; M.D., 1932.

Assistant Professors (Clinical)

Edmund B. Alvis, M.D., Washington University, 1934.

Neva P. Arribas, M.D., Manila Central University, 1954.

Stanley C. Becker, A.B., Washington University, 1948; M.A., 1950; Ph.D., 1951; M.D., Chicago Medical School, 1955.

Edward F. Berg, A.B., Washington University, 1960; M.D., 1964.

George M. Bohigian, A.B., Washington University, 1961; M.D., St. Louis University, 1965.

Isaac Boniuk, B.S., Dalhousie University, 1958; M.D., 1962.

James H. Bryan, A.B., Washington University, 1932; M.D., 1936.

Samuel A. Canaan, Jr., A.B., State University of Iowa, 1942; M.A., Columbia University, 1948; M.D., Meharry Medical College, 1954.

Robert M. Feibel, B.A., Johns Hopkins University, 1965; M.D., Harvard University, 1969.

Jack Hartstein, B.S., University of Missouri, 1953; M.D., University of Cincinnati, 1955.

Glen P. Johnston, A.B., Washington University, 1953; M.D., 1956.

Jack Kayes, B.A., Yale University, 1953; M.D., Washington University, 1957.

Terence G. Klingele, M.D., University of California, 1970.

Matthew Newman, A.B., Vanderbilt University, 1956; M.D., Columbia University, 1959.

F. Thomas Ott, B.A., Southern Methodist University, 1963; M.D., Washington University, 1965.

Lawrence T. Post, Jr., M.D., Washington University, 1948.

Harry D. Rosenbaum, M.D., Washington University, 1934.

Philip T. Shahan, A.B., Harvard College, 1938; M.D., Washington University, 1942.

Bernd Silver, B.S., University of Louisville, 1952; M.D., 1956.

H. Phillip Venable, B.S., Wayne State University, 1935; M.D., 1940.

Charles E. Windsor, A.B., Carleton College, 1956; M.D., University of Rochester, 1960.

Instructor

Paul F. Palmberg, Ph.D., Northwestern University, 1969; M.D., 1970.



Research Instructors

Walter J. Gradzki, D.D.S.S.S. (Louisiana University, 1944);
Elaine Milner, A.B., Judson College, 1944; M.D., Medical College of Alabama, 1949. (See Department of Pediatrics)

Instructors (Continued)

Nevilloman J. Amin, I.S.C.C., Bombay University, 1966; M.B.B.S., 1966.
Ronald G. Billitt, B.S., University of Toledo, 1963; M.D., Washington University, 1967.
Deane B. Butgers, A.B., Occidental College, 1963; M.D., University of California, 1967.
Richard L. Eschler, M.B.B.S., University of Washington Medical School, 1969.
Rufus S. Freedman, A.B., Washington University, 1938; M.D., 1942.
David M. Friedman, A.B., University of Missouri, 1940; B.S. Med., 1941; M.D., Washington University, 1943.
William S. Joffe, A.B., Washington University, 1959; M.D., 1963.
Harry L. S. Kopp, A.B., Harvard College, 1963; M.D., Harvard Medical School, 1967.
Maxwell Rabin, M.D., University of Toronto, 1942.
Michael B. Rubin, B.S., Lamar State College of Technology, 1962; M.D., Washington University, 1968.
Michael S. Sabin, M.D., Louisiana State University, 1959.
Arthur W. Suckle, Jr., M.D., University of Oklahoma, 1943.

Assistants

Lisa M. Cilibi, M.D., University of Heidelberg, 1939; Certified Orthoptist, Washington University, 1956.
Clemens H. Jacques, B.S., University of California, 1949; O.D., 1949. (See Division of Health Care Research)

Research Assistants

Dorothy G. Cooper, R.N., Washington University, 1953; B.S.N., 1964; M.S.N., 1966.
Nels J. Holmberg, B.S., Oklahoma State University, 1963; M.S., 1966.

Carroll S. Hoover

Gillian Roper-Hall, D.B.O., Moorfield Eye Hospital, 1966; D.B.O.(D.), Reading College, 1967; D.B.O.(T.), 1969; Certified Orthoptist, U.S. Board, 1973.
Hilgze A. Scherrer, R.N., Washington University, 1960.



Department of Otolaryngology



Otolaryngology is presented to students during their sophomore, junior, and senior years. A clinical pathologic correlation lecture series is presented to sophomores. In the junior year, each student spends two weeks on one of the services in East Pavilion, St. Louis Veterans Administration, Max C. Starkloff, or Homer G. Phillips hospitals. During this period there is teaching at the bedside, in the operating room, and in the clinic, supplemented by daily afternoon lectures, grand rounds on Thursdays, and an introduction to audiology as well as to basic ENT research.

The ENT rotation is highlighted by a field trip to an outlying community, where a full-time member of the Department evaluates and treats adults and children with common ENT problems. Senior students who show a special interest may take a rotating elective in ENT suited to their interests. Some possibilities include research or clinical work. Ample research facilities and ongoing projects are available. Clinical exposure could include oncologic diseases related to the head and neck, otologic diseases, otoneurology, audiology, or middle ear surgery.

SECOND YEAR

Otolaryngology and Physical Diagnosis. Clinical pathologic correlative lectures in otolaryngology are given to the entire class.
(Dr. Thawley)

THIRD YEAR

Otolaryngology Clerkship. Practical instruction in diagnosis and treatment. Two weeks.
(Dr. Ehrlich)

FOURTH YEAR

Electives

Structure and Innervation of Labyrinth.
(Dr. Bohne)

Clinical Clerkship. A six-week rotation which stresses outpatient diagnosis and management of ENT problems. Lectures, field trips, office practice, and operating room exposure round out the rotation. Two students are accepted for each rotation.
(Dr. Thawley)

Research Electives

Cytology, neurology, and histochemistry of membranous labyrinth. (Dr. Bohne)

Physiology of larynx. (Drs. Ogura, Harvey)

Nasopulmonary physiology. (Dr. Ogura)

Metabolism of the inner ear. Physiological and biochemical aspects. (Dr. Thalmann)

Otoneurology labs. (Dr. Stroud)

Development of otic capsule and ossicles.
(Dr. Bohne)

Audiology. (Dr. Carver)

Lindburg Professor and Head of Department
Joseph H. Ogura, A.B., University of California, 1937; M.D., 1941.

Professors

Donald G. Sessions, A.B., Princeton University, 1958; M.D., Washington University, 1962.

S. Richard Silverman (Audiology), A.B., Cornell University, 1933; M.S., Washington University, 1938; Ph.D., 1942. (Also Central Institute for the Deaf and Faculty of Arts and Sciences)

Gershon J. Spector, B.A., Johns Hopkins University, 1960; M.D., University of Maryland, 1964.

Malcolm H. Stroud, M.B., Ch.B., University of Birmingham, 1945; L.R.C.P., M.R.C.S., 1946; F.R.C.S., 1949.

Ruediger Thalmann, M.D., University of Vienna, 1954.

Research Professor Emeritus and Lecturer

Hallowell Davis, A.B., Harvard University, 1918; M.D., 1922; Sc.D. (hon.), Colby College, 1954; Northwestern University, 1962; Washington University, 1973. (See Department of Physiology and Biophysics) (Also Central Institute for the Deaf)

Research Professors

Donald H. Eldridge, S.B., Harvard University, 1943; M.D., 1946. (Also Central Institute for the Deaf and Faculty of Arts and Sciences)

Ira J. Hirsh (Audiology), A.B., New York State College for Teachers (Albany), 1942; M.A., Northwestern University, 1943; M.A., Harvard University, 1947; Ph.D., 1948. (Also Central Institute for the Deaf and Faculty of Arts and Sciences)

Professor (Clinical)

Ben H. Senturia, A.B., Washington University, 1931; M.D., 1935.

Associate Professor

Joseph E. Harvey (Experimental-Otolaryngology), B.A., University of California, Berkeley, 1954; M.A., 1964; Ph.D., 1968. (See Department of Anatomy and Neurobiology)

Associate Professors Emeriti (Clinical)

French K. Hansel, M.D., St. Louis University,

1918; M.S., University of Minnesota, 1923.

Guerdan Hardy, M.D., Washington University, 1929.

Robert E. Votaw, B.S., State University of Iowa, 1927; M.D., 1929.

Associate Professors (Clinical)

Benard C. Adler, B.S., Washington University, 1937; M.D., 1937.

William T. K. Bryan, A.B., Washington University, 1929; M.D., 1933.

Harold M. Cutler, A.B., University of Maine, 1930; M.D., Tufts College, 1937.

Morris Davidson, B.S., Indiana University, 1936; M.D., 1938.

Joseph W. West, M.D., Duke University, 1944.

Assistant Professors

Barbara A. Bohne, A.B., Washington University, 1967; Ph.D., 1971.

William F. Carver (Audiology), B.A., University of Southern California, 1951; M.A., 1955; Ph.D., 1960.

David Crowley (Physiological Acoustics), B.A., Middlebury College, 1961; M.A., University of Vermont, 1963; Ph.D., Princeton University, 1965.

Joseph A. Davidenas (Microbiology), B.S., University of Alberta, 1964; Ph.D., 1970.

John P. Murray, B.A., Vanderbilt University, 1962; M.D., Washington University, 1966.

Stanley E. Thawley, B.A., University of Texas, 1963; M.D., University of Texas Medical Branch, 1967.

Assistant Professors Emeriti (Clinical)

Alfred J. Cone, B.S., State University of Iowa, 1921; M.D., 1923; M.S., 1927.

Herbert M. Smit, M.D., St. Louis University, 1933.

A. Chesterfield Stutsman, B.S., Roanoke College, 1927; M.D., University of Virginia, 1931.

Assistant Professors (Clinical)

Carl F. Ehrlich, B.S., St. Louis University; 1961; M.D., University of Missouri-Columbia, 1965.

Charles C. Jacobs, A.B., Washington University, 1942; M.D., 1945; Postgraduate, 1948, 1949.

Edward H. Lyman, B.S., Washington University, 1937; M.D., 1937.

Wayne A. Viers, B.S., Phillips University, 1952; M.D., University of Oklahoma, 1956.

Research Instructors

Marion P. Bryan, A.B., Washington University, 1931.

Sakari Paloheimo, B.Sc., University of Turku (Finland), 1974; M.Sc., 1974.

Isolde Thalmann, B.S., Washington University, 1969; A.M., 1972.

Instructor (Clinical)

Arnoldo Kuczer, M.D., Faculty of Medical Sciences of the University of Buenos Aires, 1955. (Jewish Hospital)

Research Associates

Thomas H. Comegys, B.A., Central Methodist College, 1966.

Jacquelyn J. Scorza (Audiology), B.A., Parsons College, 1944; M.A., University of Iowa, 1957.

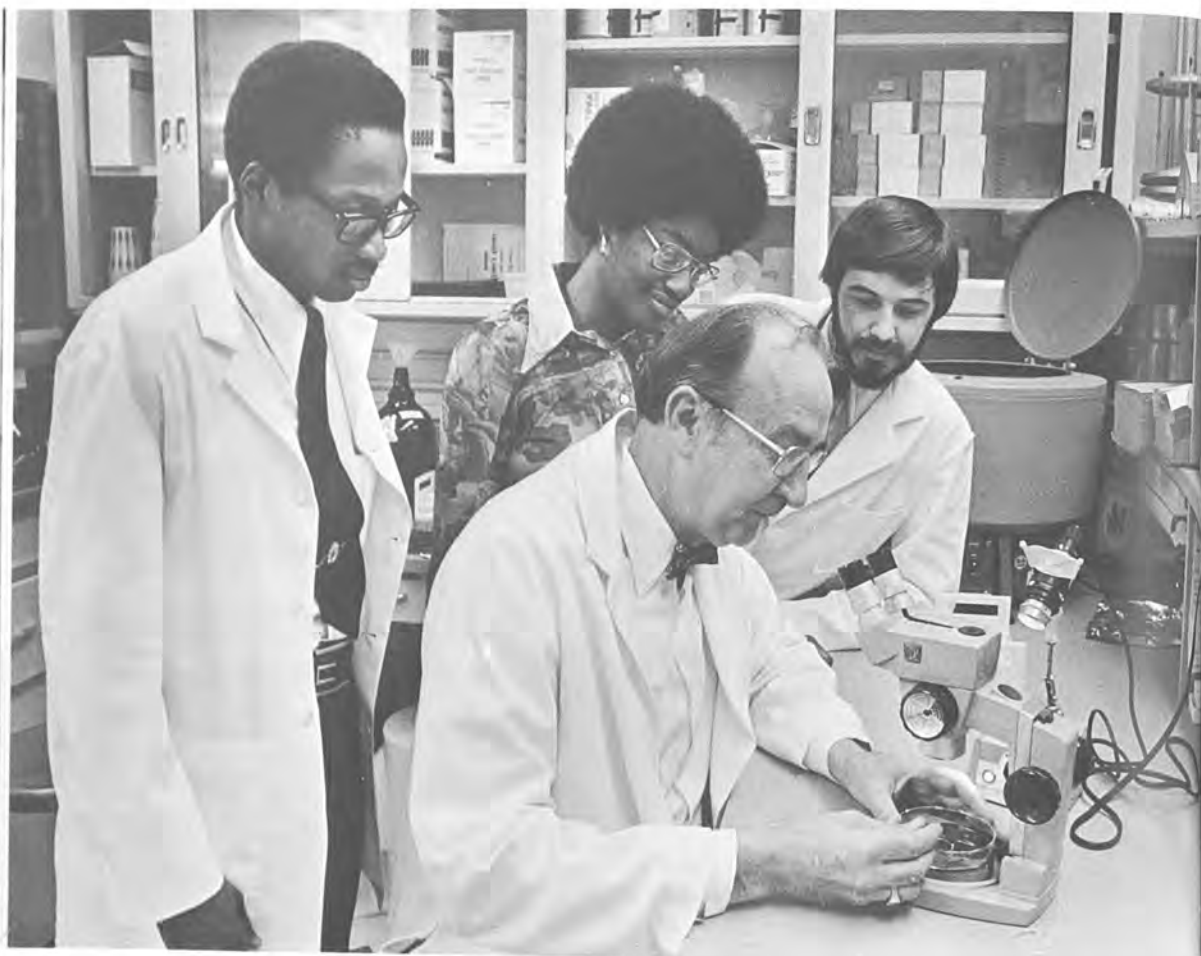
Research Assistants

David R. Bellucci

Charles D. Carr

Judith Ann Crozier, B.Sc., University of London, 1966.

Department of Pathology



Modern pathology is concerned with the molecular and ultrastructural basis of disease. Historically, morphologic studies provided the foundations of our concepts of disease, and ultrastructural studies continue to add to our understanding, but modern pathology utilizes virtually all of the tools of the basic sciences. Pathologists are involved in diagnostic, teaching, and research activities.

In addition to the sophomore year of pathology, the Department conducts numerous combined conferences which third- and fourth-year students attend as part of indi-

vidual clinical clerkships. These are described below.

Students, usually in their fourth year, may elect to participate in advanced courses or clerkships in autopsy or surgical pathology or laboratory medicine, or to pursue research in experimental pathology.

The Department offers a course of study leading to the Ph.D. degree. Medical students who desire to combine graduate and medical programs of study should consult Dr. Joseph Davie.

For the purpose of teaching, research, and

service, the Department is divided into specialty divisions under the following directors:

Autopsy Pathology

Dr. Kissane

Graduate Programs in Experimental Pathology

Dr. Davie

Laboratory Medicine

Dr. Jarett

Neuropathology

Dr. Nelson

Pediatric Pathology

Dr. Kissane

Surgical Pathology

Dr. W. Bauer

SECOND YEAR

Bio 515, 516. General Pathology. This course is a comprehensive study of the cellular and molecular basis of disease. Lectures, gross and microscopic demonstrations, laboratory work, tutorials, case studies, and experimental pathology seminars are all utilized. The course is divided into six sections, each consisting of a six-week period of study that is correlated with the subject matter concurrently presented in the sophomore pathophysiology course.

The sections consist of (1) general pathology and infectious disease, (2) cardiovascular, pulmonary and renal diseases, (3) metabolic, endocrine, and gastrointestinal disease, (4) hematology and oncology, (5) neuropathology, and (6) developmental, pediatric, obstetric, and gynecologic diseases.

Students working in small groups with a resident pathologist participate in post-mortem examinations and clinico-pathologic correlations. (Staff)

THIRD AND FOURTH YEARS

Clinical Pathological Conference. The clinical

history and treatment of patients who have died are discussed before the class by the physicians and surgeons of the departments concerned. These conferences afford the students an opportunity to interpret the clinical observations in the light of the post-mortem findings. One hour a week during the year. (Staff)

Tumor Conference. One hour each week for twelve weeks during the surgery and obstetrics and gynecology clerkships. Problem cases are presented for illustration and discussion of all aspects of neoplastic disease. (Staff)

RESEARCH

Bio 590. The department encompasses all of the major areas of investigation in experimental pathology. Examples include:

Lung development and pediatric lung disease. (Dr. Askin)

Tumor associated antigens of human lung cancers and immunological studies of human beta-glucuronidase deficiencies and replacement therapy in man. (Dr. Bell)

Viral infections of the inner ear, environmental pathology. (Dr. G. Davis)

Clinical and analytical enzymology and computerized instrumentation. (Dr. J. Davis)

Structure and function of endocrine cells of the gastrointestinal tract and pancreas. (Dr. Greider)

Environmental pathology, renin-erythropoietin-juxtaglomerular cells. (Dr. Hartroft)

Mechanism of action of insulin. (Dr. Jarett)

Studies of platelets and platelet function. (Dr. Joist)

Renal pathology, pediatric pathology. (Dr. Kissane)

Experimental pulmonary diseases, environmental pathology. (Dr. Kuhn)

Dermatopathology and surgical pathology. (Dr. Kuo)

Experimental diabetes mellitus, tissue culture of islets, transplantation of islets.

(Dr. Lacy)

Elaboration of physiological rationale for differences between activity and concentration of electrolytes, particularly calcium.

(Dr. Ladenson)

Chemical carcinogenesis and enzymology of DNA repair.

(Dr. Lieberman)

Tumor immunology and cell biology of experimental myeloma. (Drs. Lynch, Bridges)

Experimental diabetes: Biochemical studies of insulin release mechanisms *in vitro*.

(Dr. M. McDaniel)

Biochemical and ultrastructural aspects of anterior pituitary secretion. (Dr. McKeel)

Alterations of oxidative carbohydrate metabolism in the change of extracellular and intracellular parasitism. (Dr. Marr)

RNA metabolism in cultured fibroblasts.

(Dr. Mauck)

Kinetics and hormonal aspects of neoplastic cell growth. (Drs. Meyer, Bauer)

Pathogenesis of cerebral microcirculatory injury; response of the autonomic nervous system to injury; pathology and pathogenesis of lesions associated with vitamin E deficiency; pathogenesis of skeletal muscle injury. (Dr. Nelson)

Primary immune responses *in vitro*.

(Drs. Pierce, Kapp)

Immunoelectron microscopy, secretory immunoglobulin system. (Dr. Poger)

Biochemistry of DNA tumor viruses.

(Dr. Raskas)

Biochemical and ultrastructural aspects of peripheral nerve disease. (Dr. Schlaepfer)

Metabolism of coagulation moieties, in particular fibrogen and platelets of thrombus localization and of applied blood banking.

(Dr. Sherman)

Placental transport and surface membrane structure and function. (Dr. C. Smith)

Placental amino acid transfer, composition

and function of trophoblast plasma membrane. (Dr. C. Smith)

Clinical microbiology, anaerobes, endogenous infections. (Dr. Sonnenwirth)

Metabolic bone diseases. (Dr. Teitelbaum)

Biochemical and ultrastructural organization of cell surface membrane. (Dr. Tillack)

Phagocytosis, physical properties of erythrocyte membranes, permeability, transport, contractility of myocardial vasculature.

(Dr. Williamson)

ELECTIVES

Advanced Special Pathology. A series of seminars discussing timely selected topics in special pathology of human disease augmented by illustrative cases and emphasizing clinicopathologic correlations. Reading lists will be circulated and active discussion is encouraged. If the size of the group makes it practical to do so, each student will prepare and conduct a session on a subject of his choice. (Dr. Kissane)

Selected Topics in Immunology and Immunopathology. This seminar course emphasizes those areas which are most applicable to the understanding of human disease states. The subject matter can be selected so as to suit the interest of the student, but will include immune deficiency states, the role of the thymus in immune competence, immunoglobulin structure and function, immunological disorders accompanying neoplasia, tumor immunology, and autoimmune disorders. (Dr. Lynch)

Neuropathology Seminar. Clinical pathological correlations of neurological diseases will be investigated by the case study method using current and documented material. Participants will partake in gross neuropathological examinations and will be assigned selected cases for discussion of clinical data of gross and microscopic pathological findings, especially in relationship to evolution and mechanism of disease pro-

cesses. Topics covered will include vascular, infectious, demyelinating, and neuronal diseases, as well as neoplasms of the nervous system. (Dr. Nelson)

Topics in Laboratory Medicine. A series of twelve seminars over a six-week period covering topics intended to demonstrate the role of laboratory medicine in the diagnosis and therapeutic management of disease.

(Dr. Jarett and Staff)

In addition to the above, the Department offers a number of advanced courses in the Division of Biology and Biomedical Sciences. These courses are listed below, but are described in the offerings of the Division of Biology and Biomedical Sciences.

Bio 504. *Environmental Pathology.*

Bio 517. *Mechanisms of Disease.*

Bio 518. *Cellular Immunology and Immunopathology.*

Bio 519. *Pathology Research Seminar.*

Bio 520. *Methods in Experimental Pathology.*

Edward Mallinckrodt Professor and Head of Department

Paul E. Lacy, B.A., Ohio State University, 1945; M.D., 1948; M.S., 1948; Ph.D., University of Minnesota, 1955.

Professors Emeriti

Lauren V. Ackerman (Pathology and Surgical Pathology), A.B., Hamilton College, 1927; M.D., University of Rochester, 1932. (Also Consultant)

Ruth Silberberg, M.D., University of Breslau, 1931. (Also Lecturer)

Professors

Walter C. Bauer, B.S., Ohio State University,

Note—The number preceding the course title indicates that the course carries credit in the Graduate School of Arts and Sciences.

1946; M.D., Washington University, 1954.

Joseph M. Davie, A.B., Indiana University, 1962; M.A., 1964; Ph.D., 1966; M.D., Washington University, 1968. (See Department of Microbiology)

Leonard Jarett, B.A., Rice University, 1958; M.D., Washington University, 1962. (See Department of Medicine)

John M. Kissane, A.B., University of Rochester, 1948; M.D., Washington University, 1952. (See Department of Pediatrics)

James S. Nelson, M.D., St. Louis University, 1957. (See Department of Pediatrics)

Carl W. Pierce, A.B., Colgate University, 1962; M.D., University of Chicago, 1966; Ph.D., 1966. (Jewish Hospital)

Morton E. Smith, B.S., University of Maryland, 1956; M.D., 1960. (See Department of Ophthalmology)

Richard Torack, B.S., Seton Hall University, 1948; M.D., Georgetown University, 1952.

Joseph R. Williamson, A.B., Phillips University, 1954; M.D., Washington University, 1958.



Professor (Visiting Staff)

Frederick G. Germuth, Jr., A.B., Johns Hopkins University, 1942; M.D., 1945.

Associate Professors

Gustave L. Davis, B.A., Union College, 1959; M.D., State University of New York, Syracuse, 1963. (Jewish Hospital)

Milton N. Goldstein, B.S., Western Reserve University, 1946; M.S., 1947; Ph.D., 1952. (See Department of Anatomy and Neurobiology)

Marie H. Greider, B.S., Ohio State University, 1949; M.S., 1955; Ph.D., 1960.

Phyllis M. Hartroft, B.S., University of Michigan, 1949; M.A., University of Toronto, 1951; Ph.D., 1954.

Gerald Kessler, B.S., City College of New York, 1950; M.S., University of Maryland, 1952; Ph.D., 1954. (Jewish Hospital)

Charles Kuhn, A.B., Harvard University, 1955; M.D., Washington University, 1959.

Michael Kyriakos, B.S., City College of New York, 1958; M.D., Albert Einstein College of Medicine, 1962.

Michael W. Lieberman, B.A., Yale University, 1963; M.D., University of Pittsburgh, 1967; Ph.D., 1972.

J. Joseph Marr, B.S., Xavier University, 1959; M.D., Johns Hopkins University, 1964; M.S., St. Louis University, 1968. (See Department of Medicine)

John S. Meyer, A.B., Yale University, 1952; M.D., Washington University, 1956. (Jewish Hospital)

Peter A. Pullon, B.A., Albion College, 1960; D.D.S., University of Michigan, 1965; M.S., 1968. (Also School of Dental Medicine)

Heschel J. Raskas, B.S., Massachusetts Institute of Technology, 1962; Ph.D., Harvard University, 1967. (See Department of Microbiology and Immunology)

William W. Schlaepfer, B.A., Princeton University, 1954; M.D., Yale University, 1958.

Laurence A. Sherman, B.A., B.S., University of Chicago, 1956; M.D., Albany Medical College, 1964. (See Department of Medicine)

Carl H. Smith, B.A., Swarthmore College, 1955; M.D., Yale University, 1959. (See Department of Pediatrics)

Alexander C. Sonnenwirth, A.B., University of Nebraska, 1950; M.S., Purdue University, 1953;

Ph.D., Washington University, 1960. (See Department of Microbiology and Immunology) (Jewish Hospital)

Steven L. Teitelbaum, B.A., Columbia University, 1960; M.D., Washington University, 1964. (Jewish Hospital)

Thomas W. Tillack, A.B., University of Rochester, 1959; M.D., Yale University, 1963. (See Department of Anatomy and Neurobiology)

Associate Professor (Visiting Staff)

William V. Miller, A.B., University of Missouri, 1962; M.D., 1966. (See Department of Medicine)

Assistant Professors

Luis Alvarez, M.D., University of Santo Domingo, 1958. (Starkloff Hospital)

Frederic B. Askin, B.A., University of Virginia, 1960; M.D., 1964.

C. Elliott Bell, Jr., B.S., Tulane University, 1960; M.D., 1964. (See Department of Medicine)

James E. Davis, B.A., Occidental College, 1965; M.S., Duke University, 1969; Ph.D., 1970. (See Department of Medicine)

Luis Q. Del Rosario, M.D., University of Santo Tomas, 1954. (Starkloff Hospital)

Samir K. El-Mofty, B.D.S., Cairo University, 1959; M.Sc., University of Pennsylvania, 1966; Ph.D., Temple University, 1975. (Also School of Dental Medicine)

Kaarle C. Franssila, M.D., University of Helsinki, 1963.

Suleyman Gulmen, D.D.S., Hacettepe University, 1968; M.D.S., University of Minnesota, 1972. (Also School of Dental Medicine)

Johann H. Joist, M.D., University of Cologne, 1962. (See Department of Medicine)

Tseng-Tong Kuo, B.M., National Taiwan University, 1963; Ph.D., Stanford University, 1969.

Jack H. Ladenson, B.S., Pennsylvania State University, 1964; Ph.D., University of Maryland, 1971. (See Department of Medicine)

John W. Lewis III, B.S., Georgia Institute of Technology, 1966; M.S., 1968; Ph.D., 1971. (See Biomedical Computer Laboratory)

Richard G. Lynch, B.A., University of Missouri, 1961; M.D., University of Rochester, 1966.

Michael L. McDaniel, B.A., Southern Illinois University, 1963; M.S., University of North

Dakota, 1966; Ph.D., St. Louis University, 1970.

Robert McDaniel, B.A., Southwestern University, 1964; M.D., University of Texas, 1968. (Starkloff Hospital)

Daniel W. McKeel, B.S., Hampden-Sydney College, 1961; M.D., University of Virginia, 1966.

David N. Menton, B.S., Mankato State College, 1959; Ph.D., Brown University, 1966. (See Department of Anatomy and Neurobiology)

Blanca M. Perez, B.A., Universidad del Valle, 1953; M.D., 1961. (Jewish Hospital)

Marshall Poger, A.B., Washington University, 1961; M.A., Brandeis University, 1963; M.D., University of Tennessee, 1969. (Jewish Hospital)

Mohamad Rahmanian, A.B., Washington University, 1964; Ph.D., University of Arkansas, 1970. (Starkloff Hospital)

E. Kaye Smith, B.S., Webster College, 1957; M.S., St. Louis University, 1963; D.V.M., Kansas State University, 1965.

Sue Cassell Stevens, A.B., Goucher College, 1930; M.A., 1931; Ph.D., Columbia University, 1940. (Jewish Hospital)

Landy Weis, A.B., Washington University, 1963; M.D., 1966. (Jewish Hospital)

Research Assistant Professor

Judith A. Kapp-Pierce, B.A., Miami University, 1965; M.S., Indiana University, 1969. (Jewish Hospital)

Assistant Professors (Visiting Staff)

Waguih M. Abdel-Bari, B.A., School of Science, 1948; M.D., Ein Shams University, 1953; Ph.D., Washington University, 1965.

John D. Bauer, B.Sc., University of Innsbruck, 1938; L.R.C.P. and S., University of Glasgow, 1944; M.D., Marquette University, 1947.

Valgard Jonsson, B.S., North Dakota State University, 1958; M.S.P.H., University of North Carolina, 1961; Ph.D., 1965.

Nadya Konikov, B.S., Boston University, 1947; M.D., 1950.

Frederick T. Kraus, B.A., College of William and Mary, 1951; M.D., Washington University, 1955.

Virgil Loeb, Jr., M.D., Washington University, 1944. (See Department of Medicine)

Robert W. Ogilvie, B.A., University of Utah,

1943; M.D., 1946.

William R. Platt, B.S., University of Maryland, 1936; M.D., 1940.

Andres J. Valdes, B.S., Institute de Santa Clara; L.V., 1949; M.S., University of Havana, 1957.

Instructors

Madhu Bahl, F.Sc., K. M. V. College, 1958; M.D., Christian Medical College, 1963. (Starkloff Hospital)

Thomas E. Hewitt, B.Sc., University of Alberta, 1970; M.S., Purdue University, 1972; Ph.D., 1974. (Jewish Hospital)

Kavous Khodadoust, M.D., Tehran University School of Medicine, 1965. (Starkloff Hospital)

John C. Mauck, B.S., Purdue University, 1967; Ph.D., Washington University, 1971. (See Department of Medicine)

Research Instructor

Sandra Bridges Gurgo, B.A., Vanderbilt University, 1965; Ph.D., Washington University, 1970.

Instructors (Visiting Staff)

Tomas Aquino, S.B., Santa Clara Institute, 1949; M.D., University of Havana, 1957; Ph.D., University of Chicago, 1967.

Robert R. Dahlgren, B.S., Oklahoma State University, 1962; D.V.M., 1963; M.S., 1966.

Virgilio P. Dumadag, M.D., Far Eastern University Institute of Medicine, 1961.

John M. Johnson, A.B., Indiana University, 1965; M.D., 1970.

Rodolfo A. Latorre, M.D., University of the East-Ramon Magsaysay Memorial Medical Center, 1961.

Manuel Marban, A.A., Xavier University, 1959; M.D., University of Santo Tomas, 1964.

Kathleen S. McLaughlin, B.S., St. Louis University, 1960; M.D., Washington University, 1964.

Manuel F. Menendez, B.S., University of Havana, 1949; M.D., 1956.

Richard Payne, B.S., Ohio University, 1960; M.D., Washington University, 1963.

Carlos Perez-Mesa, M.D., University of Havana, 1950.

David E. Reagin, B.S., Geneva College, 1965; M.D., Howard University, 1969.



Antonio Salvador, M.D., University of Porto, 1963.

Ursula Sclafford, B.S., Howard University, 1942; M.D., 1945.

Luis Tumialan, M.D., University of San Marcos, 1965.

Mario Velez, M.D., Universidad de Caldas, 1960. (Starkloff Hospital)

Research Assistants

Maria Chraplyvy, B.S., St. Louis University, 1964; M.S., 1967.

Dorothy J. Fiete, B.S., Marymount College, 1966.

Edward H. Finke, B.S., Washington University, 1962.

Sandra K. Freeman, A.B., Cornell College, 1969; M.A., Washington University, 1971.

William J. Kraft, B.A., Southern Illinois University, 1969. (Jewish Hospital)

Maria C. LaValle, A.B., Hunter College, 1963.

Elaine Rieders, B. A., Hunter College, 1948.

Maureen Shanahan, A.B., Middlebury College, 1971.

Edward Mallinckrodt Department of Pediatrics



The primary aim of the Department of Pediatrics in the teaching program is to stimulate interest in developmental biology, especially human growth and development, and to provide the student with a foundation sufficiently comprehensive so that he will have an appreciation of pediatric problems regardless of his future choice of a career in medicine.

The major clinical and research facilities are in the St. Louis Children's Hospital and the St. Louis Maternity Hospital. The former has a bed capacity of 179, and accepts children under sixteen years of age with all types of medical problems. Hospital admittances

average 6,000 annually. The Pediatric Out-patient Division averages about 70,000 visits a year. In the Medical Center the yearly number of newborn infants averages more than 4,000.

SECOND YEAR

The student is introduced to pediatrics and to the full-time staff through a series of lectures designed to acquaint him with the concepts of human growth and development, genetics, and the effects of age and maturity on reactions to injury and disease. A second series of talks highlights the important disorders commonly encountered in

infants and children. The unique aspects of the physical examination of the infant and child are presented during the course in physical diagnosis. Members of the Department also participate in the sophomore course in pathophysiology.

THIRD YEAR

A clerkship of six weeks is scheduled, where the student participates in the following:

1. Care of inpatients, sharing responsibility with intern or resident.
2. Daily ward rounds and bedside conferences with house staff and attending physician.
3. Special conferences on various facets of pediatrics.
4. Tutorial with junior faculty.
5. Weekly grand rounds.

FOURTH YEAR

This year is devoted to elective time which may be spent according to the individual preferences of the student. He may serve as an intern substitute or in the research laboratory or combine clinical and laboratory work. The following electives are offered:

Pediatric Cardiology

Inpatient Service. Diagnosis and management of patients with acquired and congenital heart disease, including critically ill and post-operative patients in the Intensive Care Unit. Activities will include daily ward rounds, precatheterization critiques once a week, and a weekly conference on catheterization laboratory findings.

Outpatient Service. New patients for consultation, as well as follow-up on old patients.
(Dr. Goldring)

Laboratory Diagnostic Procedures. The student will be involved initially as observer and eventually as a participant in the cath-

eterization and angiocardiographic studies. The theory and interpretation of physiologic data will be reviewed in daily sessions. The students may participate in the other activities of the Pediatric Cardiology Division as time permits.
(Dr. Hartmann)

Electrocardiography, Vectorcardiography, Echocardiography, Phonocardiography, and Ergometry. In this intensive course, emphasis will be on the electrophysiology and theory as well as interpretation of electrocardiograms, vectorcardiograms, echocardiograms, phonocardiograms, and ergometry on inpatients and outpatients. The student may participate in other activities of the Pediatric Cardiology Division as time permits.

(Dr. Hernandez)



Research Opportunities

1. The use of non-invasive means to measure cardiac performance in the infant.
(Drs. Hernandez, Goldring)
2. The distribution of digoxin in the Purkinje and myocardial cells in man.
(Drs. Hernandez, Goldring)
3. The pharmacodynamics of tritiated digoxin, antiarrhythmic agents, and diuretics in the fetal lamb.
(Drs. Hernandez, Goldring)
4. Hypertension in the high school population of the metropolitan area.
(Drs. Goldring, Londe, Hernandez)

Pediatric Neurology

Clinical Elective. The student participates as a full member of the neurology ward team and is directly responsible for a proportion of the patients on the service under the direction of the senior resident. He is expected to take night call every third night, during which time he is responsible for the medical care of the entire ward, as well as for emergency admissions.

(Drs. Dodge, Prensky)

Research Elective. The student has an opportunity to learn some of the chromatographic and spectrophotometric techniques frequently used in developmental neurochemistry, while working on a project of his choosing or one that is currently in progress in the laboratory. Prior discussion is necessary.

(Drs. Agrawal, DeVivo, Fishman, Prensky)

Research Elective. Effects of experimental lead poisoning in young mice on levels of selected metabolites and enzyme activities in brain, red blood cells, liver, and kidney of young mice.

(Dr. Holowach-Thurston)

Pediatric Infectious Diseases

Clinical Elective. The student works as a subintern and is assigned selected patients



on the Isolation Division for initial evaluation and continuing care. He attends daily ward rounds and all scheduled conferences. Instruction is given in diagnostic bacteriology and serology.

(Dr. Feigin)

Research Elective. Laboratory research programs are available in the areas of (1) fetal and neonatal bacterial infections, (2) rapid diagnosis of infections, and (3) metabolic aspects of infectious diseases in man and in a variety of animal models. Amino acids in blood and urine are studied in terms of their differential diagnostic and prognostic possibilities during active infection, and mechanisms for these changes are sought.

(Drs. Feigin, Shackelford, Middelkamp)

Pediatric Hematology and Oncology

Large numbers of children with diverse hematological and oncological problems are seen. During the six-week rotation the student is expected to acquire sufficient knowledge to interpret the blood smears, bone marrows, and special laboratory studies. Concepts of management and differential diagnosis are reviewed.

(Drs. Land, Vietti, Zarkowsky)

Pediatric Allergy and Immunology

Pediatric Clinical Allergy. Complete review of allergy theory. Application of approach to patient evaluation and therapeutics. Responsibility for inpatients and outpatients, patient care, and evaluation of methods of diagnosis and therapy. Multidiscipline approach to care of allergic patients. Student is expected to complete a short library or laboratory project in ongoing research in allergy.

(Drs. Shearer, Thurston)

Pediatric Immunology. The student spends a minimum of three months of in-depth research in the area of cellular activation by immune mechanisms. The work will explore the phenomenon of immunostimulation of tumor cell growth *in vitro* whereby membrane antigen-specific antibody acting in concert with activated complement augments nucleoside transport, DNA synthesis, and growth of several cell lines. The student will become acquainted with the fundamentals of cellular immunology and tumor immunology and some techniques of tissue culture. The student may participate in hospital consultations and laboratory investigations pertaining to children with immune deficiency states.

(Dr. Shearer)

Pediatric Renal Disease

The students are responsible for evaluating, following, and presenting children who are on the inpatient and outpatient services and who have renal disease. They have the opportunity to observe the patients on chronic hemodialysis and those who are recipients of renal transplants. Discussions with the attending staff and fellows emphasize the relationship between clinical problems and the pathophysiology of the underlying disease. Organized teaching sessions, held in conjunction with the adult renal division, include renal pathology seminars in which all renal biopsies are reviewed, journal clubs in which renal physiology is emphasized, and informal teaching sessions on selected topics

in clinical or research areas of nephrology. The students are expected to review at least two subjects of their own choosing in detail, and are expected to attend other pediatric teaching functions such as grand rounds on clinical case conferences.

(Drs. Cole, Robson)

General Pediatrics

Pediatric Ambulatory Service. A six-week course with participation in all aspects of ambulatory care of children under the direction of St. Louis Children's Hospital staff physicians. Includes diagnosis and treatment of acute and chronic illness in general pediatric service, in private physicians' offices, and in the emergency room. Experiences in subspecialties and in community clinics are also offered.

(Drs. Middelkamp, Jones)

General Clinical Pediatrics. The student will participate as an active member of the pediatric care team at the St. Louis County Hospital. Under supervision of faculty and senior resident, he will see patients in the pediatric clinics, the emergency room, the neonatal nursery, and the inpatient service. The elective provides a general pediatric experience, with emphasis on ambulatory care and neonatology.

(Drs. Kahn, Barton, Benoist, Ross)

Combines Pediatric and Adult Metabolism

This elective is designed to include broad clinical experience in both pediatric and adult endocrine problems. The student has an opportunity to work up all of the pediatric endocrine patients and to see most of the adult patients. He attends rounds in pediatric metabolism, pediatric-endocrine and diabetic clinics, and the adult metabolic research seminar and rounds. There is an opportunity to attend pediatric and medical grand rounds and metabolic rounds at Jewish Hospital. A large number of patients with all types of endocrine disorders are studied

in depth.

(Drs. Daughaday, Pagliara, Weldon)

Genetics

Medical Genetics. Twelve weeks, all day. Combined clinical and research course.

(Drs. Hillman, Lichtenstein, Sly)

Clinical Genetics. Six weeks, all day. Experience in clinical/laboratory approach to study of genetic problems. Students see all consultations referred to the Division of Medical Genetics. They work in the Medical Genetics Clinic on Monday afternoons, attend daily genetics rounds, and participate in scheduled seminars.

(Dr. Sly)



Neonatology

Clinical Neonatology. The time is spent at St. Louis Children's Hospital in the intensive care nursery learning the care of severely ill newborns and prematures. During the entire six weeks, daily teaching rounds will be held on the intensive care unit at Children's Hospital. Interested students may arrange to spend time at Maternity Hospital learning the examination and care of normal newborn and premature infants, as well as those with less severe illnesses that do not require intensive care. Students will be offered considerable responsibility in patient care and may participate in the transportation of ill patients from other hospitals to St. Louis Children's Hospital. Opportunities are available for clinical research in perinatal medicine.

(Dr. Marshall)

Research. Placental amino acid transfer—*in vitro* tissue incubation, regulation, and relation to needs of the fetus. Composition and function of trophoblast plasma membrane.

(Dr. Smith)

Seminar Elective

Developmental Neurobiology. This course covers selected topics in the development of the nervous system. While emphasis is given to the neurochemical aspects of brain growth and maturation, there are also discussions of the neurophysiological and functional development of the brain. The relationship between chemical, physiological, and functional development and underlying anatomical changes is stressed. The course is conducted as a seminar, with papers assigned prior to each meeting. Members of the Departments of Pediatrics and Neurology and Neurological Surgery are present at these discussions to clarify obscure points and to add additional information when possible.

(Dr. Agrawal)

Clinical Chemistry Laboratory

(1) Development of laboratory procedures

in enzymology, gas chromatography, drug analysis and other areas; establishment of normal values in children and clinical-laboratory correlations. (2) The student may participate in studies correlating the fluorometric measurements of *in vivo* concentrations of allosteric regulators with *in vivo* measurements of the rates of enzyme activity and performing mathematical analyses of the kinetic data. (Drs. Dietzler, Smith)



Professor and Head of Department

Philip R. Dodge, M.D., University of Rochester, 1948. (See Department of Neurology and Neurological Surgery)

Allen P. and Josephine B. Green Professor of Pediatric Neurology

Arthur L. Prensky, A.B., Cornell University, 1951; M.D., New York University, 1955. (See Department of Neurology and Neurological Surgery)

Professors

Ralph D. Feigin, A.B., Columbia College, 1958; M.D., Boston University, 1962.

David Goldring, A.B., Washington University, 1936; M.D., 1940.

Alexis F. Hartmann, Jr., B.S., Washington University, 1947; M.D., 1951.

John C. Herweg, B.S., Drury College, 1943; M.D., Washington University, 1945. (See Administration)

John M. Kissane, A.B., University of Rochester, 1948; M.D., Washington University, 1952. (See Department of Pathology)

William H. McAlister, B.S., Wayne State University, 1950; M.D., 1954. (See Department of Radiology)

J. Neal Middelkamp, B.S., University of Missouri, 1946; M.D., Washington University, 1948.

James E. Miller, B.S., Tulane University, 1946; M.D., Medical College of Alabama, 1949. (See Department of Ophthalmology)

James S. Nelson, M.D., St. Louis University, 1957. (See Department of Pathology)

Alan M. Robson, M.B.B.S., University of Durham, 1959; M.D., 1964. (See Department of Medicine)

William S. Sly, M.D., St. Louis University, 1957. (See Department of Medicine)

Jessie L. Ternberg, A.B., Grinnell College, 1946; Ph.D., University of Texas, 1950; M.D., Washington University, 1953. (See Department of Surgery)

Donald L. Thurston, B.S., Vanderbilt University, 1934; M.D., 1937.

Jean H. Thurston, B.A., University of Alberta, 1938; M.D., 1941.

Teresa J. Vietti, A.B., Rice University, 1949;

M.D., Baylor University, 1953. (See Department of Radiology)

Clarence S. Weldon, A.B., University of Michigan, 1951; M.D., Johns Hopkins University, 1955. (See Department of Surgery)

Professors Emeriti (Clinical)

Joseph C. Jaudon, A.B., Washington University, 1926; M.D., 1933.

Park J. White, A.B., Harvard College, 1913; M.D., Columbia University, 1917.

Associate Professors

Harish C. Agrawal, B.Sc., Allahabad University, 1957; M.S., 1959; Ph.D., 1964.

Darryl C. DeVivo, B.A., Amherst College, 1959; M.D., University of Virginia, 1964. (See Department of Neurology and Neurological Surgery)

Marvin A. Fishman, B.S., University of Illinois, 1959; M.D., 1961. (See Departments of Neurology and Neurological Surgery and Preventive Medicine and Public Health, and Irene Walter Johnson Institute of Rehabilitation)

Richard E. Hillman, A.B., Brown University, 1962; M.D., Yale University, 1965.

Dorothy J. Jones, A.B., Oberlin College, 1930; M.D., Washington University, 1934.

Lawrence I. Kahn, A.B., University of Alabama, 1941; M.D., Louisiana State University, 1945. (See Division of Health Care Research)

James P. Keating, A.B., Harvard College, 1959; M.D., 1963.

Charles B. Manley, Jr. (Genitourinary Surgery), A.B., University of Missouri, 1955; M.D., 1958. (See Department of Surgery) (Jewish Hospital)

Richard E. Marshall, B.A., Wesleyan University, 1954; M.D., Yale University, 1962.

Anthony S. Pagliara, B.S., Union College, 1960; M.D., Albany Medical College, 1965. (See Department of Medicine)

William T. Shearer, B.S., University of Detroit, 1960; Ph.D., Wayne State University, 1966; M.D., Washington University, 1970.

Carl H. Smith, B.A., Swarthmore College, 1955; M.D., Yale University, 1959. (See Department of Pathology)

Joseph J. Volpe, B.A., Bowdoin College, 1960; M.D., Harvard University, 1964. (See Department of Neurology and Neurological Surgery)

Virginia V. Weldon, A.B., Smith College, 1957; M.D., University of Buffalo, 1962.

Harold Zarkowsky, A.B., Washington University, 1957; M.D., 1961.

Associate Professors Emeriti (Clinical)

Max Deutch, M.D., Washington University, 1926.

Stanley L. Harrison, B.S., Washington University, 1928; M.D., 1930.

Frederick A. Jacobs, B.S., Washington University, 1927; M.D., 1928.

Sol Londe, B.S., Washington University, 1925; M.D., 1927. (Also Lecturer)

Associate Professors (Clinical)

C. Read Boles, A.B., Washington University, 1940; M.D., 1943.

Helen E. Nash, A.B., Spelman College, 1942; M.D., Meharry Medical College, 1945.

George Sato, M.D., Washington University, 1947.

Donald B. Strominger, B.A., Yale University, 1948; M.D., Washington University, 1953.

Assistant Professors

Martin J. Bell, B.A., New York University, 1959; M.D., State University of New York (Downstate), 1963. (See Department of Surgery)

Barbara R. Cole, B.A., Doane College, 1963; M.D., University of Kansas, 1967.

W. Edwin Dodson, A.B., Duke University, 1963; M.D., 1967. (See Department of Neurology and Neurological Surgery)

Morey W. Haymond, B.A., Grinnell College, 1965; M.D., Washington University, 1969.

Barbara M. Herjanic, B.A., Northwestern University, 1943; B.S., Western Michigan College, 1946; M.D., University of Michigan, 1950. (See Department of Psychiatry)

Antonio Hernandez, Jr., A.A., University of the Philippines, 1949; M.D., Manila Central University, 1954.

Laura S. Hillman, B.A., Carleton College, 1964; M.D., Yale University, 1968.

Vita J. Land, B.S., McGill University, 1961; M.D., 1965.

Jack R. Lichtenstein, M.D., University of Maryland, 1967. (See Department of Medicine)

Helen Palkes (Psychology), B.S., Washington University, 1966; M.A., 1968.

Mabel L. Purkerson, A.B., Erskine College, 1951; M.D., Medical College of South Carolina, 1956. (See Department of Medicine)

Julio V. Santiago, B.S., Manhattan College, 1963; M.D., University of Puerto Rico, 1967. (See Department of Medicine)

Gary D. Shackelford, B.A., Northwestern University, 1964; M.D., Washington University, 1968. (See Department of Radiology)

Penelope G. Shackelford, B.S., University of Wisconsin, 1964; M.D., Washington University, 1968.

Paul S. Simons, B.A., University of Texas, 1963; M.D., Washington University, 1967. (See Division of Health Care Research)

James K. Turner, A.B., Washington University, 1949; M.D., 1953. (See Division of Health Care Research)

Research Assistant Professor

Gurbax S. Sekhon, B.S., Agra University, 1960; M.S., 1962; Ph.D., University of Wyoming, 1969.

Assistant Professors Emeriti (Clinical)

Marianne Kuttner, M.D., Johann Wolfgang Goethe University, 1931.

Maurice J. Lonsway, B.S., Valparaiso University, 1910; M.D., St. Louis University, 1914.

Edith C. Robinson, A.B., Randolph-Macon College, 1927; M.S., University of South Carolina, 1928; M.D., Johns Hopkins University, 1932.

Assistant Professors (Clinical)

Helen M. Alf, B.S., Washington University, 1934; M.D., 1934.

Leslie L. Barton, B.A., Hunter College, 1962; M.D., University of Chicago, 1966.

Martin Calodney, B.S., College of the City of New York, 1930; M.D., New York University, 1936.

Ira J. Friedman, B.S., University of Arkansas, 1955; M.D., 1960.

Robert H. Friedman, M.D., Washington University, 1948.

Samuel W. Gollub, B.S., Washington University, 1941; M.D., 1941.

Gene H. Grabau, B.S., St. Louis College of Pharmacy, 1937; M.D., Washington University, 1942.

Marshall B. Greenman, B.S., University of Illinois, 1946; M.D., 1948.

Norman Hankin, A.B., University of Wisconsin, 1940; M.D., 1943.

Maurice J. Keller, A.B., Yale University, 1936; M.D., Columbia University, 1940.

Kenneth A. Koerner, A.B., Washington University, 1935; M.D., 1941.

Maurice J. Lonsway, Jr., A.B., Washington University, 1946; M.D., 1950.

Richard Margolis, B.S., College of William and Mary, 1947; M.D., Western Reserve University, 1951.

John C. Martz, A.B., University of Missouri, 1938; M.D., Washington University, 1942.

David N. McClure, M.D., University of Tennessee, 1940.

Paul H. Painter, M.D., St. Louis University, 1947. (See Division of Child Psychiatry)

Frederick D. Peterson, A.B., Knox College, 1953; M.D., Washington University, 1957.

Alfred S. Schwartz, A.B., Amherst College, 1932; M.D., Johns Hopkins University, 1936.

Bernard Schwartzman, A.B., Washington University, 1931; M.D., 1935.

Argyrios A. Tsifutis, M.D., Aristotelion University of Thessalonika, 1954.

Frank S. Wissmath, A.B., Washington University, 1939; M.D., 1943.

Instructors

John Gilster (Dental Medicine), D.D.S., Washington University, 1944.

Donald V. Huebener (Dental Medicine), D.D.S., Washington University, 1969. (See Department of Radiology)

Mary I. Johnson, B.S., Washington State University, 1964; M.D., Johns Hopkins University, 1968. (See Departments of Anatomy and Neurobiology and Neurology and Neurological Surgery)

Patricia A. Parsons (Dental Medicine), B.S., San Diego State College, 1953; D.D.S., Washington University, 1957.

Zila Welner, M.D., Hebrew University, 1961. (See Department of Psychiatry)

Research Instructor

Elaine Miller, A.B., Judson College, 1944; M.D., Medical College of Alabama, 1949. (See Department of Ophthalmology)

Instructor Emeritus (Clinical)

Joseph A. Bauer, M.D., Washington University, 1926.

Instructors (Clinical)

Christos A. Antoniou, M.D., University of Athens, 1958.

Edward T. Barker, A.B., Princeton University, 1953; M.D., Washington University, 1957.

Walter F. Benoist, A.B., University of Pennsylvania, 1968; M.D., Washington University, 1972.

Huldah C. Blamoville, B.S., Queens College, 1959; M.D., Meharry Medical College, 1965.

Gordon R. Bloomberg, A.B., University of Illinois, 1955; B.S., 1955; M.D., 1959.

Gerald J. Duling, B.S., Xavier University, 1955; M.D., St. Louis University, 1959.

Elliot F. Gellman, B.A., State University of Iowa, 1957; M.D., University of Missouri, 1961.

Santosh Gupta, M.B.B.S., Lucknow University, 1963; D.C.H., University of London, 1966.

Roman E. Hammes, B.A., University of Iowa, 1950; M.D., 1954.

J. Larry Harwell, A.B., Washington University, 1958; M.D., University of Missouri, 1961.

James R. Heersma, B.S., Western Michigan College, 1946; M.S., Northwestern University, 1948; M.D., 1949.

Sheldon Kessler, M.D., St. Louis University, 1951.

Henry L. Knock, A.B., Johns Hopkins University, 1949; M.D., 1953.

Norton S. Kronemer, A.B., Washington University, 1958; M.D., University of Missouri, 1962.

Leland M. Laycob, A.B., Washington University, 1964; M.D., University of Missouri, 1968.

Despine Liebhaber, B.A., Smith College, 1958; M.D., Columbia University, 1962.

Robert D. Lins, A.B., University of Missouri, 1965; M.D., 1969.

Stanley B. Lyss, A.B., Harvard University, 1958; M.D., Washington University, 1962.

Homer E. Nash, Jr., B.S., Morehouse College, 1948; M.D., Meharry Medical College, 1951.

Eugenia M. Pierce, M.D., St. Louis University, 1958.

Susan Pittman, A.B., University of Missouri, 1959; M.D., 1963.

Steven I. Plax, A.B., University of Missouri, 1957; M.D., 1961.

William J. Ross, B.A., Miami University, 1968; M.D., Washington University, 1972.

Robert C. Schaan, A.B., Washington University, 1949; M.D., 1953.

Warren G. Sherman, B.A., University of Missouri, 1965; M.D., Tulane University, 1969.

Richard H. Spitz, A.B., Washington University, 1946; M.D., 1952.

Mary A. T. Tillman, M.D., Howard University, 1960.

Orestes S. Valdes, B.S., Instituto de Santa Clara, 1947; M.D., University of Havana, 1954.

Barbara N. Voegel, B.S., University of Illinois, 1950; M.D., Washington University, 1957.

Roger J. Waxelman, A.B., Washington University, 1965; M.D., University of Missouri, 1969.

George T. Wilkins, Jr., B.S., University of Illinois, 1956; M.D., 1957.

Kathleen Winters, B.S., Winthrop College,



1946; M.D., Medical College of South Carolina, 1955.

Gerald Wool, A.B., Princeton University, 1958; M.D., Washington University, 1962.

H. Benjamin Zwirn, M.D., University of Basel, 1954.



Research Associates

Frederick E. Brot, B.S., University of Michigan, 1962; Ph.D., Stanford University, 1966.

David N. Dietzler, A.B., Washington University, 1957; Ph.D., 1963. (See Department of Pharmacology)

Walter S. Zawalich, B.S., University of Massachusetts, 1967; Ph.D., Florida State University, 1971.

Assistants

Marcia S. Custer (Health Services), R.N., B.S., University of Michigan, 1956. (See Division of Health Care Research)

Susan K. Keating (Health Services), B.S., University of North Carolina School of Nursing, 1965.

Sandra H. Manske (Health Services), R.N., St. Joseph's School of Nursing, 1969; P.N.P., Washington University, 1975. (See Division of Health Care Research)

Kathleen Potts (Health Services), R.N., B.S., St. Louis University, 1969; M.S., Boston University, 1970. (See Division of Health Care Research)

Research Assistants

Charles E. Crawford, Jr., B.S., Washington University, 1956.

Prema B. Madyastha, B.S., Poona University, 1957; M.S., 1958; Ph.D., 1963.

Duane M. Martin, B.A., Cardinal Glennon College, 1964.

Charles A. Reed, A.B., Washington University, 1961.

Marc D. Smith, B.S., University of Missouri, 1971; M.Div., Concordia Seminary (SEMINEX), 1974.

Assistants (Clinical)

Jean M. Auguste, B.A., Lycee T. L'Ouverture, 1950; M.D., Medical School of Haiti, 1956.

Thomas G. Cleary, B.S., St. Louis University, 1967; M.D., Washington University, 1971. (On leave of absence)

Mohammad H. Rahman, M.B.B.S., University of Karachi, 1960.

Seymour M. Schlansky, M.D., Chicago Medical School, 1950.

Edward Mallinckrodt Department of Pharmacology



The number of useful drugs is steadily increasing. It is the purpose of the pharmacology course, through discussions of existing drugs, to develop general principles which will be applicable as well to drugs of the future. Pharmacology draws heavily on biochemistry, physiology, and microbiology for an understanding of drug action. It looks toward pathology, medicine, and surgery for its uses. For this reason, the course is constructed as a part of the continuum of medicine rather than as a separate discipline. Since many drugs are harmful in excessive amounts, toxicology is included as a logical

part of pharmacology.

The laboratory portion of the course is closely coordinated with the lecture material and is designed to demonstrate and emphasize pertinent pharmacological principles and to employ agents, equipment, and skills relevant to current medical practice.

SECOND YEAR

Bio 507, 508. *Pharmacology.* (a) Lectures, conferences, panel discussions. (b) Laboratory course. Credit 7 units for the year.

(Dr. Needleman and Staff)

RESEARCH

Bio 590. The facilities of the laboratory are available to those who wish to carry on an original investigation on problems of their own or on those the Department is prepared to suggest.

Neurochemistry; regulation of metabolism; quantitative histochemistry; micro-analytical methods. (Dr. Berger)

Problems in basic and clinical pharmacology in the urinary tract. (Dr. Boyarsky)

Biosynthesis of peptide hormones in human placenta and pancreatic islets. (Dr. Boime)

Problems in the biochemical development of rat kidney. Development of transport mechanisms in rat kidney. (Dr. Burch)

Neurochemistry of seizures; neuropharmacology of anti-convulsant and psychotropic drugs; role of cyclic nucleotides in nervous tissue function and metabolism.

(Dr. Ferrendelli)

Lipids of the nervous system; structural components of myelin; chemistry of the synapse; psychoactive drugs. (Dr. Burton)

Secretion of macromolecules. Serum albumin biosynthesis and secretion.

(Dr. Geller)

Studies on oxidative phosphorylation and mitochondrial structure, as well as purification and properties of the drug metabolizing enzymes. (Dr. Hunter)

Immune damage to and immunogenicity of natural and model cell membranes.

(Dr. Kinsky)

Neurochemistry; regulation of metabolism; quantitative histochemistry; micro-analytical methods; developmental biochemistry.

(Dr. Lowry)

Metabolism of pancreatic islets cells. Insulin and glucagon release. Prostaglandins. Biochemistry of auditory structures.

(Dr. Matschinsky)



Energy metabolism in nerve, axonal flow, and the biochemical effects of thiamine deficiency. (Dr. McDougal)

Pharmacology of vasoactive substances, e.g., prostaglandins, angiotensin, bradykinin. (Dr. Needleman)

Electrophysiology and biochemistry of pancreatic islets. (Dr. Pace)

ELECTIVES

521. *The Interaction of Drugs with Tissue Components.* Includes physical, chemical, and kinetic consideration of the receptor binding of drugs and the relationship to their biological actions.

(Dr. Needleman and Staff)

572. *Pharmacology of the Nervous System.* Topics covered include biochemistry of neurotransmitters; mechanisms of action of neuroactive and psychoactive agents.

(Drs. B. Moore, McDougal, and Staff)

Descriptions of the following courses are shown in the Division of Biology and Biomedical Sciences:

Bio 509, 510. *Current Topics in Pharmacology.*

Bio 532. *Mechanism and Regulation of Protein Biosynthesis.*

Bio 555. *Neurological Pharmacology.*

Bio 556. *Biochemistry of the Nervous System.*

Professor and Head of Department

Philip Needleman, B.S., Philadelphia College of Pharmacy and Science, 1960; M.S., 1962; Ph.D., University of Maryland, 1964.

Professor Emeritus and Lecturer

Helen B. Burch, B.S., Texas University for

Women, 1926; M.S., Iowa State University, 1928; Ph.D., 1935.

Professors

F. Edmund Hunter, Jr., B.S., Mount Union College, 1938; Ph.D., University of Rochester, 1941.

Stephen C. Kinsky, A.B., University of Chicago, 1951; Ph.D., Johns Hopkins University, 1957. (See Department of Biological Chemistry)

Oliver H. Lowry, B.S., Northwestern University, 1932; Ph.D., University of Chicago, 1937; M.D., 1937.

Franz M. Matschinsky, M.B., University of Freiburg, 1955; M.D., University of Munich, 1958.

David B. McDougal, Jr., A.B., Princeton University, 1945; M.D., University of Chicago, 1947.

Associate Professors

Saul Boyarsky, B.S., University of Vermont, 1943; M.D., 1946. (See Department of Surgery)

Robert M. Burton, B.S., University of Maryland, 1950; M.S., Georgetown University, 1952; Ph.D., Johns Hopkins University, 1955.

James A. Ferrendelli, A.B., University of Colorado, 1958; M.D., 1962. (See Department of Neurology and Neurological Surgery)

David M. Geller, B.A., Amherst College, 1952; Ph.D., Harvard University, 1957.

Assistant Professor

Irving Boime, B.S., St. Louis College of Pharmacy, 1964; M.S., Purdue University, 1966; Ph.D., Washington University, 1970. (See Department of Obstetrics and Gynecology)

Research Assistant Professors

Sosamma J. Berger, B.S., University of Bombay, 1958; M.S., University of Puget Sound, 1962; Ph.D., Hahnemann Medical College, 1968.

Donald A. Godfrey, B.S., Rensselaer Polytechnic Institute, 1966; Ph.D., Harvard University, 1972.

Lecturer

David N. Dietzler, A.B., Washington University, 1957; Ph.D., 1963. (See Department of Pediatrics)

Note—The number preceding the course title indicates that the course carries credit in the Graduate School of Arts and Sciences.

Department of Physiology and Biophysics



The Department offers instruction to medical and graduate students. A course in the second semester of the first year of the medical curriculum is designed to provide students with a foundation for their further study of clinical and applied physiology. In addition, advanced courses open to medical and graduate students provide for more detailed study of specific areas of physiology and biophysics.

The following research interests are represented in the Department at the present time: macromolecular structure as studied by X-ray crystallography and other physical methods, the mechanism of action of

polypeptide hormones, transport across cell membranes, neurophysiology, contractile activation of muscle, peripheral circulation, respiration, and the application of computer techniques to biological problems. The interests in neurophysiology concern principally membrane phenomena in nerve fibers, the physiology of synapse, and the function of receptors and sensory systems. Electron microscopy of nerve and muscle is used to relate structure and function in these tissues.

FIRST YEAR

Bio 502. *General Physiology.* Lectures, demonstrations, and laboratory experiments

are utilized to provide a basis for understanding general physiological mechanisms and the functional organization of physiological systems that are of immediate or potential importance in medicine. Credit 8 units. (Staff)

Bio 554. *Neural Sciences.* An integrated course dealing with the anatomy and physiology of the nervous system at the cellular level, leading on to a consideration of sensory and motor systems. Credit 5 units.

RESEARCH

Bio 590. *Research.* The Department offers a variety of research opportunities, particularly in the following areas; macromolecular structure as studied by X-ray crystallography; synthesis and biological activities of polypeptides; membrane transport; lysosomes and intracellular transport; neurophysiology, including nerve membrane, muscle, synaptic transmission, sensory systems (especially auditory and visual), electron microscopy of neural tissues, and biochemical regulation in neurons; circulation; respiration; renal physiology; and the application of computer sciences to physiological problems. (Staff)

ELECTIVES

Descriptions of the following courses may be found under the Division of Biology and Biomedical Sciences.

Bio 431. *Principles of Cellular Physiology.*

Bio 433. *Cell Biology.*

Bio 457. *Somatosensory System.*

Bio 459. *Vision.*

Bio 511. *Fundamentals of Circulation.*

Bio 525. *Fundamental Concepts in Cell Membrane Physiology and Biophysics.*

Bio 526. *Advanced Topics in the Physiology and Biophysics of Cell Membranes.*

Bio 545. *Conformational Analysis of Macromolecules.*

Bio 558. *Long-term Changes in the Nervous System.*

Bio 559. *Nerve, Muscle, and Synapse.*

Edward Mallinckrodt, Jr., Professor and Head of Department

Carlton C. Hunt, B.A., Columbia University, 1939; M.D., Cornell University, 1942.

Professors Emeriti

Hallowell Davis, A.B., Harvard College, 1918; M.D., 1922; Sc.D. (hon.), Colby College, 1954; Northwestern University, 1962; Washington University, 1973. (See Department of Otolaryngology) (Also Lecturer) (Also Central Institute for the Deaf)

Arthur S. Gilson, Jr., B.S., Dartmouth College, 1919; A.M., Harvard University, 1922; Ph.D., 1924.

Harvey L. White, B.S., Washington University, 1918; M.D., 1920.

Professors

Mordecai P. Blaustein, B.A., Cornell University, 1957; M.D., Washington University, 1962.

Jerome R. Cox, Jr. (Biomedical Engineering), S.B., Massachusetts Institute of Technology, 1947; S.M., 1949; Sc.D., 1954. (See Biomedical Computer Laboratory and Division of Health Care Research) (Also School of Engineering and Applied Science)

Garland R. Marshall, B.S., California Institute of Technology, 1962; Ph.D., Rockefeller University, 1966. (See Department of Biological Chemistry)

Charles E. Molnar, B.S.E.E., Rutgers University, 1956; M.S.E.E., 1957; Sc.D., Massachusetts Institute of Technology, 1966. (Also Computer Systems Laboratory)

Albert Roos, M.D., University of Groningen, 1940. (See Department of Anesthesiology)

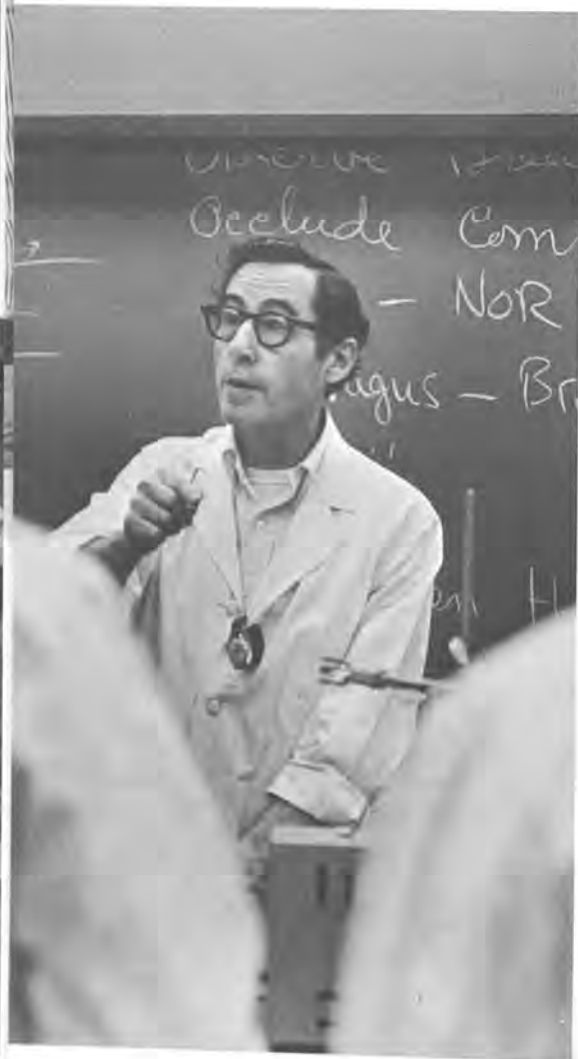
Note—The number preceding the course title indicates that the course carries credit in the Graduate School of Arts and Sciences.

Associate Professors

Leonard J. Banaszak, B.S., University of Wisconsin, 1955; M.S., Loyola University, 1960; Ph.D., 1961. (See Department of Biological Chemistry)

Harold Burton, B.A., University of Michigan, 1964; Ph.D., University of Wisconsin, 1968. (See Department of Anatomy and Neurobiology)

Nigel W. Daw, B.A., Trinity College, Cambridge, 1956; M.A., 1961; Ph.D., Johns Hopkins University, 1967. (See Department of Ophthalmology)



Paul J. De Weer, B.S., University of Louvain, 1959; M.D., 1963; M.S., 1964; Ph.D., University of Maryland, 1969.

Yasushi Fukami, M.D., Kyoto University, 1957; Ph.D., 1961.

Stanley Lang, Ph.B., University of Chicago, 1948; B.S., 1949; M.S., 1951; Ph.D., 1953.

F. Scott Mathews, B.S., University of California, 1955; Ph.D., University of Minnesota, 1959. (See Department of Biological Chemistry)

Alan L. Pearlman, A.B., State University of Iowa, 1958; M.D., Washington University, 1961. (See Department of Neurology and Neurological Surgery)

Dale Purves, A.B., Yale University, 1960; M.D., Harvard University, 1964.

Carl M. Rovainen, B.S., California Institute of Technology, 1962; Ph.D., Harvard University, 1967.

Lewis J. Thomas, Jr., B.S., Haverford College, 1953; M.D., Washington University, 1957. (See Department of Anesthesiology and Biomedical Computer Laboratory)

Assistant Professors

C. David Barry, B.Sc., Manchester University, 1962; Ph.D., 1965. (Also Computer Systems Laboratory)

Duck O. Kim, B.S., Seoul National University, 1968; M.S., Rose Polytechnic Institute, 1969; D.Sc., Washington University, 1972. (Also Computer Systems Laboratory)

Robert F. Rakowski, B.Ch.E., Cornell University, 1964; M.Eng., 1966; Ph.D., University of Rochester, 1972.

Philip D. Stahl, B.S., West Liberty State College, 1964; Ph.D., West Virginia University, 1967.

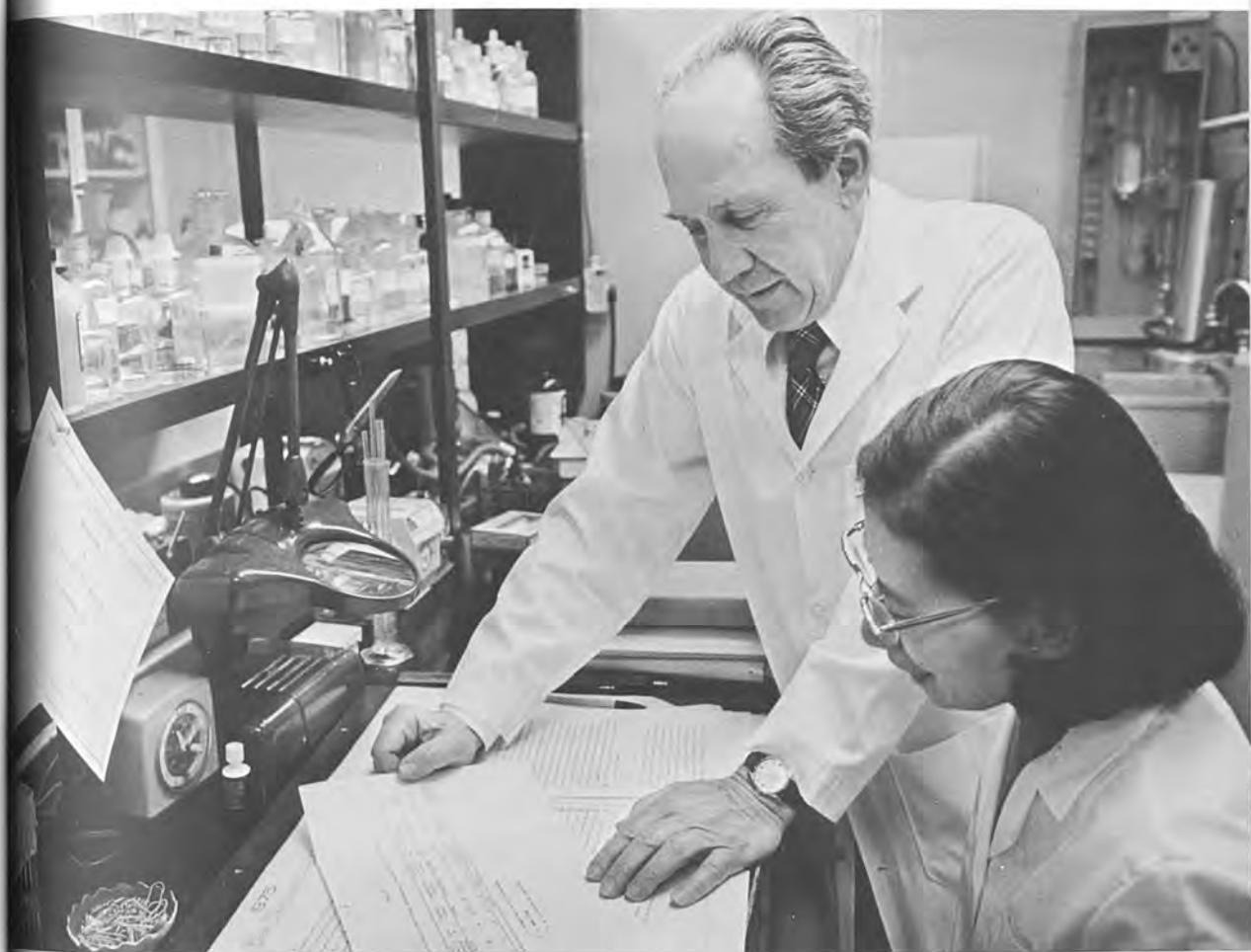
Research Assistant Professor

Edmund W. Czerwinski, A.B., University of California, 1962; Ph.D., Indiana University, 1971.

Instructor

Shirley A. Sahrman, B.S.P.T., Washington University, 1958; A.M., 1971; Ph.D., 1973. (See Departments of Neurology and Neurological Surgery and Preventive Medicine and Public Health)

Department of Preventive Medicine and Public Health



The Department offers instruction during the first and second years of the curriculum and provides other learning experience in elective courses in the fourth year. In clinical clerkships of other departments, students have experience in rehabilitation in the Irene Walter Johnson Institute of Rehabilitation. In the first semester of the first year, the course Social Aspects of Medicine provides background information, and students are encouraged to participate in discussion of important and evolving issues of medical care. A course in statistical methods in medicine, given in the second semester, affords a basis of understanding of quantitative as-

essment in biology and medicine and prepares the student for critical evaluation of reports in the medical literature. During the second year in the course in pathophysiology, the Department contributes material concerning the epidemiology of disease and the variety of factors in the person and environment which contribute to the occurrence of disease, and provides approaches and methods for prevention and control. Interested students may choose to participate in more intensive study of certain of these subject areas in the departmental elective offerings.

Opportunities for clinical and/or research

experience are provided by the following organizational units within the Department:

Division of Applied Physiology
Dr. John Holloszy

Division of Biostatistics
Dr. Reimut Wette

Nutrition Research Laboratories
Dr. Robert Shank, Dr. Ruth Brennan

Irene Walter Johnson Institute of Rehabilitation
Dr. Marvin Fishman

Lipid Research Center
Dr. Gustav Schonfeld

FIRST YEAR

The Social Aspects of Medicine. The course consists of seventeen required two-hour sessions during which various topics dealing with current issues in ethics, medical care organization, community medicine, and politics are discussed. The objectives are to provide students with necessary quantitative data and philosophic concepts in each of these areas to serve for discussion of the ways in which inquiry, information, and logic can be utilized to affect the issues at hand. Another objective is to develop the interest of students in this field and in the pursuit of further knowledge in this area applicable both to patient care *per se* and to the understanding of health care systems. Students choose approximately one-half of the topics during a survey of the class prior to matriculation. At each session, about one hour is spent in formal presentation and one hour in discussion. The course is considered to be initial preparation for later teaching in nutrition, epidemiology and public health, and for various electives dealing with health care research and community aspects of medicine.

(Drs. Perkoff, Shank, Vavra, and Staff)

Biomedical Statistics. This introduction to the principles and methods of biostatistics emphasizes the concepts of statistical meth-

odology as being essential to proper application and interpretation of statistical methods. Elementary statistical techniques illustrating the use of statistical principles in experimentation and clinical research are discussed. Second semester.

(Dr. Wette and Staff,
Division of Biostatistics)

SECOND YEAR

Pathophysiology. In lectures and demonstrations, there is description of the patterns of occurrence and the distribution of selected diseases in populations. Consideration is given to the variety of characteristics of host, agent, and environment which determine the occurrence of specific disorders. Procedures which may be utilized to prevent or interrupt the course of disease and disability are described and evaluated. Patterns of provision of medical care and the social factors influencing health care needs are discussed. (Dr. Shank and Staff)

Summer Traineeships in Physical Disability and Rehabilitation. (See Institute of Rehabilitation.) (Drs. Fishman, Holloszy)

FOURTH YEAR

Electives

Clerkship in Primary Care. This clerkship is designed to provide the student with first-hand experience with medical practice, much in the same manner that clerkships in other medical disciplines provide patient care experience in supervised settings. The clerkship uses as its clinical settings the Medical Care Group of Washington University (MCG), a teaching and research pre-paid group practice, and other practices.

Students will join individual physicians in the Medical Care Group of Washington University or in their private practices, and will work in their offices caring for patients under supervision. Preventive, social, and continuing aspects of medical practice will be emphasized. Students will accompany

their supervisory physicians on hospital rounds, will share night call with the physicians and, when a house or emergency call is to be made, will be contacted by the physician's exchange and will make the call with the supervisory physician. Students also will attend hospital staff and committee meetings with their supervisory physicians. Each student will be requested to write a description of his six-week period tabulating patients seen by age, race and diagnosis. One patient will be described in detail, including such social, family, and community aspects of his problems as are applicable. A simple diary of the student's daily experience (rounds and calls made, conferences attended, etc.) will also be required. It is hoped that this elective will give an overview of medical practice in internal medicine and in pediatrics, and will provide an opportunity for the student to see comprehensive medical care as it is practiced in St. Louis and as it exists in a group practice model: the Medical Care Group.

Family Practice Preceptorship. The Division of Health Care Research will monitor this elective. The student wishing such an experience should find the practitioner with whom he or she wishes to work and request that this physician send Dr. Gerald T. Perkoff of the School of Medicine (1) a statement of his (the physician's) own training and experience for approval (he would need to be a bona fide licensed M.D. in practice), (2) an outline of the program he will offer the student, i.e., supervised office work and hospital visits, discussion of family problems as they bear on the patient's illness, availability of community resources, etc., and (3) a commitment to evaluate the student's performance. The student must then give Dr. Perkoff (1) his agreement to the proposed program, (2) a diary of patients seen and visits made and a summary of positive and negative aspects of the practice in which he was involved, and (3) a report of his study of particular problems in the community or presented by a given patient, i.e., a brief paper. This material would have to be pre-

sented in acceptable form for credit to be given. (Dr. Perkoff)

Primary Care Rounds. Presentations and discussions of primary care subjects: medical, organizational, fiscal, and social. (Dr. Perkoff)

Clinical Elective. Physical disability and rehabilitation. (See Institute of Rehabilitation) (Drs. Fishman, Holloszy)

Physical Disability and Rehabilitation. The student will become familiar at first hand with the techniques for defining the extent of physical disability and with various approaches to its treatment. Emphasis will be placed on methods used in physical, occupational, and speech therapy, and on the specialized contribution to be made by rehabilitation social work, nursing, and vocational testing and counseling. Supervised visits will be arranged to specially related outside facilities and agencies (Visiting Nurses Association, Special School District, Shriners Hospital, Central Institute for the





Deaf, manufacturers of prosthetics and orthotic devices). All the above will be accomplished in relation to selected patients assigned to the student for his supervision of their rehabilitation programs. In general, these will include inpatients on the Pediatrics, Medical, Neurology, Neurosurgical, Orthopedic, and Plastic Surgery Services. Special emphasis on any one or any combination of the above services can be arranged to suit the interests of individual students.

In addition to the programs available at the Rehabilitation Institute, the student may choose to spend part of the elective at Jewish Hospital on the Rehabilitation Service.

(Dr. Fishman)

Long-Term Care. The Division of Long-Term Care of Jewish Hospital offers a six- or twelve-week elective course to senior medical students. The Division operates a thirty-six bed service for patients with physical disabilities under the supervision of three full-time physicians. The case material is varied by the large number of patients with spinal cord injuries, strokes, Parkinson's disease, and arthritis. The Division holds an Amputee Clinic twice a month and does all the electromyographic examinations for the Jewish Hospital. The medical student serves as an extern. He gains experience in the prescription of a rehabilitation program and follows his patients in physical therapy, occupational therapy, speech therapy, or whatever other activity is applicable. He works with the orthopedic, neurological, urological, and plastic surgery consultants who serve this unit. The details of the program can be adapted to fit the particular interests of the individual student.

(Dr. Steinberg and Staff)

Seminar Electives

Artherosclerosis and Lipoproteins. Six lectures followed by discussions on (1) current concepts of atherogenesis; (2) lipoprotein structure; (3) lipoprotein production; (4) lipoprotein catabolism and interactions with tissues; (5) pathophysiology of dyslipoproteinemias; (6) diagnosis and treatment of hyperlipoproteinemia, coronary prevention programs.

(Drs. Schonfeld, Witztum, Weidman, Chen)

Clinical Immunology. This course, through lectures and seminars, provides opportunity for broadening the knowledge and experience of students in fields of clinical immunology. The material covered includes immunization, immune deficiency states, immunological diseases, cellular hypersensitivity, complement in human disease, and cancer immunology.

(Drs. Chaplin, Hahn, C. Parker)

Clinical Nutrition. The Division of Applied

Nutrition was established for the purpose of finding new and more effective means of providing medical students and physicians with information and assistance in the utilization of the knowledge of nutrition for purposes of patient management and the prevention of disease. The seminars and activities of this elective will utilize the experience and knowledge of the new division. Topics to be included are nutrient requirements of humans, food sources of nutrients, dietary evaluation, clinical assessment of nutritional status, modification of nutrient requirements by disease processes, dietary management of specific disorders, and the use of nutritional information for most favorable outcome of pregnancy, growth, and development in infancy and childhood, and avoidance of disease. Readings will be assigned and case demonstration utilized.

(Drs. Shank, Brennan)

Roles of Exercise in Medicine: Biochemical, Physiological, and Clinical Considerations. Biochemical and physiological adaptations to long-term exercise; acute responses to exercise; role of exercise in the prevention and treatment of (a) obesity, (b) diabetes, (c) coronary heart disease; diagnostic use of exercise-stress-testing; use of exercise in rehabilitation medicine; effects of lack of exercise and immobilization. (Dr. Holloszy)

AMCS-BMed 555. *Methods of Biomedical Statistics.* The principles and application of statistical methods in the health sciences, with emphasis on the treatment of statistical problems typical in biomedical and clinical research. The usefulness and limitations of standard statistical techniques; t-, F-, and chi-square tests; correlation and regression; analysis of variance and covariance; life-tables. The rationale and applications of advanced biometrical methods: sequential analysis, especially in clinical trials; quantal response analysis; multivariate analysis; distribution-free methods. Special topics in health research: incomplete (censored) observations, mixed and competing risk distri-

butions, classification and clustering analysis. Computer applications in biomedical statistics (with laboratory experience).

(Dr. Wette)

Topics in Health Care Delivery. Student-led discussions of community medicine, social aspects of medical care systems, and alternative structures which can improve health care delivery will be directed by faculty members. Topics covered in an elective period will vary according to the faculty member assigned; course content, therefore, will not be the same for all students. The seminars will follow the design of assigned readings of specific topics, with presentations to be made by each course participant. Simultaneous participation as volunteers in the Pruitt-Igoe Project is encouraged but not required. (Dr. Perkoff and Staff)

Research Electives

Biochemistry of Exercise. Research deals with the acute and chronic responses to exercise. Areas of interest include biochemical adaptations in muscle in response to endurance exercise and to heavy resistance exercise; effects of exercise on body composition during growth and during weight reduction; cardiac adaptations to increased work load; the serum triglyceride lowering effect of exercise; the biochemical basis of muscle fatigue. (Dr. Holloszy)

Biomedical Statistics. Students will be supervised and gain experience in the proper application of statistical methods (including computer usage) to health research problems; qualified students can also engage in research projects concerned with the development of statistical methods for special biomedical and clinical research situations. (Drs. Wette, Choi)

Mathematical Biology. Qualified students can engage in research concerned with the mathematical modeling and analysis (including computing techniques) of biologic

processes, such as tumor growth and radiation response. (Drs. Wette, Choi)

Clinical and Experimental Nutrition. The student engages in a selected research project under supervision of staff of this laboratory. Occasional opportunities may be made to study and observe major problems of deficiency disease in other countries.

(Drs. Shank, Holloszy, Schonfeld, Brennan, Cheng)

Immunohematology. Application of serologic and immunochemical techniques in basic studies of erythrocyte autoantibodies and isoantibodies encountered in hemolytic disease of the newborn, leukemias, lymphomas, malignancies, and connective tissue diseases. Special problems in transfusion practice are also covered with blood bank personnel.

(Dr. Chaplin)

Mathematical Biology. Qualified students may engage in research concerned with the mathematical modeling and analysis (including computing techniques) of biologic processes such as tumor growth and radiation response.

(Dr. Wette)

Objective Quantitation of Spasticity. The student collaborates with the staff of the Biomedical Engineering Research and Development Unit, employing electronic instrumentation to obtain objective measurements of spasticity and impaired voluntary motor function in patients with neurological disorders. The equipment includes electrically driven and hydraulic systems, EMG recordings, and computer analysis of data. Machine findings are correlated with clinical performance based on standardized functional evaluation tests.

(Dr. Fishman and Staff)

Medical Care in a Group Practice. Students will select a problem of mutual interest dealing with medical care utilization, reaction to illness, screening, etc.

(Dr. Perkoff)

Studies in Adult Ambulatory Care. Studies of medical care utilization, social and eco-

nomie aspects of medical care, problems in medical care organization at Barnes or affiliated hospitals or in community projects.

(Dr. Perkoff)

Open Topics. Any topic related to health care delivery in a broad sense may be selected by discussion with the supervisor.

(Dr. Perkoff and Staff)

Studies in Pediatric Ambulatory Care. Studies in medical care utilization, social and economic aspects of medical care, and problems in medical care organization at St. Louis Children's or St. Louis County Hospital or in a community project. (Dr. Kahn)

Topics in Medical Economics. This course is designed to expose students to economic issues in the medical sector. Students will pursue a selected research topic under an economist's supervision. Emphasis will be placed on policy issues concerning the effective allocation of medical expenditures. Examples of topics which can be considered are: the economics of excess capacity in surgery; the economics of prepaid group practice; the cost effectiveness of therapy for hypertension, cost differences of therapies for a given medical problem as a function of physicians' specialties; responsiveness of physician to alternative incentive schemes; criteria to be used in determining the allocation of resources among the medical subsectors.

(Dr. Benham)

Danforth Professor and Head of Department

Robert E. Shank, A.B., Westminster College, 1935; M.D., Washington University, 1939. (See Department of Medicine)

Kountz Professor

Hugh Chaplin, Jr., A.B., Princeton University, 1943; M.D., Columbia University, 1947. (See Department of Medicine)

Note—The number preceding the course title indicates that the course carries credit in the School of Engineering and Applied Science.



Professor and Director of Division of Biostatistics

Reimut Wette, B.S., University of Heidelberg, 1949; M.S., 1952; D.Sc., 1955.

Professor Emeritus

C. Howe Eller (Public Health), A.B., Stanford University, 1927; M.D., University of Colorado, 1930; Ph.D., Johns Hopkins University, 1934.

Professors

John O. Holloszy (Director of Applied Physiology Division), M.D., Washington University, 1957. (See Department of Medicine and Irene Walter Johnson Institute of Rehabilitation)

M. Kenton King, B.A., University of Oklahoma, 1947; M.D., Vanderbilt University, 1951. (See Administration and Department of Medicine)

Gerald T. Perkoff, M.D., Washington Univer-

sity, 1948. (See Department of Medicine and Division of Health Care Research)

John D. Vavra, B.A., University of Colorado, 1950; M.D., Washington University, 1954. (See Administration, Department of Medicine, and Division of Health Care Research)

R. Dean Wochner, A.B., Arizona State University, 1956; M.D., Washington University, 1960. (Hospital Commissioner of St. Louis and Director of Health and Hospitals) (See Department of Medicine)

Associate Professor Emeritus

M. Frances Watson (Social and Environmental Studies), B.S., Northeast Missouri State Teachers College, 1932; M.S.W., Washington University, 1949.

Associate Professors

Lee Benham, B.A., Knox College, 1962; Ph.D., Stanford University, 1970. (See Division of Health Care Research) (Also Faculty of Arts and Sciences)

Thomas W. Bice, B.A., Knox College, 1963; M.S., Purdue University, 1965; Ph.D., 1969. (See Division of Health Care Research) (Also Faculty of Arts and Sciences)

Sung C. Choi (Biostatistics), B.S., University of Washington, 1957; M.A., 1960; Ph.D., University of California, 1966.

Marvin A. Fishman, B.S., University of Illinois, 1959; M.D., 1961. (See Departments of Neurology and Neurological Surgery and Pediatrics, and Irene Walter Johnson Institute of Rehabilitation)

Mary L. Parker, B.S., Florida State University, 1946; M.S., 1949; M.D., Washington University, 1953. (See Departments of Medicine and Pediatrics) (University Health Service)

Gustav Schonfeld, A.B., Washington University, 1956; M.D., 1960. (See Department of Medicine)

Associate Professor (Clinical)

Franz U. Steinberg, M.D., University of Berne, 1938. (See Departments of Medicine and Surgery) (Jewish Hospital)

Assistant Professors

William C. Banton II, M.D., Howard University, 1946; M.P.H., Johns Hopkins University,

1970. (Director of Department of Community Health and Medical Care, St. Louis County)

Edward J. Berger, M.D., Washington University, 1937. (Medical Director, Labor Health Institute)

Howard A. Bomze (Rehabilitation Biomedical Engineering), B.S.E.E., Drexel Institute of Technology, 1966; M.S.Bm.E., 1968; D.S.E.E., Washington University, 1972. (Also School of Engineering and Applied Science)

Ruth E. Brennan (Nutrition), B.S., University of Tennessee, 1943; M.S., Simmons College, 1945; Sc.D., University of Pittsburgh, 1966.

Chuan Huan Cheng, B.S., China National Central University, 1944; M.S., Cornell University, 1950; Ph.D., Michigan State University, 1955.

Jon D. Cooksey (Associate Director of Applied Physiology Division), M.D., Tulane University, 1962. (See Department of Medicine and Irene Walter Johnson Institute of Rehabilitation)

Bevra H. Hahn (Clinical Immunology), B.Sc., Ohio State University, 1960; M.D., Johns Hopkins University, 1964. (See Department of Medicine)

Barbara B. Hixon (Biostatistics), B.S., University of Illinois, 1941.

Peregrina C. Labay, B.S. (Ed.), University of St. Thomas, 1947; B.S. (Sci.), 1949; M.D., 1954. (See Department of Surgery)

Lorraine F. Lake, B.S., Washington University, 1950; A.M., 1954; Ph.D., 1962. (See Irene Walter Johnson Institute of Rehabilitation, Department of Anatomy and Neurobiology and Program in Physical Therapy)

Isaias Spilberg, B.S., University of San Marcos, 1956; M.D., 1963. (See Department of Medicine) (Starkloff Hospital)

Stuart W. Weidman, A.B., Washington University, 1957; M.A., 1963; Ph.D., University of Chicago, 1965. (See Department of Biological Chemistry)

William W. Winder, B.S., Brigham Young University, 1966; Ph.D., 1971.

Joseph L. Witztum, A.B., Vanderbilt University, 1965; M.D., Washington University, 1969. (See Department of Medicine)

Instructors

Mary L. Cope (Physical Therapy), B.S., Washington University, 1969.

Patricia A. Csengody (Physical Therapy), B.S., St. Louis University, 1970; M.Ed., University of Missouri, St. Louis, 1975.

Kathleen M. Haralson (Physical Therapy), B.S.P.T., University of Kansas, 1965.

Jacqueline Hartman (Speech Pathology), B.A., Western Reserve University, 1963; A.M., Washington University, 1965. (Also Faculty of Arts and Sciences)

Donna King, B.A., Western Maryland College, 1960; M.S.W., Washington University, 1966. (See Division of Health Care Research)

Carol L. Meador (Occupational Therapy), B.S., Washington University, 1972.

Barbara J. H. Norton (Physical Therapy), B.S.P.T., Washington University, 1966.

Patricia R. Pickett (Nursing and Rehabilitation), B.S.N., Western Reserve University, 1959.

Michael J. Rennie, B.Sc., University of Hull, 1968; M.Sc., University of Manchester, 1970; Ph.D., University of Glasgow.

Shirley Ann Sahrman (Physiology), B.S.P.T., Washington University, 1958; A.M., 1971; Ph.D., 1973. (See Departments of Neurology and Neurological Surgery and Physiology and Biophysics)

Elizabeth A. Stoddard (Rehabilitation), B.S., Montana State University, 1954; M.D., Washington University, 1957. (See Department of Medicine) (Jewish Hospital)

In Sook Sunwoo (Rehabilitation), M.D., Woo Sok University, 1959. (Jewish Hospital)

Research Assistant

Patricia E. Wirth, B.A., University of Nebraska, 1971. (See Division of Health Care Research)

Lecturer

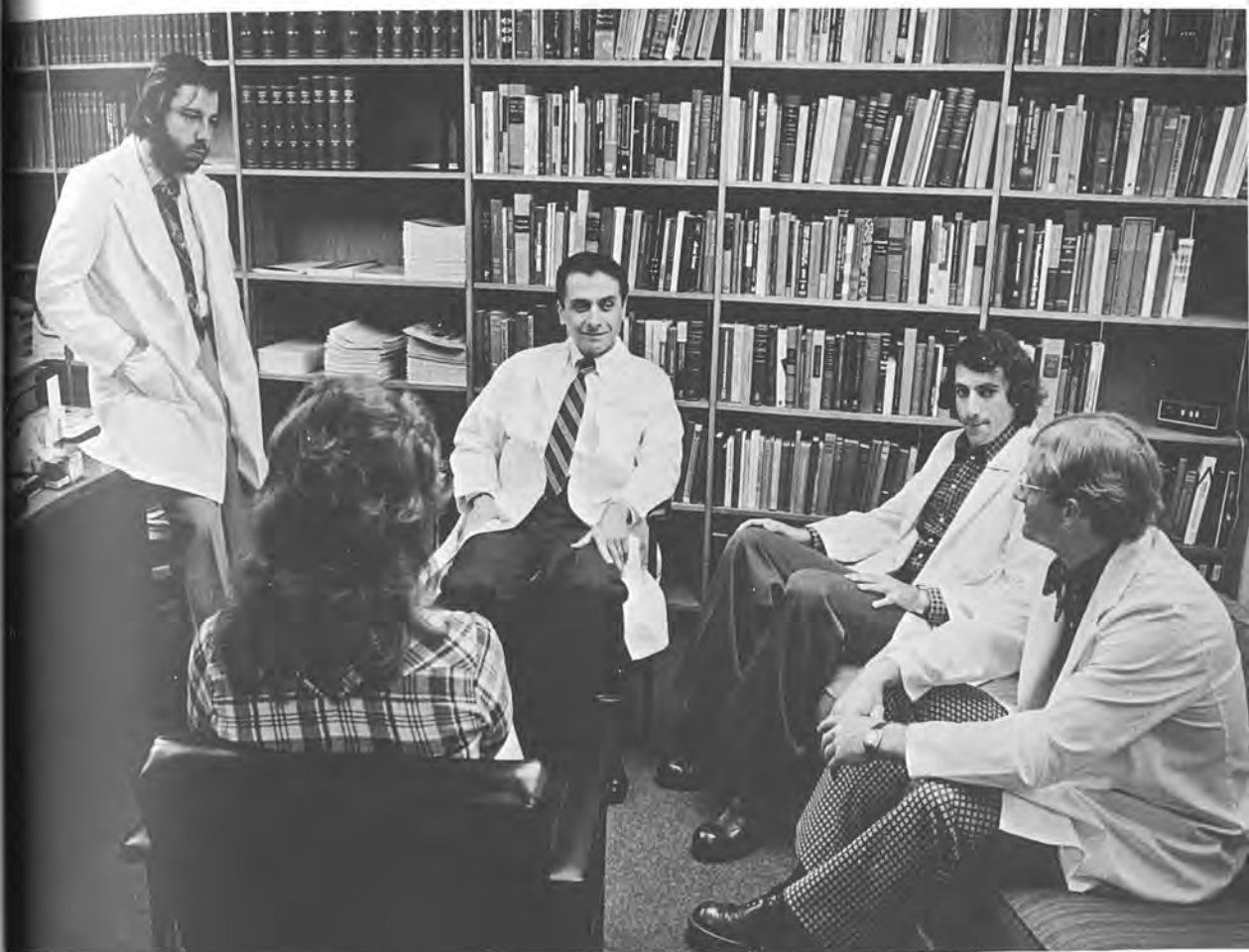
Richard A. Sutter (Industrial Medicine and Rehabilitation), A.B., Washington University, 1931; M.D., 1935.

Miscellaneous

Sven G. Eliasson, Ph.D., University of Lund, 1952; M.D., 1954. (See Department of Neurology and Neurological Surgery and Irene Walter Johnson Institute of Rehabilitation)

Paul M. Weeks, A.B., Duke University, 1954; M.D., University of North Carolina, 1958. (See Department of Surgery and Irene Walter Johnson Institute of Rehabilitation)

Department of Psychiatry



Instruction in psychiatry is given in the last three years of the medical course. Emphasis is on teaching psychiatry as a medical discipline, including the biological, social, and psychological mechanisms and manifestations of psychiatric illness, as well as psychological reactions to other illnesses. Recognition of current limitations of knowledge combined with an appreciation of what is known leads to a spirit of constructive skepticism. This attitude permits the student to study psychiatry in depth and broadly without preconceived theories.

SECOND YEAR

Introduction to Clinical Psychiatry. Empha-

sis is upon (a) effective interviewing in preparation for medical history taking, (b) evaluation of behavioral and emotional factors in patients with various kinds of illnesses, (c) the diagnosis and natural history of the major psychiatric disorders, (d) critical evaluation of conceptual and methodologic problems in psychiatry and psychology. Lectures, demonstration interviews, discussions. (Dr. Murphy and Staff)

THIRD YEAR

Psychiatry Clerkship. Students in groups of about fifteen spend six weeks on the inpatient services of Renard and Bliss Hospitals. (Drs. Reich, Clayton, and Staff)

FOURTH YEAR

Electives

Outpatient and Community Psychiatry. This is a flexible clerkship tailored to the student's interests. Adult psychiatric patients in the Washington University Psychiatric Clinic present a variety of psychological and interpersonal problems similar to those encountered in the office practice of a psychiatrist, an internist, or a family physician. Students have an opportunity to learn a variety of treatment techniques under supervision.

Opportunities are also available for students to obtain experience in drug abuse treatment modalities and programs now available in the metropolitan area. Students can participate in group therapy among adolescent multiple drug abusers, can become adept at drug crisis intervention, can observe encounter-confrontation groups in a self-help drug therapeutic community, or a combination of such programs can be scheduled. Participation in other community psychiatry services is also available, including the County Juvenile Court and various alcohol programs.

Students also manage patients in a community mental health center located in an inner-city area. There, students see how psychiatry works with social agencies, schools, and other institutions utilizing paramedical personnel in the detection and treatment of mental illness. (Dr. Halikas, Ms Smith)

Clinical Psychiatry in a Community Mental Health Center. This elective course provides students with opportunities to become key medical members of psychiatric treatment teams dealing with evaluation of patients in an emergency room, selective admissions of certain cases, diagnosis and management of particular patients. Supervision is provided by the full-time supervising psychiatrist in charge of wards to which the student may be assigned. The student participates in teaching sessions arranged for first year psychiatric residents in training at the Malcolm

Bliss Mental Health Center.

(Drs. M. Herjanic and Tomelleri)

Child Psychiatry, Malcolm Bliss Mental Health Center. This clerkship in child psychiatry gives students an appreciation of the intricacies of diagnosis and treatment of emotionally disturbed children. The course involves working up a small number of pre-adolescent, as well as adolescent, children under the supervision of senior staff members of the child unit at Bliss. Didactic teaching is available, as well as individual



supervision of patients. Students gain an appreciation of both drug treatment and the limitations of drug treatment. They are exposed to the roles of community agencies such as settlement houses, juvenile courts, and various private agencies with whom a child psychiatrist must work. Students also gain appreciation of the roles of nurse, social worker, teacher, and occupational therapist in collaboration with individuals of these disciplines. (Dr. Kusama)

Psychoanalysis. Introduction to psychoanalysis is presented at weekly seminars lasting six consecutive weeks. Some didactic material is given, but most of the session is devoted to discussion. (Dr. Kaplan)

Neurochemistry. This course is given jointly by the Departments of Psychiatry and Pharmacology. Topics covered include carbohydrates; energy metabolism, including changes found in different functional states; amino-acid metabolism and its relation to protein and transmitter synthesis; special proteins and protein metabolism; cerebral lipids, membranes, and normal and disordered lipid metabolism; transmitters and modulators; learning; growth, development, and trophic functions; cerebral blood flow, blood brain barrier.

(Drs. McDougal, B. Moore)

Selected Topics in Research. Students may elect to work full time in psychiatric research at any time during their elective year. Twelve weeks is the minimum time allowed; no maximum time is specified. The arrangements are made on an individual basis with the appropriate investigators.

(Drs. Guze, Clayton, Goodwin, Murphy, Cicero, Hartman, M. Herjanic, B. Herjanic, and Staff)

Spencer T. Olin Professor and Head of Department

Samuel B. Guze, M.D., Washington University, 1945. (See Administration and Department of Medicine)

Wallace Renard Professor

Eli Robins, A.B., Rice University, 1940; M.D., Harvard University, 1943.

Wallace Renard Professor Emeritus

Edwin Francis Gildea, A.B., Colorado College, 1920; M.D., Harvard University, 1924.

Professor Emeritus

Saul Rosenzweig, (Medical Psychology), A.B., Harvard University, 1929; M.A., 1930; Ph.D., 1932. (Also Psychology)

Professors

Paula J. Clayton, B.S., University of Michigan, 1956; M.D., Washington University, 1960.

Donald W. Goodwin, A.B., Baker University, 1953; M.D., Kansas University, 1964.

Blake W. Moore (Biochemistry), B.S., University of Akron, 1948; Ph.D., Northwestern University, 1952. (See Department of Biological Chemistry)

George E. Murphy, B.S., Oregon State College, 1949; M.D., Washington University, 1952.

Lee N. Robins (Sociology), A.B., Radcliffe College, 1942; M.A., 1943; Ph.D., 1951.

William R. Sherman (Biochemistry), A.B., Columbia University, 1951; Ph.D., University of Illinois, 1955. (See Department of Biological Chemistry)

Kathleen Smith, B.S., University of Arkansas, 1944; M.D., Washington University, 1949. (Malcolm Bliss Hospital)

John A. Stern (Psychology), A.B., Hunter College, 1949; M.S., University of Illinois, 1951; Ph.D., 1953. (Also Faculty of Arts and Sciences)

Research Professor

Mitchell Taibleson (Mathematics), S.M., University of Chicago, 1960; Ph.D., 1962. (Also Faculty of Arts and Sciences)

Professor Emeritus (Clinical)

Margaret C. L. Gildea, B.S., University of Chicago, 1923; M.D., Yale University, 1936.

Professor (Clinical)

Richard W. Hudgens, B.A., Princeton University, 1952; M.D., Washington University, 1956.

Associate Professors

Theodore J. Cicero (Neuropharmacology), B.S., Villanova University, 1964; M.S., Purdue University, 1966; Ph.D., 1968. (See Department of Anatomy and Neurobiology)

Boyd K. Hartman, A.B., University of Kansas, 1962; M.D., 1966. (See Department of Anatomy and Neurobiology)

Marijan Herjanic, M.D., Zagreb University, 1956. (Malcolm Bliss Hospital)

James N. McClure, Jr., A.B., Washington University, 1951; M.D., 1955.

John W. Olney, B.A., Iowa University, 1956; M.D., 1963.

Theodore Reich, B.S., McGill University, 1959; M.D., 1963.

Amos Welner, M.D., Hebrew University Hadassah Medical School, 1960.

Research Associate Professor

David J. Pittman (Sociology), A.B., University of North Carolina, 1949; M.A., 1950; Ph.D., University of Chicago, 1956. (Also Social Science Institute)

Associate Professors (Clinical)

John M. Anderson, B.S., Colorado State University, 1938; M.D., Meharry Medical College, 1958. (Malcolm Bliss Hospital)

Robert B. Deitchman, B.A., University of Virginia, 1949; M.D., 1953.

Alex H. Kaplan, B.S., College of City of New York, 1932; M.D., St. Louis University, 1936.

Edward H. Kowert, A.B., Washington University, 1940; M.D., 1943. (Malcolm Bliss Hospital)

Wanda M. Lamb, B.S., University of Missouri, 1946; M.D., Washington University, 1948.

Sydney B. Maughs, A.B., Westminster College, 1931; M.D., Washington University, 1935.

Patricia L. O'Neal, A.B., Washington University, 1944; M.D., 1948.

Ferris N. Pitts, Jr., A.B., Washington University, 1952; M.D., 1955.

Earl R. Schultz, A.B., Southeast Missouri State College, 1952; B.S.Med., University of Missouri, 1953; M.D., Washington University, 1955. (See Department of Neurology and Neurological Surgery)

Frank O. Shobe, A.B., Washington University, 1938; M.D., 1942.

Assistant Professor Emeritus

Lucile Healy (Social Work), A.B., College of St. Catherine, 1922; M.A., University of Minnesota, 1927; M.S.W., Washington University, 1949.

Assistant Professors

James H. Allison, A.B., Kenyon College, 1960; M.D., University of Pittsburgh, 1965.

John T. Biggs, Jr., A.B., Drury College, 1963; M.S., University of Tennessee, 1965; M.D., 1968.

Jane B. Brownstone (Medical Psychology), A.B., Washington University, 1961; A.M., 1964; Ph.D., 1968. (Malcolm Bliss Hospital)

C. Robert Cloninger, B.A., University of Texas, 1966; M.D., Washington University, 1970.

Jack L. Croughan, B.A., University of Kansas, 1964; M.D., Kansas University, 1968.

Plaridel C. Deza, M.D., University of Santo Tomas, 1956. (Malcolm Bliss Hospital)

James A. Halikas, B.S., Brooklyn College, 1962; M.D., Duke University, 1966.

Julian C. Hall (Social Work), B.S., University of Louisville, 1949; M.S., 1951; D.S.W., Washington University, 1968. (Malcolm Bliss Hospital)

John E. Helzer, M.D., University of Utah Medical School, 1967.

Barbara M. Herjanic (Child Psychiatry), B.A., Northwestern University, 1943; B.S., Western Michigan College, 1946; M.D., University of Michigan, 1950. (See Department of Pediatrics)

Haruo Kusama (Child Psychiatry), A.B., Washington University, 1960; M.D., 1965. (Malcolm Bliss Hospital)

Paul M. Packman, A.B., Washington University, 1959; M.D., 1963.

Daniel Pugh, B.A., Carleton College, 1960; M.D., Washington University, 1964. (Malcolm Bliss Hospital)

Elizabeth M. Smith (Social Work), B.A., University of Nebraska, 1960; M.S.W., 1962.

Robert H. Vanderpearl, A.B., Washington University, 1950, M.D., 1954.

Richard D. Wetzel (Medical Psychology), B.A., Concordia College, 1959; B.D., Concordia Seminary, 1963; Ph.D., St. Louis University, 1974.

Research Assistant Professor

Shirley Y. Hill (Neuropsychology), A.B., Grinnell College, 1963; Ph.D., Washington University, 1971.

Paul P. Hipps (Biochemistry), B.S., Lakeland College, 1966; Ph.D., North Dakota State University, 1971.

Assistant Professors (Clinical)

John F. Bergmann, A.B., Washington University, 1950; M.D., 1954.

Robert D. Brookes, A.B., DePauw University, 1934; M.D., Washington University, 1938.

Alan G. Craig, M.D. (MB., Ch.B.), Aberdeen University, 1951.

Hyman H. Fingert, B.A., State University of Iowa, 1931; M.D., 1934.

James N. Haddock, A.B., University of Missouri, 1940; M.A., 1942; M.D., Washington University, 1943.

Robert S. Hicks, A.B., Hendrix College, 1951; M.D., University of Arkansas, 1958.

R. Eugene Holemon, A.B., Washington University, 1954; M.D., 1958.

Joe E. McKinney, B.A., Westminster College, 1954; M.D., Washington University, 1958.

Marie O. Mowrer, A.B., Southern Illinois University, 1947; B.S., University of Illinois, 1949; M.D., 1951.

Marcel T. Saghir, B.Sc., American University of Beirut, 1959; M.D., 1963.

Jorge A. Viamontes, M.D., Havana University, 1948; Ph.D., Ignacio Agramonte University, 1957. (Malcolm Bliss Hospital)

Harold D. Wolff, A.B., Washington University, 1952; B.S., University of Missouri, 1953; M.D., State University of Iowa, 1955.

Instructors

Bernardo G. Aleksander, M.D., University of

Buenos Aires, 1959. (Malcolm Bliss Hospital)

Alma Apostol, A.A., University of Santo Tomas, 1952; M.D., 1961. (Malcolm Bliss Hospital)

Michael D. Bieri, B.A., University of Kansas, 1968; M.D., Washington University, 1972. (Malcolm Bliss Hospital)

Anna K. Bradley (Social Work), B.J., University of Missouri, 1956; M.S.W., Washington University, 1958. (Malcolm Bliss Hospital)

Lincoln B. Calvin (Child Psychiatry), B.Ed., Illinois State University, 1942; M.D., Meharry Medical College, 1951. (Malcolm Bliss Hospital)

Marguerite Cannon (Social Work), B.S., St. Louis University, 1936; M.S.W., Washington University, 1948.

Sei Young Choi, B.S., Woo Sok University, 1951; M.D., 1963. (Malcolm Bliss Hospital)

Felipe Crimi, M.D., National University of Cordoba, 1946. (Malcolm Bliss Hospital)

Earl P. Dick, A.B., Central College, 1961; M.D., Baylor College, 1966. (Also School of Law) (Malcolm Bliss Hospital)

Eduardo A. Garcia-Ferrer, M.D., Havana University, 1952. (Malcolm Bliss Hospital)

Fred W. Gaskin, B.S., University of Minnesota, 1966; M.D., 1968. (Malcolm Bliss Hospital)

Clifford Gilpin, S.B., University of Chicago, 1945; M.D., 1948. (Malcolm Bliss Hospital)

Jose A. Gutierrez, B.S., Colegio San Roque, 1960; M.D., Universidad de Cartagena, 1967. (Malcolm Bliss Hospital)

Ali Kashfi-Lari (Child Psychiatry), M.D., University of Teheran, 1965. (Malcolm Bliss Hospital)

Natarajan Lakshminarayanan, M.B., University of Madras, 1960; M.S., 1960; M.D., 1967. (Malcolm Bliss Hospital)

Ronald L. Martin, B.A., Northwestern University, 1967; M.D., 1971.

Gustavo A. Martinez-Okrassa, M.D., Universidad de San Carlos de Guatemala, 1958. (Malcolm Bliss Hospital)

John F. Mueller (Social Work), B.S., Washington University, 1947; M.S.W., 1952. (Malcolm Bliss Hospital)

Ronald A. Oliver (Medical Psychology), B.A., University of Rhode Island, 1968; M.A., Xavier University, 1970; Ph.D., Iowa State University, 1973. (Malcolm Bliss Hospital)

Earni Pal, M.B.B.S., Andhra University, 1965. (Malcolm Bliss Hospital)

Lourdes Pineda (Child Psychiatry), B.A., University of the Philippines, 1962; M.D., 1967. (Malcolm Bliss Hospital)

Diana L. Richards (Medical Psychology), B.A., University of Colorado, 1966; M.A., Miami University, 1969; Ph.D., 1974. (Malcolm Bliss Hospital)

Howard E. Rogers (Medical Psychology), B.A., New York City College, 1960; M.A., Los Angeles State College, 1963; Ph.D., Arizona State University, 1969. (Malcolm Bliss Hospital)

John Sweet, B.A., University of Michigan, 1964; M.D., University of Missouri, 1968. (Malcolm Bliss Hospital)

Carlos Tomelleri, B.A., Colegio San Jose, 1955; M.D., Universidad Javeriana, 1965. (Malcolm Bliss Hospital)

Jaime Vargas, M.D., National University of Colombia, 1954. (Malcolm Bliss Hospital)

Gary M. Vickar, B.A., University of Manitoba, 1967; M.D., 1971. (Malcolm Bliss Hospital)

Zila Welner (Child Psychiatry), M.D., Hebrew University Hadassah Medical School, 1961. (Malcolm Bliss Hospital)

Eliza E. Wochnik (Child Psychiatry), M.D., Medical Academy of Warsaw, 1962. (Malcolm Bliss Hospital)

Vincent E. Ziegler, B.S., Xavier University, 1968; University of Kentucky, 1972.

Research Instructors

Thomas M. Badger (Biochemistry), B.A., University of California, 1968; M.A., University of Missouri, 1970; Ph.D., 1973.

Juanita L. Carl (Biochemistry), B.S., Drury College, 1959; A.M., Washington University, 1962.

Philip M. Fishman (Computer Sciences), B.S., Brooklyn College, 1964; M.S., New York University, 1969; Ph.D., Washington University, 1974.

Robert Goldstein (Medical Psychology), B.A., City College of New York, 1954; Ph.D., Uni-



versity of Illinois, 1962. (Also Faculty of Arts and Sciences) (Malcolm Bliss Hospital)

William H. Holland (Electronics), A.B., Washington University, 1950. (See Department of Biological Chemistry)

Madelon T. Price (Biochemistry), A.B., Washington University, 1953; Ph.D., 1973.

Patricia A. West (Sociology), B.S., Memphis State University, 1967; M.A., 1969; Ph.D., St. Louis University, 1975.

Instructors Emeriti (Clinical)

Robert M. Bell, M.D., St. Louis University, 1928.

Barbara S. Kendall (Medical Psychology), A.B., Radcliffe College, 1913; Ed.M., Harvard University, 1928.

Instructors (Clinical)

Libby G. Bass (Medical Psychology), B.A., University of Illinois, 1928; M.A., Northwestern University, 1929.

William W. Clendenin, M.D., University of Tennessee College of Medicine, 1963.

William Cone, B.A., Yale University, 1949; M.D., 1954.

Juan C. Corvalan, M.D., Argentina National University, 1965. (Malcolm Bliss Hospital)

Edmund V. Cowdry, Jr., A.B., Princeton University, 1942; M.D., Washington University, 1945. (On leave of absence)

Mary E. Cox, A.B., Washington University, 1941; M.D., 1944.

Alejandro M. Datuin, A.A., University of Santo Tomas, 1951; M.D., 1956. (Malcolm Bliss Hospital)

Mary Davis, B.A., Ohio State University, 1947; M.D., Washington University, 1952.

George H. Dowell, B.A., Amherst College, 1960; M.D., Washington University, 1969.

Anthony L. Ferro, M.D., Havana University, 1949 (Malcolm Bliss Hospital)

Wilbur H. Gearhart, B.S., Butler University, 1949; M.D., Hahnemann Medical College, 1950.

Jay A. Liss, A.B., Washington University, 1962; M.D., 1966.

Maria E. Manion (Child Psychiatry), M.D., University of Buenos Aires, 1961. (Malcolm Bliss Hospital)

Elizabeth Mann, B.S., Valparaiso University, 1966; M.D., St. Louis University, 1970.

John H. McMahan, A.B., Southeast Missouri State Teachers College, 1939; M.D., St. Louis University, 1943.

Jay Meyer, A.B., Washington University, 1956; M.D., St. Louis University, 1960.

Jackson C. Neavles, A.B., Washington University, 1938; B.S.Med.Sci., 1942; M.D., 1942.

Reese H. Potter, A.B., University of Kansas, 1931; B.S., University of Missouri, 1933; M.D., Washington University, 1935.

Thomas F. Richardson, B.A., Millikin University, 1959; M.D., Washington University, 1963.

Nathan M. Simon, B.S., Yale University, 1949; M.S., 1950; M.D., Washington University, 1955.

James B. Smith, A.B., University of Missouri, 1963; M.D., 1967.

Narendir Soorya (Child Psychiatry), M.D., Dow Medical College, 1964. (Malcolm Bliss Hospital)

Alberto Soto, B.S., Instituto de Santiago, 1951; M.D., Havana University, 1960.

Edwin D. Wolfram, B.A., State University of Iowa, 1954; M.D., 1959.

Department of Radiology



The Department of Radiology occupies the Edward Mallinckrodt Institute of Radiology and provides diagnostic radiology, nuclear medicine, and radiation oncology services to Barnes and St. Louis Children's hospitals. It connects by corridor and tunnel with Barnes, St. Louis Children's, East Pavilion, Wohl, Barnard, and Renard hospitals, Queeny Tower, and the Washington University Clinic.

Clinical facilities for the Division of Radiation Oncology are located on the ground floor of the Institute and in Barnard Hospital. The therapy equipment consists of an

advanced 35 MeV linear accelerator, 24 MeV Betatron, 4 MeV linear accelerator, and Cobalt 60 therapy. There are also facilities and an ample stock of Cesium 137 sources for both interstitial and intracavitary therapy. The first floor of the Institute houses administrative and business offices, film library, consulting viewing rooms, and the 135-seat Scarpellino Auditorium.

Diagnostic radiology facilities are located on the second floor (chest, musculoskeletal radiology, mammography, and whole body computerized tomography), third floor (two cardiac catheterization laboratories, two

head computerized tomography facilities, and special neuroradiological and vascular radiological equipment), fourth floor (gastrointestinal and genitourinary radiology), and the fifth floor (pediatric radiology).

The sixth floor contains the Division of Radiation Sciences, which also utilizes the medical cyclotron in Barnard Hospital. Nuclear Medicine is also located on this floor and in the adjoining Barnard Hospital. Research facilities are located on the seventh floor (nuclear medicine and cancer biology), ninth floor (diagnostic radiology) and tenth floor (cancer biology).

Administrative, teaching, and support functions occupy the eighth and eleventh floors. The twelfth floor has recently been completed in order to develop modern computer facilities for clinical, research, and teaching use.

The undergraduate teaching program is designed to present both diagnostic and therapeutic radiology to students as part of the clinical clerkship experience. Every effort is made to provide an opportunity to correlate roentgen and clinical findings through interdepartmental conferences, consultations, and group discussions. The thirteen floors of the Mallinckrodt Institute are utilized for the following academic activities.

SECOND YEAR

Twenty-two hours of lecture devoted to diagnosis. Twelve hours of lecture devoted to radiation physics, radiation biology, radiation therapy, and nuclear medicine.

Electives

Research Electives. Opportunity is available to carry out research in the laboratories under the guidance of the staff in the fields of diagnostic radiology, therapeutic radiology, radiation physics, nuclear medicine, and radiation biology.

SUMMER ELECTIVE FOR FRESHMAN STUDENTS

A ten-week summer clerkship program is available for freshman medical and dental students. The students participate in the clinical activities of the Division of Radiation Oncology and are exposed to the fundamental concepts of cancer biology and clinical radiation therapy in a series of lectures, seminars, and case presentation conferences. They have the opportunity to conduct some laboratory research or clinical investigation under the direction of the staff members of the sections of Clinical Radiation Oncology and Cancer Biology.

(Drs. Lee or Stewart)

CANCER BIOLOGY PROGRAM

The section of cancer biology provides a twelve-week (full time) oncology training program in even-numbered years beginning in January. A series of laboratory exercises, with emphasis on quantitative cellular cancer biology, constitutes the major portion of this course. Experiments in tissue culture systems and in mice have been chosen to emphasize aspects of oncology important in the understanding of cancer biology and in its application for optimal cancer therapy. A number of concepts necessary to the understanding of tumor biology and cancer therapy are presented through three sets of formal lectures: radiation biology; cellular kinetics of normal and tumor tissues; and the biochemical, cellular, and clinical action of anti-cancer drugs. Each set consists of approximately twenty one-hour lectures. In addition, an informal seminar series will be presented to include topics in molecular biology, cell biology, immunology, virology, statistics, and instrumentation.

(Dr. Valeriote)

FOURTH-YEAR ELECTIVES

Clerkship in Radiation Oncology. Six-week elective in which the student has the opportunity to see patients being evaluated and

treated in Radiation Therapy. Emphasis is on techniques of cancer diagnosis and localization, selection of therapy, indications for irradiation and techniques on treatment planning, simulation and irradiation of a variety of tumors. There are several conferences in which the students participate, including new case planning conferences, clinical physics conference, protocol conference, and interdepartmental conferences with the departments of Pediatrics, Obstetrics and Gynecology, Surgery, and Pathology. (Drs. Marks or Perez)

Clerkship in Diagnostic Radiology. A six-week elective in which approximately half of the student's time will be spent attending lectures, seminars, and conferences emphasizing the principles of general radiology, including film interpretation and the role of radiology in the solution of clinical diagnostic problems. The remaining time will be divided between elective periods on subspecialty rotations within the Department (thoracic, abdominal, musculoskeletal, neurologic, pediatric, nuclear medicine, radiation therapy) under the direct supervision of a senior faculty member. The student will be exposed to the daily workload of a subspecialty radiologist, and have an opportunity to observe the appropriate diagnostic and therapeutic procedures in each section. (Dr. Gilula)

Clerkship in Clinical Nuclear Medicine. A six-week elective in which the student will be exposed to the full range of techniques including organ imaging with radionuclides, nuclear hematology, *in vitro* tests, and radionuclide therapy. The student will be responsible for planning appropriate isotope studies in patients referred to the department in conjunction with the staff. Opportunity exists to learn instrumental techniques, including newer ones such as computer applications. Participation in clinical and laboratory research projects may also be arranged if desirable. There are daily conferences and scan interpretation sessions. (Dr. Siegel)

Elizabeth E. Mallinckrodt Professor and Head of Department and Director of the Mallinckrodt Institute of Radiology

Ronald G. Evans, A.B., Washington University, 1961; M.D., 1964.

Professor Emeritus

Hugh M. Wilson, A.B., Illinois College, 1924; M.D., Washington University, 1927; M.A. (hon.), Yale University, 1945.

Professors

William H. McAlister, B.S., Wayne State University, 1950; M.D., 1954. (See Department of Pediatrics)

Carlos A. Perez, B.S., University of Antioquia, 1952; M.D., 1960.

Michel M. Ter-Pogossian (Radiation Sciences), B.A., University of Paris, 1943; M.S., Washington University, 1948; Ph.D., 1950. (Also School of Engineering and Applied Science)

Leonard J. Tolmach (Radiation Biology), B.S., University of Michigan, 1943; Ph.D., University of Chicago, 1951. (See Department of Anatomy and Neurobiology)

Michael J. Welch (Radiation Chemistry), B.A., Cambridge University, 1961; M.A., 1964; Ph.D., University of London, 1965. (Also Faculty of Arts and Sciences)

Associate Professors

John O. Eichling (Radiation Sciences), B.S., Northeastern Oklahoma State College, 1958; M.S., Oklahoma State University, 1959; Ph.D., Washington University, 1970.

Mokhtar Gado, M.B., B.Ch., Cairo University, 1953; DMRE, 1960.

G. Leland Melson, B.A., Ottawa University, 1961; M.D., Washington University, 1965.

Marcus E. Raichle (Radiation Sciences), B.S., University of Washington, 1960; M.D., 1964. (See Department of Neurology and Neurological Surgery)

Stuart S. Sagel, B.A., Temple University, 1961; M.D., 1965.

Barry A. Siegel, A.B., Washington University, 1965; M.D., 1969.

Robert J. Stanley, B.S., St. Peter's College, 1959; M.D., St. Louis University, 1963.

Frederick A. Valeriote (Cancer Biology), B.S.,

University of Toronto, 1962; M.A., 1964; Ph.D., 1966.

Teresa J. Vietti (Radiation Oncology), A.B., Rice University, 1949; M.D., Baylor University, 1953. (See Department of Pediatrics)

Associate Professors Emeriti (Clinical)

William E. Allen, Jr., B.S., Howard University, 1927; M.D., 1930.

A. Norman Arneson, B.S., Texas Christian University, 1924; M.D., Washington University, 1928. (See Department of Obstetrics and Gynecology)

Associate Professors (Clinical)

Mark D. Eagleton, Jr., A.B., Amherst College, 1947; M.D., Washington University, 1950.

John V. Forrest, B.A., University of Notre Dame, 1962; M.D., State University of New York, Downstate Medical Center, 1966.

Sumner Holtz, M.D., St. Louis University, 1948.

Hyman R. Senturia, A.B., Washington University, 1929; M.D., 1933.

Assistant Professors

Fransiska L. Brigham, A.B., Washington University, 1962; M.D., 1966.

Guillermo C. Geisse, B.A., University of Chile, 1957; M.D., 1965.

Louis A. Gilula, M.D., University of Illinois, 1967.

Robert L. Grubb, Jr. (Radiation Sciences), A.B., University of North Carolina, 1961; M.D., 1965. (See Department of Neurology and Neurological Surgery)

Rexford L. Hill (Computer Sciences), B.S., University of Cincinnati, 1964; M.S., 1966. (See Biomedical Computer Laboratory)

Donald V. Huebener (Dental Medicine), D.D.S., Washington University, 1969. (Also School of Dental Medicine)

R. Gilbert Jost, A.B., Harvard College, 1964; M.D., Yale University, 1969.

Hsiu-san Lin (Cancer Biology), M.D., Taiwan University, 1960; Ph.D., University of Chicago, 1968. (See Department of Microbiology and Immunology)

Philip R. Ludbrook, M.B., B.S., University of Adelaide, 1963. (See Department of Medicine)

James E. Marks, A.B., Knox College, 1961; M.D., Washington University, 1965.

Robert C. McKnight, B.S., Florida State University, 1957; M.D., Washington University, 1961. (See Department of Medicine)

Gaellan McIlmoyle, M.D., University of Toronto, 1968.

William B. Mill, Jr., M.D., University of Tennessee, 1962.

Alexander N. Nakeff (Cancer Biology), B.S., University of Toronto, 1962; M.S., 1965; Ph.D., University of Rochester, 1969.

Lily A. Palmer-Hanes, B.S., University of Denver, 1957; M.D., Washington University, 1960.

James A. Purdy (Radiation Physics), B.S., Lamar University, 1967; M.A., University of Texas, 1969; Ph.D., 1971.

Donald P. Ragan (Radiation Physics), B.A., New Mexico State University, 1967; M.A., Washington University, 1969; Ph.D., 1972.

Aly A. Razek, M.B., B.Ch., Cairo University,



1963; M.D., 1969.

Fedrico Reiter, B.H., University of Chile, 1957; M.D., 1964.

Gary D. Shackelford, B.A., Northwestern University, 1964; M.D., Washington University, 1968. (See Department of Pediatrics)

Emily L. Smith, A.B., Washington University, 1964; M.D., 1968.

Palmer G. Steward (Cancer Biology), B.A., Haverford College, 1959; M.S., University of California, 1964; Ph.D., 1968.

Carleton C. Stewart (Cancer Biology), B.A., Hartwick College, 1962; M.S., University of Rochester, 1964; Ph.D., 1967.

Bruce J. Walz, A.B., Washington University, 1962; M.D., 1966.

Research Assistant Professor

John F. Harwig (Nuclear Medicine), B.A., Knox College, 1967; Ph.D., Washington University, 1973.

Assistant Professor Emeritus (Clinical)

Oscar C. Zink, M.D., Washington University, 1921.

Assistant Professors (Clinical)

Enrique Cubillo, M.D., University of Madrid, 1962.

James W. Debnam, Jr., B.A., University of Louisville, 1958; M.D., 1962.

Allan H. McCown, B.S., University of Idaho, 1962; M.D., Washington University, 1964.

Arthur A. Porporis, A.B., Washington University, 1946; M.D., 1948.

Wayne A. Simril, A.B., Culver-Stockton College, 1941; M.D., Washington University, 1944.

Noah Susman, A.B., Washington University, 1948; M.D., 1952. (Jewish Hospital)

Instructors

W. Bob Davis, B.A., Drew University, 1967; M.D., Meharry Medical College, 1971.

Mark B. Edelstein (Cancer Biology), B.A., University of Wisconsin, 1970; M.D., Washington University, 1975; Ph.D., 1975.

Thomas R. Fuller, Jr., A.B., Duke University, 1968; M.D., Vanderbilt University, 1972.

Glenn P. Glasgow (Radiation Physics), B.S., Western Kentucky State College, 1965; M.S., University of Kentucky, 1969; Ph.D., 1974.

Isidro L. Huete, B.A., St. Louis College, 1960; M.D., University of Chile, 1969.

Javad Jamshidnejad, M.D., Tehran University Medical School, 1966.



Premalal Gukhool, H.S.C., Mauritius College, 1964; M.D., Glasgow University, 1971.

Robert G. Levitt, B.A., University of California, 1968; M.D., 1972.

H. Lynn Magill, B.S., Northwestern University, 1966; M.D., 1970.

Adel G. Mattar, M.B., Ch.B., Ain-Shams University, 1964.

Michael A. Mikhael, M.B., Ch.B., Alexandria University, 1959.

William A. Murphy, Jr., B.S., University of Pittsburgh, 1966; M.D., Pennsylvania State University, 1971.

Carlos V. Rozenbom, M.D., University of Buenos Aires, 1969.

Philip R. Shalen, B.A., Alfred University, 1964; M.D., New York Medical College, 1968.

Donald E. Velkley (Radiation Physics), B.S., University of Kentucky, 1963; Ph.D., 1968.

Frederick R. Zivnuska, B.S., St. Procopius College, 1961; M.S., Marquette University, 1964; M.D., University of Wisconsin, 1970.

Instructors (Clinical)

Charles L. Abramson, A.B., New York University, 1957; M.D., University of Basel, 1963.

John L. Bardsley, B.A., University of Illinois, 1961; M.D., 1964.

Edward Cohen, A.B., Washington University, 1961; M.D., University of Missouri, 1969.

Beauvoir H. Edmond, B.S., Lycee Petion, 1949; M.D., University of Haiti, 1955.

Albert E. Hesker, A.B., University of Missouri, 1961; M.D., 1964.

Lawrence M. Kotner, Jr., B.A., Washington University, 1965; M.D., 1968.

Harold G. Kunz, A.B., Cornell University, 1961; M.D., 1965.

MacDonald B. Logie, B.S., Northwestern University, 1965; M.D., 1967.

Ben R. Mayes, Jr., B.A., Vanderbilt University, 1962; M.D., Washington University, 1966.

Gary T. Ratkin, B.A., Rice University, 1963; M.D., Washington University, 1967.

Gerald L. Shaikun, B.S., University of Kentucky, 1960; M.D., University of Chicago, 1964.

Gene W. Spector, B.A., Amherst College, 1954;

M.D., Yale University, 1959.

T. K. Youssef, M.D., Ein-Shams University, 1960.

Research Associates

Karen B. Brandt, B.A., St. Olaf College, 1968; M.S., University of Iowa, 1971; Ph.D., 1974.

Peter A. Parrino, B.S.E.E., Worcester Polytechnic Institute, 1962; M.S.E., Pennsylvania State College, 1970.

Bantwal R. Rao, B.S., University of Madras, 1957; M.S., University of Baroda, 1962; Ph.D., State University of Utrecht, 1967.

Giovanni R. Santelli, Ph.D., Bologna University, 1969.

Maria G. Straatmann, B.A., St. Mary College, 1970.

Madhukar L. Thakur, B.Sc., University of Bombay, 1961; M.Sc., University of London, 1969; Ph.D., 1973.

Research Assistants

Sylvia S. Harwig, B.S., Chinese University of Hong Kong, 1966; A.M., Washington University, 1970.

Julius Hecht, A.B., Washington University, 1950.

Carol Higgins, A.B., Georgia State University, 1969.

Robert W. Jones, B.A., University of Missouri, 1965.

Lecturer

Armand Diaz (Radiologic Technology), R.N., R.T., Havana University School of Medicine, 1948. (See Program in Radiologic Technology)

Consultants

Arthur L. Hughes (Physics), B.Sc., Liverpool University, 1906; M.Sc., 1908; D.Sc., 1912; B.A., Cambridge University, 1910.

Edward H. Reinhard (Hematology and Oncology), A.B., Washington University, 1935; M.D., 1939. (See Department of Medicine)

Mildred Trotter (Anatomy), A.B., Mount Holyoke College, 1920; Sc.M., Washington University, 1921; Ph.D., 1924; Sc.D., (hon.), Western College, 1956; Sc.D. (hon.), Mount Holyoke College, 1960. (See Department of Anatomy and Neurobiology)

Mary Culver Department of Surgery



The Department of Surgery includes general surgery, plastic and reconstructive surgery, orthopedic surgery, genitourinary surgery, cardiothoracic surgery, and pediatric surgery.

An elective course in basic emergency care is offered in the freshman year. The formal instruction begins in the second year with an introduction to surgical principles. For the most part, these surgical principles are derived from fundamental concepts in the preclinical sciences which have been occupying the student since the beginning of the freshman year. Although in this course a few patients are used for the demonstration of

lesions which illustrate the principles of surgery, it is in the junior year that the first personal contact with patients occurs. Students in the third year are assigned to general surgical clinical clerkships in the hospitals, where they have an opportunity to study the frequent and important surgical diseases.

The junior surgical clerkship, lasting twelve weeks, is spent on the surgical services of the Medical Center and allied hospitals. Students attend patient rounds with residents and staff daily during the clerkship and attend seminars conducted by the general and

specialty surgical staffs.

Students are encouraged to attend and assist at operations upon patients assigned to them. The physiology, pathology, chemistry, and bacteriology and pre- and post-operative care are stressed. Experience is acquired in surgical diagnosis and in the use of scientific methods that permit students to assess the effectiveness of what they do.

The fourth-year surgical program permits the senior student to select any of the following types of electives for periods of six to eighteen weeks: (1) sub-internships and preceptorships in which the student is assigned to a staff member for instruction and exposure to the problems of clinical practice, (2) surgical research under supervision (minimum time twelve weeks), (3) electives in pediatric surgery, thoracic and cardiac surgery, plastic and reconstructive surgery, orthopedics, neurosurgery, urology, oncology, transplantation, and emergency room surgery.

SECOND YEAR

Introduction to Surgery. Panel discussions present certain fundamental principles of physiology, biochemistry, and pathology as applied to surgery. Recitations and demonstrations are included. Two hours weekly for eighteen weeks during the second and third trimesters of the second year.

THIRD YEAR

Surgical Wards. For twelve weeks the students serve as clerks in surgery, working on the wards of the hospitals of the Medical Center. Students take case histories and make the physical examinations and the usual laboratory examinations on the patients assigned to them. They are assigned patients with diseases treated by both surgical specialists and general surgeons. They assist at operations and do some surgical dressings. Surgical pathological material is followed as an integral part of the case

study. At regular intervals the students meet with residents and attending staff in informal conferences, when questions which have arisen during the day are discussed and various aspects of the care of the patient considered. In addition, the material is presented to students in small discussion groups with their preceptors. They follow their patients after discharge in the postoperative and outpatient clinic. Particular effort is made to see that students have some experience with the more frequent and important surgical lesions, and that the assigned cases are sufficiently diversified to afford an accurate perspective of surgery. Students are encouraged to consult the library frequently in the solution of problems concerning patients. One afternoon a week students participate in the tumor clinic and attend a tumor conference held jointly by the departments of Surgery, Pathology, and Radiology. Students may attend a variety of other scheduled conferences conducted by the various divisions of the Department. Finally, by rotation, students spend time in the emergency room, where they function under the supervision of house staff and attendings.

FOURTH YEAR

The electives offered to senior students are principally clinical sub-internships or research.

Surgical Preceptorships and Sub-internships. Each student is assigned to a carefully selected senior general surgeon. The student sees patients in the surgeon's office, takes histories, performs physical examinations on the patients, and follows them in the hospital. The student is expected to attend the surgeon's office hours, operate with him, and make rounds with him. Reading assignments are evaluated by the surgeon to whom the student is assigned. Projects of a clinical nature may be undertaken during this preceptorship. Sub-internships are offered at Barnes, Starkloff, Jewish and St. Luke's hospitals, where the student acts as an intern

under the guidance of the senior staff.

(Dr. Ballinger and Staff)

Surgical Research Elective. This elective introduces the student to the general approach to analyzing clinical problems of surgery in the laboratory and to familiarize him with some of the investigative methods in surgery. In general, the student gains more experience by working with an established investigator on a current project. The student is encouraged, however, to plan and execute a laboratory solution to a specific problem within the limitations of his elective time. The student participates in the weekly departmental research seminars, where investigators describe a wide range of current topics.

(Dr. Ballinger and Staff)

Pediatric Surgery Elective. Emphasis is placed on the different problems this age group presents in respect to type of surgical diseases and their care. In addition to the daily ward rounds, conferences are arranged twice a week to discuss the etiology, diagnosis, and treatment of disorders that have not been encountered on the ward. The student also attends the general surgery pediatric clinic, where he participates in postoperative follow-up of patients. Once a week the student attends the pediatric oncology clinic. Pertinent pediatric X-ray films are reviewed regularly.

(Dr. Ternberg and Staff)

Principles of Thoracic and Cardiac Surgery. Two avenues are available which may be mixed. The first involves a clinical rotation on cardiothoracic surgical service where the student will be assigned duties comparable to that of an intern. They will share night call under supervision of the first- and second-year residents in rotation with the ward interns. They will have the prerogative of selection of operative cases on which to scrub and are at liberty to spend time within the cardiac catheterization laboratory, with members of the cardiopulmonary bypass team, or on any particular problem of acute pulmonary or hemodynamic nature in the

intensive care unit. The second alternative is 6 weeks in the laboratory working on on-going projects having to do with ischemic heart disease and a myocardial infarction model, prosthetic heart valves, perfusion techniques for infants and the studies of the pulmonary micro-circulation. Individual meetings with Drs. Weldon and Clark or both are available on a weekly basis.

(Dr. Weldon and Staff)

Plastic and Reconstructive Surgery Preceptorship. The aim of this elective is to familiarize the student with some of the problems in plastic and reconstructive surgery. The student has an opportunity to discuss the application of principles of tissue repair to a variety of surgical conditions, including burns and other forms of trauma, and major soft tissue injury associated with cancer surgery. There is a constant personal relationship between the student and the attending staff during the period.

(Dr. Weeks and Staff)



Orthopedic Surgery Elective. Clinical clerkship electives are available for six weeks, during which time the student attends conferences and outpatient clinics and serves in the various orthopedic clinical divisions. The Orthopedic Service does not have interns, and medical students electing this clerkship serve as an active and integral part of the team.
(Dr. Stein and Staff)

Urology Elective. A six-week clinical clerkship offers the interested student an adequate knowledge of the type of problems with which the clinical urologist deals. The student is taught the basic diagnostic procedures and the management of surgical and nonsurgical patients on both the private and ward services under the supervision of the attending staff and house officers. The experience involves direct care of patients in the clinics, as well as the urologic admissions to the hospital. Daily morning and evening rounds of all patients on a particular service are conducted by the responsible resident. Two additional teaching rounds for the house staff and students are held weekly. In addition, the student attends daily X-ray conferences, the weekly staff conference, and the pathology conference and journal club conducted every other week. The student is given an opportunity to assist in open and endoscopic surgery, as well as in the various diagnostic procedures performed in the cystoscopy and urography section.
(Dr. Fair and Staff)

Oncology Elective. Students electing to study the theoretical and practical aspects of the epidemiology, diagnosis, treatment, and prognosis of neoplastic diseases in man may select a program (subject to the approval of the Tumor Committee) which includes interdepartmental experience in several of the following areas of knowledge:

1. Surgical Pathology of Neoplasms.
(Dr. Bauer)
2. Surgical Pathology of Gynecologic Neoplasms.
(Dr. Dehner)



3. Neoplasms in children (Dr. Vietti)
4. Head and Neck Cancer. (Dr. Ogura)
5. Radiation Therapy of Neoplasms.
(Dr. Powers)
6. Hematologic Neoplastic Disease.
(Dr. Reinhard)
7. Chemotherapy of Solid Tumors.
(Dr. Philpott)

All students attending the oncology elective will be expected to attend the tumor, gyn cancer, ENT tumor, and neoplastic hematology conferences, as well as the cancer workshop.

Each student taking an elective in oncology must select (or be assigned) a problem for study in this field. Each student is expected to report to his peers and instructors on the selected subject at the end of the elective period. Members of the Tumor Committee evaluate the report, as well as the student's performance during the elective.

(Drs. Bauer, Philpott, and Staff)

Transplantation Elective. This orientation course is designed to offer the student an overview of the entire field of organ transplantation. The student is an integral part of the renal transplantation team and assumes appropriate responsibilities under supervision. (Dr. Anderson and Staff)

Emergency Room Elective. The student participates actively under supervision in the emergency services of the St. Louis County Hospital. In addition, he attends formal lectures, seminars, and radiology and EKG conferences to further his training in emergency medicine. (Dr. Klippel and Staff)



Bixby Professor of Surgery and Head of Department

Walter F. Ballinger, M.D., University of Pennsylvania, 1948.

Harry Edison Professor of Surgery

Gordon W. Philpott, B.S., Yale University, 1957; M.D., Washington University, 1961. (Jewish Hospital) (Cancer Coordinator and Director, Division of Tumor Services)

Professors

Harvey R. Butcher, Jr., A.B., Central College, 1941; M.D., Harvard University, 1944.

John A. Collins, A.B., Fordham University, 1955; M.D., Columbia University, 1959.

William T. Newton, B.S., Yale University, 1947; M.D., 1950. (Head, Washington University Surgical Service, St. Louis V.A. Hospitals)

Professor Emeritus (Clinical)

Eugene M. Bricker, M.D., Washington University, 1934.

Associate Professors

Carl E. Lischer, A.B., University of California, 1933; M.D., Washington University, 1937.

Associate Professors Emeriti (Clinical)

Robert W. Bartlett, B.S., University of Michigan, 1926; M.D., 1930.

J. G. Probst, M.D., Loyola University, 1917.

Franklin E. Walton, B.S., Shurtleff College, 1923; M.D., Washington University, 1927; Sc.D. (hon.), Shurtleff College, 1952.

Associate Professors (Clinical)

Ralph J. Graff, A.B., Washington University, 1957; M.D., 1957. (See Department of Microbiology and Immunology)

Heinz Haffner, B.S., University of Arizona, 1931; M.D., Washington University, 1935.

Falls B. Hershey, B.S., University of Illinois, 1939; M.D., Harvard University, 1943.

C. Alan McAfee, B.S., Washington State College, 1938; M.D., Washington University, 1942.

Lawrence W. O'Neal, M.D., Washington University, 1946.

Mohammed M. Sayeed (Surgical Physiology), B.S., Osmania University, 1956; A.M., Washington University, 1960; Ph.D., University of Miami, 1964.

James M. Stokes, M.D., Washington University, 1948.

George L. Tucker, A.B., Columbia University, 1952; M.D., Harvard University, 1956.

Willard B. Walker, M.D., Washington University, 1946.

Assistant Professors

Charles B. Anderson, A.B., Johns Hopkins University, 1958; M.D., Yale University, 1962.

Thomas H. Covey, Jr., A.B., West Virginia University, 1957; M.D., Harvard University, 1961.

Robert C. Donaldson, A.B., University of Missouri, 1941; M.D., Washington University, 1944. (St. Louis V.A. Hospitals)

Edward E. Etheredge, B.A., Yale College, 1961; M.D., Yale University, 1965; Ph.D., University of Minnesota, 1974.

John D. Halverson, B.A., Hamilton College, 1963; M.D., State University of New York, 1967.

Bernard M. Jaffe, A.B., University of Rochester, 1961; M.D., New York University, 1964.

Allen P. Klippel, A.B., Amherst College, 1944; M.D., St. Louis University, 1946. (Director of Emergency Medical Services, City of St. Louis)

Research Assistant Professors

Irshad H. Chaudry (Biochemistry), M.S., Sind University, 1966; Ph.D., Monash University, 1970.

Harry W. Margraf, M.Sc., Polytechnicum, 1941; D.Sc., Milan University, 1943.

Assistant Professors (Clinical)

Richard V. Bradley, M.D., Washington University, 1952.

Cyril J. Costello, B.S., University of Texas, 1935; M.D., 1939.

Richard H. Fallon, B.S., Boston College, 1952; M.D., Harvard University, 1956; A.M., Washington University, 1971.

Jerome F. Levy, A.B., Washington University, 1954; M.D., 1958.

Stanley L. London, M.D., Washington University, 1949.

Robert H. Lund, B.S., Miami University, 1945; M.D., Washington University, 1949.

Jerry R. Meyers, B.A., University of Texas, 1962; M.D., Washington University, 1966.

Leo A. Sachar, A.B., Washington University, 1936; M.D., 1940.

Sam F. Schneider, A.B., Washington University, 1932; M.D., 1936.

William D. Shieber, M.D., Washington University, 1953.

Richard G. Sisson, A.B., Harvard University, 1943; M.D., Yale University, 1946.

Andrew D. Spencer, A.B., Indiana University, 1951; M.D., 1954.

George L. Watkins, Jr., A.B., Westminster College, 1938; M.D., Washington University, 1942.

Instructors Emeriti (Clinical)

Virgil O. Fish, M.D., Washington University, 1930.

George C. Wee, M.D., University of Louisville, 1931.

Instructors (Clinical)

Robert R. Anschuetz, M.D., Washington University, 1940.

Kenneth J. Bennett, M.D., Tulane University, 1965.

John B. Buettner, A.B., Dartmouth College, 1963; M.D., Washington University, 1967.

Arthur R. Dalton, B.S., University of Missouri, 1938; B.S.Med., Northwestern University, 1940; M.D., 1941.

Fleming B. Harper, M.D., Medical College of Virginia, 1947.

Robert J. Kingsbury, A.B., Asbury College, 1956; M.D., University of Michigan, 1960.

G. Lynn Krause, Jr., A.B., Amherst College, 1950; M.D., University of Pennsylvania, 1954.

Alan M. Londe, A.B., Washington University, 1957; M.D., 1961.

Sherwin H. Malt, A.B., Washington University, 1962; M.D., University of Missouri, 1966.

Eugene N. Mitchell, B.S., St. Louis University, 1955; M.D., University of Missouri, 1960.

George A. Oliver, A.B., Washington University, 1948; M.D., 1952.

Joseph C. Peden, Jr., B.S., Harvard University, 1940; M.D., 1943.

Mather Pfeiffenberger, Jr., A.B., Yale University, 1941; M.D., Harvard University, 1944.

George B. Rader, M.D., Washington University, 1951.

Frank O. Richards, A.B., Talladega College, 1944; M.D., Howard University, 1947.

Donald C. Sauer, A.B., Washington University, 1956; M.D., 1960.

Belmont R. Thiele, M.D., St. Louis University, 1948. (St. Louis County Hospital)

Assistant

Raj N. Mohapatra, I.Sc., Utkal University, 1953; M.B.B.S., 1958; F.R.C.S., Royal College of Surgeons, 1967. (St. Louis V.A. Hospitals)

Assistants (Clinical)

Arthur I. Auer, B.S., Massachusetts Institute of Technology, 1952; M.D., Washington University, 1956.

Leslie F. Bond, A.B., University of Illinois, 1948; M.D., Meharry Medical College, 1952.

Katherine J. Crawford, B.S., Michigan State College, 1942; M.D., Woman's Medical College of Pennsylvania, 1946.

James R. Criscione, B.S., Youngstown University, 1943; M.D., St. Louis University, 1951.

Frederick W. Klinge, A.B., University of Missouri, 1938; M.D., Washington University, 1942.

Samuel Lugo, B.S., St. Louis University, 1954; M.D., 1958.

Lester J. Nathan, B.A., University of Omaha, 1949; M.D., University of Nebraska, 1952.

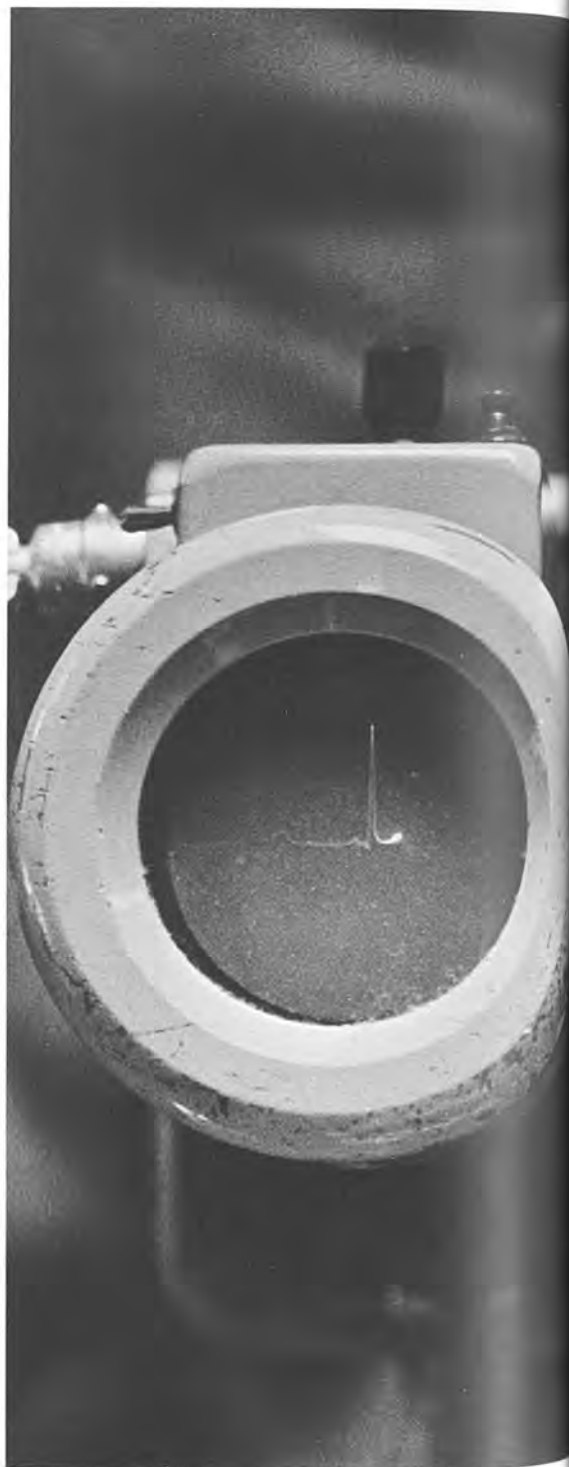
Meredith J. Payne, A.B., Washington University, 1947; M.D., 1950.

Keith E. Pipes, A.B., Fresno State College, 1950; M.D., Washington University, 1954.

Robert Rainey, B.S., Yale University, 1944; M.D., Washington University, 1947.

Lecturer

John S. Spratt, Jr., M.D., Southwestern Medical School of the University of Texas, 1952. (Ellis Fischel State Cancer Hospital)



CARDIOTHORACIC SURGERY

Professor

Clarence S. Weldon, A.B., University of Michigan, 1951; M.D., Johns Hopkins University, 1955. (See Department of Pediatrics)

Professors (Clinical)

Thomas H. Burford, A.B., University of Missouri, 1931; B.S.Med., 1933; M.D., Yale University, 1936.

Thomas B. Ferguson, B.S., Duke University, 1947; M.D., 1947.

Associate Professor

Richard E. Clark, B.S.E., Princeton University, 1956; M.D., Cornell University, 1960; M.S., University of Virginia, 1962.

Associate Professors (Clinical)

Martin Bergman, A.B., Washington University, 1942; M.D., 1945.

Charles L. Roper, A.B., Colorado College, 1949; M.D., University of Colorado, 1953.

Assistant Professor

John R. McCormick, B.S., Loyola University of Los Angeles, 1961; M.D., Boston University, 1965.

GENITOURINARY SURGERY

Professor Emeritus

Justin J. Cordonnier, B.S., Washington University, 1926; M.D., 1928.

Professors

Saul Boyarsky, B.S., University of Vermont, 1943; M.D., 1946. (See Department of Pharmacology)

William Fair, B.S., Philadelphia College of Pharmacy and Science, 1956; M.D., Jefferson Medical College, 1960.

Professor Emeritus (Clinical)

Dalton K. Rose, M.D., Washington University, 1915.

Associate Professor

Charles B. Manley, Jr., A.B., University of Missouri, 1955; M.D., 1958. (See Department of Pediatrics)

Associate Professor Emeritus (Clinical)

Rogers Deakin, M.D., Washington University, 1922.

Associate Professors (Clinical)

Morris Abrams, B.S., University of Illinois, 1934; M.D., 1937.

William T. Bowles, M.D., Stanford University, 1955.

Robert K. Royce, B.S., University of Mississippi, 1939; M.D., Washington University, 1942.

Carl A. Wattenberg, A.B., University of Kansas, 1934; M.D., 1937.

Assistant Professor

James G. Bucy, B.S., Haverford College, 1958; M.D., Northwestern University, 1962.

Research Assistant Professor

Franz U. Steinberg, M.D., University of Berne, 1938. (See Departments of Medicine and Preventive Medicine and Public Health)

Assistant Professors (Clinical)

M. Richard Carlin, B.A., Dartmouth College, 1944; M.D., Yale University, 1947.

Richard P. Parsons, B.S., Missouri Valley College, 1954; M.D., Washington University, 1958.

Instructors (Clinical)

J. Byron Beare, B.S., St. Louis University, 1936; M.D., 1939; M.S., University of Minnesota, 1947.

Saul Klein, M.D., Syracuse University Medical Center, 1959.

Herbert Sunshine, A.B., Washington University, 1950; M.D., 1954.

Assistant (Clinical)

Jules H. Kopp, M.D., University of Arkansas, 1951.

ORTHOPEDIC SURGERY

Professor

Fred C. Reynolds, A.B., Washington University, 1931; M.D., 1934.



Professor (Clinical)

Arthur H. Stein, Jr., A.B., Amherst College, 1946; M.D., Washington University, 1948.

Associate Professor

Marshall B. Conrad, A.B., Westminster College, 1942; M.D., Washington University, 1945.

Associate Professor Emeritus (Clinical)

Oscar P. Hampton, Jr., M.D., University of Tennessee, 1928.

Associate Professors (Clinical)

Lee T. Ford, Jr., M.D., University of Tennessee, 1940.

Harry C. Morgan, B.A., University of Missouri, 1949; B.S., 1951; M.D., Harvard University, 1953.

Assistant Professors

Virginia M. Badger, B.A., Occidental College, 1950; M.S., University of Southern California, 1957; M.D., Woman's Medical College of Pennsylvania, 1961.

Paul R. Manske, B.A., Valparaiso University, 1960; M.D., Washington University, 1964.

Research Assistant Professor

David J. Simmons, B.A., Boston University, 1954; M.A., Clark University, 1956; Ph.D., University of Chicago, 1959.

Assistant Professors (Clinical)

James C. Ellsasser, B.A., Duke University, 1960; M.D., Washington University, 1964.

Earl P. Holt, Jr., B.A., Duke University, 1942; M.D., 1945.

Robert E. Kuhlman, A.B., Washington University, 1953; M.D., 1956.

James O. Lottes, Ph.B., St. Louis College of Pharmacy, 1926; Ph.G., 1928; A.B., University of Missouri, 1934; B.S., 1935; M.D., University of Louisville, 1937.

Marvin R. Mishkin, M.D., University of Illinois, 1955.

George E. Scheer, A.B., Municipal University of Wichita, 1940; M.D., Washington University, 1943.

Instructors (Clinical)

Vilray P. Blair, Jr., M.D., Washington University, 1939.

William S. Costen, A.B., Princeton University, 1950; M.D., Washington University, 1954.

Jerome J. Gilden, A.B., Washington University, 1948; M.D., 1952.

Ronald C. Hertel, A.B., Washington University, 1952; M.D., 1956.

Edward C. Holscher, A.B., University of Missouri, 1931; B.S., 1933; M.D., Harvard University, 1935.

W. Edward Lansche, A.B., Washington University, 1948; M.D., 1952.

Stanley M. Leydig, B.A., Montana State University, 1930; M.D., Washington University, 1934.

Alan H. Morris, M.D., University of Illinois, 1963.

Assistants (Clinical)

John P. Arnot, B.A., Rice University, 1954; M.D., Yale University, 1958.

Kyu Sop Cho, M.D., Yon-Sei University, 1954.

Herman E. Russell, B.A., New York University, 1950; M.D., University of Geneva, 1956.

George R. Schoedinger III, M.D., University of Oregon Medical School, 1962.

PEDIATRIC SURGERY*Professor*

Jessie L. Ternberg, A.B., Grinnell College, 1946; Ph.D., University of Texas, 1950; M.D., Washington University, 1953. (See Department of Pediatrics)

Assistant Professor

Martin J. Bell, B.A., New York University, 1959; M.D., State University of New York, Downstate Medical Center, 1963. (See Department of Pediatrics)

PLASTIC AND RECONSTRUCTIVE SURGERY*Professor*

Paul M. Weeks, A.B., Duke University, 1954; M.D., University of North Carolina, 1958. (See Department of Preventive Medicine and Public Health and Irene Walter Johnson Institute of Rehabilitation)

Professor (Clinical)

Minot P. Fryer, A.B., Brown University, 1936; M.D., Johns Hopkins University, 1940; D.S.C., Brown University, 1972.

Associate Professor

Robert C. Wray, Jr., B.S., University of Arkansas, 1961; M.D., Washington University, 1963.

Associate Professor (Clinical)

George H. Zografakis, M.S., Rutgers University, 1955; M.D., State University of New York, Upstate Medical College, 1959.

Assistant Professor (Clinical)

Marcy A. Goldstein, M.D., Washington University, 1951.

Instructors (Clinical)

Joseph W. Eades, A.B., Amherst College, 1952; M.D., Washington University, 1960.

Barbel Holtmann, B.S.Ed., A.B., University of Missouri, 1964; M.D., 1968.

Bruce I. White, M.D., Washington University, 1964.

Instructor (Speech Pathology)

Edith E. Kopp, B.S., University of Minnesota, 1955; M.S., Southern Illinois University, 1968.

Consultant in Oral Surgery

Leroy W. Peterson, D.D.S., University of Michigan, 1940. (Also School of Dental Medicine)



Teaching and Research Divisions



BIOMEDICAL COMPUTER LABORATORY

The Biomedical Computer Laboratory collaborates with research investigators at the Medical Center in the application of modern information processing techniques to problems in biology and medicine. The laboratory currently has active programs in electrocardiographic rhythm analysis, monitoring the critically ill in a surgical intensive care unit, cardiac catheterization data processing, regional tracer kinetics in nuclear medicine, clinical research and diagnosis using mass spectrometry, speech synthesis and models of cochlear function, and pa-

tient-based medical information systems.

Research and training is offered to medical and graduate students in mathematical techniques, digital system design, and advanced programming techniques applied to the biomedical problems described above. Externships in biomedical computing of two- to three-months' duration are offered during the summer for students who have completed the first year of the medical school curriculum. Opportunities to carry out research are also available to graduate students on a year-round basis. A number of assistantships are available. The laboratory participates in the interdepartmental programs in

Biomedical Engineering and Health Care Technology.

The Biomedical Computer Laboratory is affiliated with the Computer Systems Laboratory located in nearby quarters at the School of Medicine. The mission of the Computer Systems Laboratory is the design and development of advanced computer systems with a current focus on the development of a compatible set of "macromodules" for which arbitrary large, complex, or specialized computer systems can be assembled. These systems are being applied to molecular and neural modeling, electrocardiographic rhythm analysis, speech synthesis, and ventricular dynamics.

Elective Courses

Bio 530. *Digital Computers for Laboratory Use.* Methods of using small digital computers with laboratory instruments. Basic programming, data collection and conversion, data processing, digital control, output techniques. Credit 3 units. (Dr. Holmes)

BMed 693. *Physical and Mathematical Principles of Tracer Kinetics.* Theoretical foundations of tracer-kinetic methods. Topics covered are differential equations for conservation of tracer mass, applications of elementary linear systems theory, stochastic and compartmental models, methods of accounting for tracer recirculation, and methods of data-processing. (Dr. Larson)

Programming for Medical Information Systems. An interpretive language designed for medical information systems is described, with programming examples from hospital and ambulatory care settings. The language used is MUMPS (MGH Utility Programming Systems). Three hours of class work plus laboratory each week for six weeks. (Mr. Domke)

Introduction to Programming a Laboratory Computer. A generalized description of digital computers, octal and binary number systems, structured programming techniques,

assembly language for the PC (Programmed Console), and introduction to higher level languages (FORTRAN). Three hours of class work plus laboratory each week for six weeks. (Mr. Domke)

Survey of Biomedical Computer Techniques. This course is directed toward biological scientists who seek an appreciation of the capabilities and limitations of digital computers as applied to biomedical problems. Only a minimal background in mathematics and electrical theory will be assumed. Topics include elements of sampling theory relevant to computer processing of biological signals, architectures of computers and computer systems, pertinent number systems, logical design of digital computers, programming techniques including elements of machine, assembler, and higher level languages, input and output devices, information systems, application techniques as exemplified by existing systems (e.g., clinical and laboratory research systems, patient monitoring, molecular modeling, and patient information systems). Given in two parts (six weeks each), with Part I as prerequisite to Part II. Three class hours plus laboratory each week. (Dr. Blaine and Staff)

Associate Professor and Director

Lewis J. Thomas, Jr., B.S., Haverford College, 1953; M.D., Washington University, 1957. (See Departments of Anesthesiology and Physiology and Biophysics)

Professor and Senior Research Associate

Jerome R. Cox, Jr., S.B., Massachusetts Institute of Technology, 1947; S.M., 1949; Sc.D., 1954. (See Department of Physiology and Biophysics and Division of Health Care Research) (Also School of Engineering and Applied Science)

Assistant Directors

G. James Blaine, III, B.S., Washington University, 1959; M.S., 1961; Sc.D., 1974.

Vernon W. Gerth, Jr., B.E., Vanderbilt University, 1960; M.S., 1964.

Professor

Donald L. Snyder, B.S., University of Southern California, 1961; M.S., Massachusetts Institute of Technology, 1963; Ph.D., 1966. (Also School of Engineering and Applied Science)

Associate Professors

R. Martin Arthur, B.A., Rice University, 1962; B.S., 1963; M.S., 1964; Ph.D., University of Pennsylvania, 1968. (Also School of Engineering and Applied Science)

William F. Holmes, A.B., Princeton University, 1953; Ph.D., University of Pennsylvania, 1960. (See Department of Biological Chemistry)

Research Associates

Robert J. Arnzen, B.S., Washington University, 1964; M.S., 1966; Sc.D., 1969. (Also Computer Systems Laboratory)

A. Maynard Engebretson, B.S., University of

Minnesota, 1958; M.S., Washington University, 1963; Sc.D., 1970. (Also Central Institute for the Deaf)

Kenneth B. Larson, Met.E., Colorado School of Mines, 1954; S.M., Massachusetts Institute of Technology, 1958; Ph.D., 1964.

Joan Zimmerman, B.S., Leeds University, 1966; Ph.D., Oxford University, 1970.

Assistant Professor

John W. Lewis III, B.S., Georgia Institute of Technology, 1966; M.S., 1968; Ph.D., 1971. (See Department of Pathology)

Instructors

Rexford L. Hill, B.S., University of Cincinnati, 1964; M.S., 1966. (See Department of Radiology)

Thomas F. Martin, B.S., St. Louis University, 1961; M.D., 1965. (See Department of Medicine)



WILLIAM GREENLEAF ELIOT
DIVISION OF CHILD PSYCHIATRY

The Division of Child Psychiatry offers a varied teaching program for Residents in Psychiatry and Fellows in Child Psychiatry through its Child Psychiatry Clinics and Walk-In Clinic at 369 North Taylor Avenue, the St. Louis County Division of Mental Diseases, and the Youth Center at the St. Louis State Hospital. Trainees are assigned to these various units where they participate in complete diagnostic evaluations and see patients in treatment under the supervision of the unit doctor and the Professor of Child Psychiatry. Seminars in child psychiatry, child development, individual and group treatment, clinical psychology, social work, and research are held weekly. New methods of teaching and observation (video-taped sessions, one-way screens, clinical films) are in regular use. The Harry Edison Child Development Research Center, attached to the Division of Child Psychiatry, carries out systematic research in child psychiatry with the help of funds from the National Institutes of Health. Fellows in Child Psychiatry with special research interests can participate in the various research programs.

Director and Blanche F. Ittleson Professor

E. James Anthony, B.S., University of London, 1938; M.R.C.S., L.R.C.P., 1941; M.B., B.S., 1942; D.P.M., 1947; M.D., 1949.

Assistant Professor Emeritus

Loretta K. Cass (Medical Psychology), B.A., Colorado College, 1934; M.A., 1942; Ph.D., Ohio State University, 1950. (Also Faculty of Arts and Sciences)

Assistant Professors (Clinical)

Roy M. Mendelsohn (Child Psychiatry), B.S., University of Illinois, 1950; M.D., 1952.

Paul H. Painter (Child Psychiatry), M.D., St. Louis University, 1947. (See Department of Pediatrics)

Adolfo E. Rizzo (Child Psychiatry), M.D., Buenos Aires University, 1955.

Instructor Emeritus

Louetta Berger (Psychiatric Social Work), B.S., University of Wichita, 1941; M.S.W., Washington University, 1946.

Acting Director of the Child Psychiatry Clinics and Instructor

Doris C. Gilpin (Child Psychiatry), B.S., Drury College, 1944; M.D., University of Chicago School of Medicine, 1948.

Instructors

Ebrahim Amanat (Child Psychiatry), M.D., Tehran University Medical Faculty, 1959.

Sarah W. Bowen (Psychiatric Social Work), B.A., Syracuse University, 1969; M.S.W., Smith College, 1971.

William S. Gorman (Psychiatric Social Work), B.A., Marquette University, 1964; M.S.W., St. Louis University, 1968.

Linda B. Greensfelder (Medical Psychology), B.A., William Smith College, 1971; Ph.D., Washington University, 1976.

Sheila L. Hill (Psychiatric Social Work), B.A., Emmanuel College, 1964; M.S.W., Washington University, 1973.

Susan K. Newman (Psychiatric Social Work), B.A., University of Texas, 1971; M.S.W., Virginia Commonwealth University, 1973.

Syed A. Raza (Child Psychiatry), M.D., Dow Medical College, 1959.

Sandra W. Russ (Medical Psychology), B.S., University of Pittsburgh, 1966; Ph.D., 1970.

Judith L. Schechtman (Psychiatric Social Work), B.A., Northwestern University, 1968; M.S.W., Washington University, 1970.

Marylyn Voerg (Medical Psychology), B.A., University of Florida, 1950; Ph.D., 1964.

Julien Worland (Medical Psychology), B.A., McGill University, 1966; Ph.D., Washington University, 1973.

Research Instructors

Cynthia L. Janes (Medical Psychology), B.A., University of Oklahoma, 1965; Ph.D., 1970.

Emel A. Sumer (Child Psychiatry), M.D., University of Istanbul School of Medicine, 1957.

Instructor (Clinical)

Anna E. Hartnett (Child Psychiatry), B.S.,

Loyola University, 1956; M.D., University of Ottawa, 1960.

Research Assistant

Harriet S. Lander (Medical Psychology), A.B., Washington University, 1964; M.S., St. Louis University, 1968.

Consultants

Eleanore T. Kenney (Medical Psychology), A.B., Bryn Mawr College, 1937; Ph.D., Washington University, 1964.

Robert E. Lefton (Medical Psychology), A.B., Washington University, 1953; Ph.D., 1958.

Lecturer

Manon McGinnis (Psychiatric Social Work), B.A., Westhampton College, 1927; M.S.W., Pennsylvania School of Social Work, 1929.



DIVISION OF HEALTH CARE RESEARCH

The Division of Health Care Research is an extradepartmental unit of the School, directly responsible to the Dean. Staff members hold appointments in a variety of departments of the School of Medicine and the University; indeed, broad multidisciplinary staffing is considered appropriate for address to the complicated sociomedical and economic problems of health care and education. The primary function of the divisional staff is to contribute to the solution of such problems. Its responsibilities include:

Experimental Programs in Medical Care. The Division operates the Medical Care Group of Washington University, a prepaid group practice model. This practice is being developed as a teaching practice to provide a setting for training in general internal medicine, general pediatrics, medical care organization and economics, and for health care research.

Health Care Planning, Ambulatory Services, Washington University Medical Center. The Division conducts studies to provide a factual basis for planning improvements in the use of ambulatory medical facilities of the Center. In this way it is hoped that more effective medical care can be achieved.

Research in Health Care. Studies of several broad areas are conducted by the staff of the Division, including investigations into effects of various methods of practice on medical care costs, factors in the organization of medical care, studies of triage in emergency rooms, sociologic and economic aspects of medical care, and methods of education for comprehensive care.

Medical and Paramedical Education. The Division is responsible for the course Social Aspects of Medicine, a series of seventeen two-hour lecture-discussion periods presented during the first semester of the freshman year. Other educational activities include the collection and cataloging of

literature related to medical care for the library of the Division, the provision of elective courses for medical students (see Preventive Medicine and Public Health), plus an integrated training experience in primary care in internal medicine and pediatrics. This program provides both junior and senior medical and pediatrics residents with the opportunity to practice general medicine or pediatrics in the Medical Care Group of Washington University for one or two years during their regular training. The program is available to residents already accepted for training in their parent departments. The program for training pediatric nurses practitioners (PNP) is described on page 158; the interinstitutional program for physicians' assistants is described on page 159.

Director

Gerald T. Perkoff, M.D., Washington University, 1948. (See Departments of Medicine and Preventive Medicine and Public Health)

Associates

Thomas W. Bice, B.A., Knox College, 1963; M.S., Purdue University, 1965; Ph.D., 1969. (See Department of Preventive Medicine and Public Health) (Also Faculty of Arts and Sciences)

Lee Benham, B.A., Knox College, 1962; Ph.D., Stanford University, 1970. (See Department of Preventive Medicine and Public Health) (Also Faculty of Arts and Sciences)

Clifford A. Birge, A.B., Amherst College, 1956; M.D., Washington University, 1961. (See Department of Medicine)

Bruce L. Brown, M.D., University of Rochester, 1947. (See Department of Medicine)

Jerome R. Cox, Jr., S.B., Massachusetts Institute of Technology, 1947; S.M., 1949; Sc.D., 1954. (See Biomedical Computer Laboratory and Department of Physiology and Biophysics) (Also School of Engineering and Applied Science)

Marcia S. Custer, R.N., B.S., University of Michigan, 1956. (See Department of Pediatrics)

Allen F. Delevett, A.B., Johns Hopkins University, 1938; M.D., 1940. (See Department of Medicine)

Carl G. Harford, A.B., Amherst College, 1928;

M.D., Washington University, 1933.

Clemens H. Jacques, B.S., University of California, 1949; O.D., 1949. (See Department of Ophthalmology)

Lawrence I. Kahn, A.B., University of Alabama, 1941; Louisiana State University, 1945. (See Department of Pediatrics) (Also Pediatric Nurse Practitioners Program)

Donna King, B.A., Western Maryland College, 1960; M.S.W., Washington University, 1966. (See Department of Preventive Medicine)

Sandra Manske, R.N., St. Joseph School of Nursing, 1969; PNP, Washington University, 1975. (See Department of Pediatrics)

Gordon W. Philpott, B.S., Yale University, 1957; M.D., Washington University, 1961. (See Department of Surgery)

Kathleen Potts, R.N., St. Louis University, 1969; B.S., 1969; M.S., Boston University, 1970. (See Department of Pediatrics)

Calixto A. Romero, B.A., University of Pennsylvania, 1942; M.D., 1945. (See Department of Medicine)

Paul S. Simons, B.A., University of Texas, 1963; M.D., Washington University, 1967. (See Department of Pediatrics)

James K. Turner, A.B., Washington University, 1949; M.D., 1953. (See Department of Pediatrics)

John D. Vavra, B.A., University of Colorado, 1950; M.D., Washington University, 1954. (See Administration and Departments of Medicine and Preventive Medicine and Public Health)

Patricia Wirth, B.A., University of Nebraska, 1971. (See Department of Preventive Medicine)

DIVISION OF TUMOR SERVICES

The Division of Tumor Services was organized by the coordinating committee for the cancer education program. Cancer, like many other subjects in the medical curriculum, is taught in an interdepartmental manner. In the sophomore year, a six-week interdepartmental course in hematology and oncology is taught as part of the pathophysiology course by members of all clinical departments which participate in the Division. In the junior year, students are assigned to the tumor clinics of the various services, where they gain firsthand experience with cancer.

An interdepartmental tumor conference, held each week in the Wohl Clinic building for members of the junior class, postgraduate students, and visitors, serves as a forum to demonstrate some of the complex problems in diagnosis and therapy which arise in patients with malignant disease. Other tumor conferences are held at regular intervals by the various clinical departments.

In the senior year, students may elect periods of study which expose them to the theoretical and practical aspects of the epidemiology, diagnosis, treatment, and prognosis of various human neoplasms. This program is tailored to the particular interests of each student with the approval of the executive committee of the Division of Tumor Services. The oncological electives available to seniors include studies in any of the following fields: surgical pathology, neoplasms in children, surgical oncology, radiation therapy, hematologic neoplasms, and epidemiology of cancer.

*Cancer Coordinator, Director of Division,
and Chairman of Executive Committee*
Gordon W. Philpott

Executive Committee

William D. Owens
Anesthesiology

Stuart A. Kornfeld
Edward H. Reinhard
Internal Medicine

William S. Coxé
Neurology and Neurological Surgery

H. Marvin Camel
Ming-Shian Kao
Obstetrics and Gynecology

Morton E. Smith
Ophthalmology

Joseph H. Ogura
Donald G. Sessions
Otolaryngology

Walter C. Bauer
Heschel J. Raskas
Thomas W. Tillack
Pathology

Teresa J. Vietti
Pediatrics

James E. Marks
Carlos A. Perez
Radiology

Harvey R. Butcher, Jr.
Gordon W. Philpott
Surgery

BEAUMONT-MAY INSTITUTE OF NEUROLOGY

The Beaumont-May Institute of Neurology was established in 1955 by gifts from the Louis D. Beaumont Foundation, Mrs. Charles M. Rice, and Morton J. May. It is the purpose of the Institute to foster basic and clinical research in neurology, with special reference to defects in the structure of the nerve cell which occasion important neurological disorders having a high incidence of prolonged disability.

THE IRENE WALTER JOHNSON INSTITUTE OF REHABILITATION

The teaching of rehabilitation is conducted in all four years of the curriculum by the Department of Preventive Medicine and Public Health in collaboration with various specialty services. The Irene Walter Johnson Institute of Rehabilitation is a modern, two-story facility that is air-conditioned and well equipped for the care of disabled patients. Students of medicine, house officers, and students of paramedical services have an opportunity to affiliate with the Institute.

Traineeship Elective. Traineeships in Physical Disability and Rehabilitation of eight weeks' duration may be elected during the interval between the end of the spring semester and beginning of the fall semester by up to five students who have completed the first year of the medical school curriculum. Specific instruction is given by means of informal lectures, demonstrations, and seminars.

Senior Elective. In the six-week elective in physical disability and rehabilitation the student becomes familiar at first hand with the techniques for defining the extent of physical disability and with various approaches to its treatment. Emphasis is placed on methods used in physical, occupational, and speech therapy, and on the specialized contributions to be made by rehabilitation, social work, nursing, and vocational testing and counseling. Opportunity is made available for special emphasis on the rehabilitation of hand injuries and for participating in research activities of the Biomedical Engineering Unit.

Interests of the students will be met by arranging experience in rehabilitation medicine at extra-mural facilities including Jewish Hospital. (Dr. Fishman)

Director

Marvin A. Fishman, B.S., University of Illinois, 1959; M.D., 1961. (See Departments of Neurology and Neurological Surgery, Pediatrics, and Preventive Medicine and Public Health)





Associate Director for Education and Administration

Lorraine F. Lake, B.S., Washington University, 1950; M.A., 1954; Ph.D., 1962. (See Departments of Anatomy and Neurobiology and Preventive Medicine and Public Health, and Program in Physical Therapy)

Associate Medical Directors

Jon D. Cooksey, M.D., Tulane University, 1962. (See Departments of Medicine and Preventive Medicine and Public Health)

Sven G. Eliasson, Ph.D., University of Lund, 1952; M.D., 1954. (See Departments of Neurology and Neurological Surgery and Preventive Medicine and Public Health)

John O. Holloszy, M.D., Washington University, 1957. (See Departments of Medicine and Preventive Medicine and Public Health)

Director of Milliken Hand Rehabilitation Center

Paul M. Weeks, A.B., Duke University, 1954; M.D., University of North Carolina, 1958. (See Departments of Surgery and Preventive Medicine and Public Health)

Graduate Training



DIVISION OF BIOLOGY AND BIOMEDICAL SCIENCES

The Division of Biology and Biomedical Sciences, formed in the summer of 1973, was established because of the realization that training and research in modern biology transcended the limits of departmental structure, and scientists interested in related areas of investigation were distributed among many departments in the School of Medicine, as well as the Department of Biology in the Graduate School of Arts and Sciences. The faculty consists of members of preclinical departments of the School of Medicine: Anatomy and Neurobiology,

Biological Chemistry, Genetics, Microbiology and Immunology, Pathology, Pharmacology, Physiology and Biophysics; and of the Department of Biology of the Faculty of Arts and Sciences. For purposes of graduate training, the Division is divided into the following programs: Cellular and Developmental Biology, Evolutionary Biology and Ecology, Molecular Biology, Neural Sciences and Plant Biology.

The faculty in each of these programs participates in the presentation of divisional courses and sets the requirements for the Ph.D. degree within the programs. These courses are also available to medical students

as *senior electives*. The Ph.D. requirements in all programs are highly flexible. They include courses which are adjusted to the student's background and interest, a qualifying examination to be taken in the second year, execution of original research suitable for a dissertation, and defense of the thesis. Graduate students will be admitted to the Division as students-at-large for the first year of their training. During the first year, advisers will be appointed to assist students in selecting courses and to help them become acquainted with the various research programs in the Division. At the conclusion of the first year, it is expected that students will make a decision as to which program they wish to join and, by choosing a research adviser, will be located in one of the departments which comprise the Division.

Graduate students may also select training programs within the disciplines represented by the departments. The Ph.D. degree requirements for these students will be determined by the individual departments.

In order to obtain expertise in teaching as well as research, all students will serve as teaching assistants for one year during their graduate training.

Students in the Ph.D. program will receive full tuition remission and stipends at the level of \$3,900.

Applications for admission are due no later than January 31 of the academic year preceding that in which study is to begin. Admission is based solely on ability and the number of openings currently available. In general, a student should have completed at a high scholastic level undergraduate training in biology, chemistry, or physics, and have completed most of the following courses: biology, genetics, chemistry (general, analytical, organic and physical), physics and calculus. It is possible for the student, in exceptional cases, to fill some lack of basic entrance requirements for the specific program by electing these courses in the

beginning year of graduate study. It is strongly recommended that the applicant take the Graduate Record Examination, both the aptitude and advanced portions. Additional information and the application for admission may be obtained by writing directly to the Office of Graduate Student Affairs, Box 8072, Washington University School of Medicine, 660 South Euclid Avenue, St. Louis, Missouri 63110.

For the 1976-77 academic year, the tuition in the Graduate School of Arts and Sciences will be \$1,825 a semester for full-time study. For students enrolled for fewer than twelve units, the rate is \$150 a unit. Graduate students who are enrolled for more than six units per semester in courses at the Medical Center are required to participate in the Medical Center Student Health Service. The health fee is payable each semester at the time of registration.

The following graduate courses are offered by the Division of Biology and Biomedical Sciences. Those courses which are particularly relevant to any given department are cross-listed under that department in this *Bulletin*. The faculty member in charge of the course and his departmental affiliation are shown at the end of each course.

Bio 405. *Physiological Basis of Acoustic Communication.* Lectures and seminars in hearing of various species of animals, from invertebrates to humans. Structural and functional adaptation to the environment in which their acoustic communication is performed is considered. Not only auditory physiology, but also sound production, acoustic communication, echolocation in bats, and electroreception by lateral line organs of fishes will be discussed. Demonstrations of neural responses to acoustic stimuli will be included. Credit 2 units. (Suga [Biology])

Bio 406. *Experimental Approaches in Embryology.* A lecture-laboratory course in which classical analytical studies of embryonic development and cellular differentiation

are re-examined in an attempt to elucidate underlying mechanisms at the molecular level. The laboratory will include morphological and biochemical studies of selected developmental systems in intact embryos and cultured organs and tissues. Credit 4 units.

(Kirk [Biology])

Bio 408. *Evolution of Man and Culture.* The fossil evidence for human and non-human primate evolution. Classification and genetics in evolutionary perspectives, relations between biology and culture in ancient and modern populations.

(Sussman [Anthropology])

Bio 411. *Phycology.* A systematic treatment of the freshwater and marine algae. Emphasis primarily on morphology, physiology, taxonomy, and genetics of the major and minor algal groups. Certain aspects of recent research and present problems in phycology will be considered. Credit 4 units.

(Nichols [Biology])

Bio 416. *Evolutionary Biology.* Individual areas of evolutionary biology will be discussed in depth. Topics will include the Biological Species Concept, the hypothesis of selective neutrality of enzyme polymorphism, modern concepts in systematics, molecular approaches to the study of adaptation, the coevolution of insects and plants, and other topics of current evolutionary interest. Credit 3 units.

(Johnson [Biology], Raven)

Bio 423. *Physiology of Development.* Special topics in modern developmental biology, including fertilization and early development, morphogenesis, tissue interactions, synthesis of new substances, and hormonal control of developmental events. Credit 3 units.

(Moog [Biology])

Bio 424. *Immunology.* The basic molecular and cellular aspects of the vertebrate immune response, emphasizing the specificity of antibody reactions, the molecular structure of antibodies, the genetic origin of their diversity, and the cellular basis of their for-

mation. Other topics will include tolerance, autoimmunity, allergy, blood groups, and tissue transplantation. Credit 3 units.

(Fleischman [Microbiology])

Bio 428. *Developmental Neurobiology.* Lectures, demonstrations, and discussions presenting a survey of the major features of neuroembryology (induction of neural tissue, cell proliferation, migration, and specification) and the contributions of tissue culture (cellular and organotypic) to the understanding of neural development. Credit 2 units.

(Bunge [Anatomy], Cowan, Hamburger)

Bio 431. *Principles of Cellular Physiology.* A course in basic physiological principles with emphasis on cellular mechanisms. Four major topics are considered: (1) exchange of oxygen and carbon dioxide between cells and environment, (2) membrane function in the regulation of cell volume and composition, (3) properties of excitable and contractile cells, and (4) the role of cellular and subcellular organization in cell function. Credit 3 units.

(Roos [Physiology])

Bio 439. *History of Scientific Thought to Newton.* Main streams of cosmological, physical, chemical, and biological thought from the pre-Socratics to Newton. Credit 3 units.

(Hall [Biology])

Bio 440. *The History of Scientific Thought Since Newton.* A chronological continuation of Bio 439, the course covers the period 1700 to the present. It begins with an historical analysis of the origins of the scientific, political, and industrial revolutions of the seventeenth century; it proceeds to discuss Newtonianism in the eighteenth century, the chemical revolution, German "nature-philosophy" in the early nineteenth century, Darwinism, thermodynamics, quantum and relativity theory in the middle and late 1900's. The rise of genetics, social Darwinism, and eugenics will form the focus of developments in the early twentieth century. The course will focus on the interrelation-

ships between economics, science, politics, philosophy and art as interpreted from a Marxist view of history. Credit 3 units.

(Allen [Biology], Hall)

Bio 443. *Advanced Genetics.* A general genetics course designed for graduate and advanced undergraduate students. Content will vary from year to year and will include such topics as: techniques in genetic analysis, the nature of mutation, mapping and recombination, genetics of regulation, genetics of indispensable cellular processes, genetics of organelles, *Drosophila* fate maps and genetic engineering. Credit 3 units.

(Apirion [Microbiology], Staff)

Bio 444. *Experimental Genetics Laboratory.* A laboratory course introducing experimental approaches employed in major areas of genetics. Experiments such as genetic cross analysis in *Drosophila*, mutagenesis in bacteriophage, biochemical pathway analysis in fungi, electrophoretic survey of en-

zyme polymorphism, mark-release-recapture analysis, cytogenetic analysis in plants, and caryotype analysis in humans will be included. Each experiment will be taught by a faculty member experienced in the experimental approach. Credit 3 units.

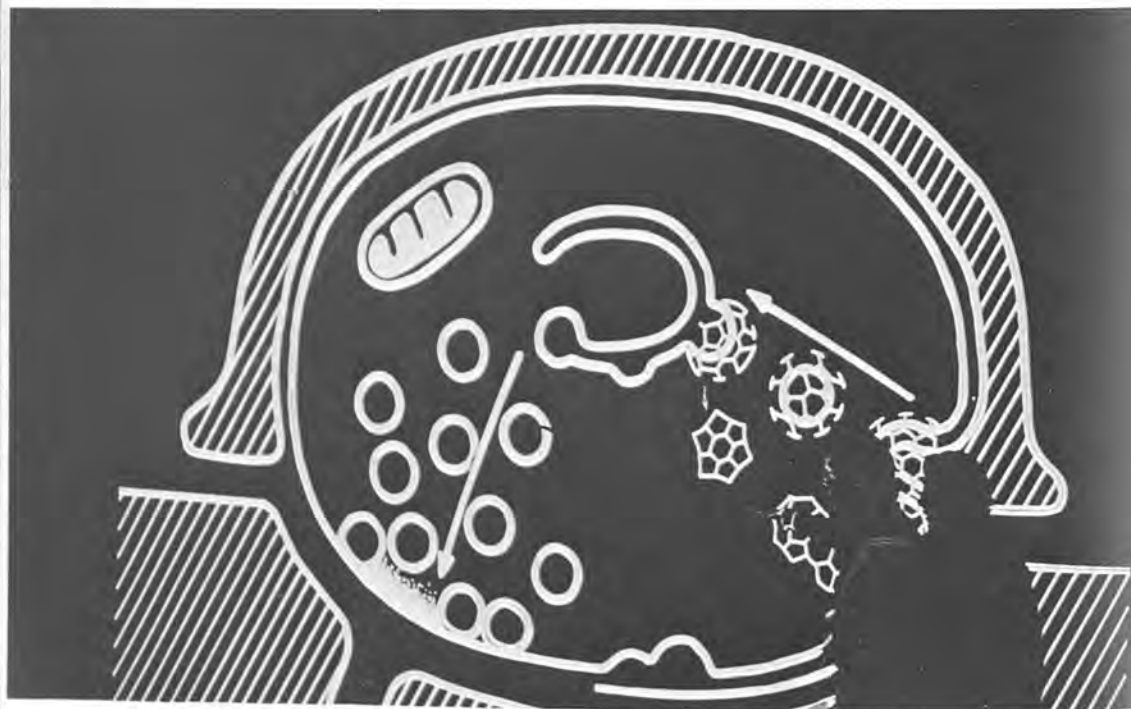
(Johnson [Biology], Staff)

Bio 446. *Biology of the Fungi.* General aspects of the biology of the major fungal groups, including their development, genetics, cytology, metabolism and ecology. Roles these microorganisms play in nature, research, medicine, and agriculture. Credit 3 units.

(Maniotis [Biology])

Bio 451. *General Biochemistry.* (See Department of Biological Chemistry)

Bio 454. *History of Genetics.* A survey of the historical development of genetics, focusing on the period after 1900. Attention will be given to Mendel's work and its re-discovery in 1900, the chromosome theory of heredity (1910-1925), population gen-



etics, the eugenics movement, biochemical and molecular genetics. The course will also touch on philosophical and historical issues such as the role of models in science, confluence of fields, the nature of reality (materialism versus idealism), the role of techniques and instrumentation, and the influence of one science on another. Credit 3 units. (Allen [Biology])

Bio 455. Neurocytology. A consideration at the light and electron microscopical level of the structure of neural tissues, including neurons and their processes, synapses, glial cells, myelin, etc., and their reaction to experimental injury. Lectures and laboratory. Credit 2 units.

(Jones [Anatomy], Woolsey, Price)

Bio 457. Somatosensory System. This course is designed to correlate anatomical, physiological and psychophysical information on tactile sensation, proprioception, thermal and pain sensation. Emphasis will be placed on peripheral receptor mechanisms as well as central nervous system processing of afferent inputs in each somesthetic system. Credit 2 units.

(Burton [Anatomy], Hunt, Jones)

Bio 459. Vision. A course designed to bring together the anatomy, physiology, and psychology of vision to provide an understanding of function. Properties of light and receptors will be covered, and analysis of form, movement, color and depth in the vertebrate visual system, with some material on invertebrates. Credit 3 units.

(Daw [Physiology], Cohen, Pearlman)

Bio 482. Ecology: Ecosystems. A study of selected topics, including measurements of species diversity, productivity, carbon cycle, energy flow, and secondary succession, with emphasis on trophic dynamics of specific interactions such as predation and grazing. Credit 3 units. (Covich [Biology])

Bio 501. Human Anatomy. (See Department of Anatomy and Neurobiology.)

Bio 502. General Physiology. (See Department of Physiology and Biophysics.)

Bio 503. Biology of Cultured Cells. Lectures and laboratory experiments dealing with metabolism, growth, and differentiation of cells grown *in vitro*. Established cell lines, primary cultures, and organ cultures will be used to investigate basic problems in cell biology. Credit 2 units.

(Bischoff [Anatomy], Tolmach)

Bio 504. Environmental Pathology. Lectures and seminars discussing the effect of modern industrial environment on man's health. The adaptability of man, his ability to manipulate his environment and the effects of these manipulations in regard to health and disease will be discussed. Topics include acute and chronic diseases associated with air and water pollution, waste disposal, pesticide usage, transportation and urban living and noise. Credit 2 units.

(Kuhn [Pathology])

Bio 505. Intrauterine Development. Lectures and discussion on the structure and function of the maternal placenta, maternal-fetal exchange of gases and metabolites, immunological development of the fetus, hormone metabolism in the fetal-placental unit and abnormal trophoblastic growth. Credit 2 units. (King [Anatomy])

Bio 506. Microscopic Anatomy. (See Department of Anatomy and Neurobiology)

Bio 507. Pharmacology. (See Department of Pharmacology)

Bio 508. Pharmacology. Second semester of Bio 507. (See Department of Pharmacology)

Bio 509. Current Topics in Pharmacology. Topics of current interest will be presented and discussed. Critical evaluation will be made of recent articles in the scientific literature. Credit 2 units for the year.

(Hunter [Pharmacology], Staff)

Bio 510. *Current Topics in Pharmacology.* Second semester of Bio 509.

Bio 511. *Fundamentals of Circulation.* Mechanisms of cardiac muscle excitation and contraction. Analysis of peripheral circulation. Neural regulation of circulation. Credit 2 units. (Lang [Physiology])

Bio 512. *Human Growth and Development.* Discussions on the principles and patterns of post-natal growth and development. Topics include nature of growth, growth in height and weight, growth of tissues, growth of systems, indices of maturity, factors influencing growth and maturity, growth and repair, disturbances of growth, old age. Credit 2 units. (Peterson [Anatomy])

Bio 515. *General Pathology.* (See Department of Pathology)

Bio 516. *General Pathology.* Second semester of Bio 515. (See Department of Pathology)

Bio 517. *Mechanisms of Disease.* Lectures on general mechanisms of disease, including subcellular, cellular, and organism responses to injury, inflammation, abnormal growth and development, aging, and neoplasia. Intended for graduate students in biomedical sciences. Credit 3 units. (Davie [Pathology])

Bio 519. *Pathology Research Seminar.* Study of current and reported research in experimental pathology. Credit 2 units. (Williamson [Pathology], Staff)

Bio 520. *Methods in Experimental Pathology.* Discussion and demonstration of routine and special microscopic techniques (light, phase, fluorescent, transmission, and scanning electron microscopy); other techniques (bio- and immunoassay, various physiologic correlates). Design of experiments using laboratory animals and autopsy specimens will be emphasized. Students will be

expected to do a short research project of interest to them. Credit 2 units. (Hartroft [Pathology], Grieder)

Bio 521. *Early Mammalian Development.* Seminar dealing with fertilization, cleavage, blastocyst formation, and implantation. Credit 2 units. (King [Anatomy])

Bio 522. *Seminar in Developmental Biology.* Weekly meetings devoted to reports and discussion by students and staff members. Each year one or two important topics in developmental biology are dealt with, and the subject matter changes from year to year. Credit 2 units. (Moog [Biology])

Bio 523. *Functional Anatomy of the Mammalian Integument.* A light and electron microscopical survey of the skin including hair and cutaneous glands. Particular emphasis will be given to the epidermis and its functional role as a water barrier. Credit 2 units. (Menton [Anatomy])

Bio 524. *Radiation Biology.* The action of ionizing radiation at the biochemical, cellular, tissue, and whole organism levels will be discussed. A cellular approach will be taken for a number of topics such as the target for lethality, the biological basis of radiation therapy, and radiation effects on specific tissues in mammals. Credit 2 units. (Valierote [Cancer Biology])

Bio 525. *Fundamental Concepts in Cell Membrane Physiology and Biophysics.* A lecture course devoted to the theoretical principles underlying the physiological properties of biological membranes. Topics to be covered include (1) a review of aqueous solution thermodynamics, (2) properties of electrolyte solutions, (3) diffusion and osmosis, (4) electro-diffusion, with applications to membranes, (5) membrane potentials and interfacial potentials, (6) kinetics and thermodynamics of carrier-mediated transport. Credit 3 units.

(De Weer [Physiology], Blaustein)

Bio 526. *Advanced Topics in the Physiology and Biophysics of Cell Membranes.* A seminar course devoted to in-depth analysis of selected readings. Topics to be covered include ionophorous antibiotics and artificial membranes; movements of salt and water across organelle and cell membranes and epithelia; kinetics of carrier mechanisms; and the chemistry and kinetics of the sodium pump. Credit 3 units.

(Blaustein [Physiology], De Weer)

Bio 527. *Current Topics in Eukaryotic Cell Biology.* A weekly seminar in which the subject will be introduced by the instructor and students will report on the current literature. Selected topics will be presented each year and will include mechanisms in cell proliferation, cell genetics, organelles, responses of cells to environmental stress, cell interactions, cellular differentiation, nuclear-cytoplasmic interactions, cellular control processes. Credit 2 units.

(Tolmach [Anatomy], Staff)

Bio 528. *Cellular Immunology and Immunopathology.* An advanced lecture and seminar course on selected topics in cellular immunology and immunopathology. Extensive reading in the original literature will be emphasized. Credit 2 units.

(Davie [Microbiology])

Bio 530. *Digital Computers for Laboratory Use.* Methods of using small digital computers with laboratory instruments. Basic programming, data collection and conversion, data processing, digital control, output techniques. Credit 3 units.

(Holmes [Biochemistry])

Bio 531. *Advanced Biochemistry.* (See Department of Biological Chemistry)

Bio 532. *Mechanism and Regulation of Protein Biosynthesis.* Properties of eukaryotic and prokaryotic systems will be discussed, including a survey of reaction involved in initiation, elongation, and termination of



protein synthesis. Special consideration will be given to a number of systems involved in biosynthesis of proteins destined for secretion; regulatory steps will be emphasized. Credit 2 units. (Geller [Pharmacology])

Bio 533. *Medical Microbiology.* (See Department of Microbiology and Immunology)

Bio 535. *Physical-Chemical Basis of Techniques in Molecular Biology.* The following techniques will be discussed from a physical-chemical viewpoint: sedimentation, viscosity, electrophoresis, chromatography, radioactivity counting, electron microscopy, spectrophotometry, X-ray diffraction, nuclear magnetic resonance and electron spin resonance. Credit 2 units.

(Thach [Biochemistry])

Bio 536. *Physical Chemistry of Macromolecules.* Application of physical chemistry to the study of proteins, nucleic acids and other natural and synthetic polymers. The thermodynamics of macromolecular solutions and the use of osmotic pressure, light scattering, viscosity, ultracentrifugation, diffusion, and birefringence experiments in the determination of the molecular structures of these substances. Credit 3 units.

(Holtzer [Chemistry])

Bio 537. *Protein Chemistry and Enzyme Mechanisms.* Protein chemistry; peptide synthesis; sequence analysis; development of enzyme kinetic theory, including concepts of regulatory enzymes. Credit 3 units.

(Bradshaw [Biochemistry])

Bio 538. *Structure and Function of Cell Membranes and Surfaces.* Topics include contemporary cell membrane models; membrane structure as revealed by electron microscopy, X-ray analysis, etc.; physical properties of lipids and membrane proteins; model membranes and their applications; permeability and active transport in mammalian and bacterial systems; cell recognition, contact inhibition, and transformation;

immunological characteristics of membranes. Credit 3 units. (Kinsky [Pharmacology])

Bio 539. *Molecular Biology of Animal Viruses.* Molecular biology of DNA and RNA animal viruses, with emphasis on viral replication and transformation in animal cell culture. Credit 3 units.

(S. Schlesinger [Microbiology])

Bio 543. *Molecular Biology of Bacterial Viruses.* (See Department of Microbiology and Immunology)

Bio 544. *Mechanisms of Disease (Cancer).* This course embodies a multi-disciplinary approach to cancer. Experimental results from basic research on tissue culture cells and animal tumors will be correlated with clinical observations on human cancer. Lectures will contain some background material, but will be primarily devoted to explicating current trends and ideas in research. Subject areas dealt with include biochemical and regulatory aspects of the cancer cell, causative agents, host-tumor interactions, and modes of treatment of human cancer. Credit 2 units.

(Thach [Biochemistry], Staff)

Bio 545. *Conformational Analysis.* Structure of macromolecules. Emphasis on CD, ORD, fluorescence, ESR, NMR, fiber and single crystal X-ray analysis, theoretical energy calculations. Credit 3 units.

(Marshall [Physiology])

Bio 547. *The Interaction of Drugs with Tissue Components (Drug Receptors).* Includes consideration of kinetics of drug-receptor interactions and examination of the biochemistry and pharmacology of transmitters, hormones, and drug receptors. The course combines staff and student lectures and requires a paper or examination. Credit 2 units.

(Needleman [Pharmacology])

Bio 548. *Structure, Synthesis and Regulation of Nucleic Acids.* Mechanisms involved in the biosynthesis and function of nucleic acids in cellular processes are emphasized. Specialized aspects of prokaryotes, eukar-

yotes, and their viruses are considered. Credit 2 units.

(Roeder [Biochemistry], D. Schlessinger)

Bio 549. *Antibodies: Structure, Function, and Formation.* (See Department of Microbiology and Immunology)

Bio 551. *Topics in Neurobiology.* A weekly seminar series on selected topics of current interest in neurobiology, such as synaptic and neuromuscular transmission, plasticity in the nervous system, the structure and function of receptors, etc. Credit 2 units.

(Cowan [Anatomy and Neurobiology], Staff)

Bio 552. *Topics in Neurobiology.* Second semester of Bio 551.

Bio 553. *Seminar in Cellular Basis of Behavior.* Weekly meetings will consider theoretical and experimental work with neuronal networks. Emphasis will be placed on systems controlling motor behavior. Credit 2 units.

(Stein [Biology])

Bio 554. *Neural Sciences.* (See Departments of Anatomy and Neurobiology and Physiology)

Bio 555. *Neurological Pharmacology.* Basic neuropharmacology for graduate students. The course covers the principles of general pharmacology, drug metabolism, and autonomic and neuromuscular pharmacology. Credit 3 units. May be taken without laboratory for 2 units of credit.

(Ferrendelli [Pharmacology], Staff)

Bio 556. *Biochemistry of the Nervous System.* Topics covered include carbohydrates; energy metabolism related to different functional states; amino acid metabolism in relation to protein and transmitter synthesis; cerebral lipids, membranes, lipid metabolism; cerebral blood brain barrier. Credit 2 units.

(McDougal [Pharmacology], Moore)

Bio 558. *Long-term Changes in the Nervous System.* This course will cover those

interactions between excitable cells that take place over long periods (days to months or more). Beginning with trophic interactions between nerve and muscle cells, the extent to which the neuromuscular junction serves as a model for neuronal interactions will be explored. Finally, long-term changes in simple central nervous systems and in the visual system of higher animals will be examined. Credit 2 units.

(Purves [Physiology], Cowan, Daw, Pearlman)

Bio 559. *Nerve Muscle and Synapse.* The ionic basis of the resting and action potentials and the mechanisms of synaptic transmission. Students will be expected to present two to five one-hour seminars based on assigned original papers. Credit 2 units.

(Rovainen [Physiology], Staff)

Bio 560. *Pharmacology of the Nervous System.* Topics covered include biochemistry of neurotransmitters, mechanisms of neurotransmission, and mechanisms of action of neuroactive and psychoactive agents. Credit 2 units.

(McDougal [Pharmacology], Moore)

Bio 561. *Topics in Molecular Neurobiology.* The course will consist of lectures and seminars on selected areas in which the function of the nervous system is being studied at the molecular level. Among topics considered will be: behavior in simple organisms, continuous neuronal lines, intraxonal transport, transmitter receptors, transmitter biosynthesis, cell recognition, filamentous proteins of the nervous system. Credit 2 units.

(Gottlieb [Anatomy and Neurobiology], Willard)

Bio 563. *Techniques in Neural Sciences.* A laboratory course for first year graduate students in the Neural Sciences program including intracellular recordings from muscle fibres; growth of nerve tissue culture and electron microscopy of it; recording of synaptic potentials in crayfish muscle; extra-

cellular recording in lateral geniculate and visual cortex; tracing of thalamo-cortical pathways by an autoradiographic technique; and biochemical analysis of proteins transported down an axon.

(Daw [Physiology], Staff)

Bio 571. *Classical Approaches to Plant Systematics.* Topics in nomenclature, classification, and revisions leading to monographic and floristic studies. Credit 3 units.

(Lewis [Biology], Staff)

Bio 572. *Seminar in Plant Biology: Plant Biochemistry.* Discussion of current research and concepts of morphogenesis, growth, and development. Credit 2 units.

(Varner [Biology])

Bio 573. *Experimental Approaches to Plant Systematics.* Topics in nomenclature, classification, and revisions leading to monographic and floristic studies. Credit 3 units.

(Lewis [Biology])

Bio 575. *Advanced Studies in Plant Systematics.* Seminars in specific topics including anatomy, chemotaxonomy, cytology, ecotaxonomy, embryology, nomenclature, palynology, phytogeography and bibliography. Credit 1 unit.

(Lewis [Biology])

Bio 580. *Seminar in Population Biology: Evolution.* This weekly seminar, covering topics in both population genetics and ecology, will be taken by graduate students in this program each semester. Research and literature reports will be given by staff, visitors and graduate students. Credit 2 or 3 units.

(Covich [Biology], Johnson, Raven, Staff)

Bio 581. *Seminar in Techniques in Field Biology.* Planning and presentation of techniques in selected areas of population biology. Credit 3 units.

(Sexton [Biology])

Bio 590. *Research.* Credit to be arranged.

(Staff)

Bio 591. *Seminar in Biology and Biomedical Sciences.* These seminars cover the recent

literature in various areas not included in other courses, or in more depth than other courses. A list of topics to be covered for the next semester is published shortly before registration. Credit to be arranged. (Staff)

Note—The number preceding the course title indicates that the course carries credit in the Graduate School of Arts and Sciences.



PROGRAM IN BIOMEDICAL ENGINEERING

Professor Robert E. Sparks, Chairman, Executive Committee; Professors Saul Boyarsky, W. Maxwell Cowan, Jerome R. Cox, Jr., Philip L. Gould, Robert M. Hochmuth, Charles E. Molnar, William F. Pickard, Salvatore P. Sutura, Michel M. Ter-Pogossian, Donald F. Wann, Reimut Wette; Associate Professors R. Martin Arthur, Richard E. Clark, William F. Holmes, Marcus E. Raichle, Curt Thies, Lewis J. Thomas, Jr., Donald Walkup; Research Associate Professor Peregrina Labay; Assistant Professors Stuart Boxerman, John W. Lewis; Research Assistant Professor Howard A. Bomze; Senior Research Associate N. S. Mason; Research Associate Kenneth B. Larson.

This course of graduate study is designed to provide education and training for students wishing to apply principles of modern engineering and mathematics to theoretical and practical problems in biology and medicine. Students and faculty of both the School of Engineering and Applied Science and the School of Medicine participate in the Program.

Every student seeking an advanced degree in engineering must be admitted to one of the participating departments of the Sever Institute of Technology, the graduate division of the School of Engineering and Applied Science. The program permits the student to earn a certificate in biomedical engineering or health care technology in addition to the M.S. or D.Sc. degree in a chosen engineering field. Students not candidates for a degree are welcome to take courses as electives.

Graduate study plans are tailored to the individual's needs and interests, and provide essential background in the related areas of life and medical sciences. Students with diverse undergraduate backgrounds may be admitted provided they have adequate

preparation and experience in mathematics and the physical sciences. Areas of specialization include sensory communications, electrocardiography, flow and diffusion in biological systems, electrobiology, technology in health care, biomedical statistics, modeling of biological systems, engineering of artificial organs, drug concentration control, urodynamics, and applications of advanced computer techniques to biology and medicine. Research facilities available to the



program are located in the School of Engineering and Applied Science, the School of Medicine, and the Washington University Computer Laboratories. The faculty includes representatives from the Biomedical Computer Laboratory, the departments of Biological Chemistry, Physiology and Biophysics, Preventive Medicine and Public Health, Radiology, Surgery, and Anatomy and Neurobiology in the School of Medicine; and the departments of Computer Science, Chemical, Civil, Electrical, and Mechanical Engineering, and Systems Science and Mathematics in the School of Engineering and Applied Science.

Complete course listings and information about application and degree requirements may be found in the Bulletin of the School of Engineering and Applied Science.

BMed 547. *Biological Mass and Momentum Transfer.* Principles of viscous incompressible flow and diffusion and mass transfer in flowing fluids. Application of these principles to the analysis of physiological problems and to the design and operation of artificial organ devices. Discussion of convective diffusion in blood and flow in peristaltic pumps, arteries, and capillaries. Credit 3 units.

BMed 600. *Research for Doctoral Dissertation.*

BMed 644. *Surgical Techniques for Biomedical Experimentation.* A course of instruction in surgical techniques necessary for basic experimental applications. Sterile-chronic surgery, implant techniques for telemetry and monitoring agents. The humane care, handling, and housing of animals, choice and induction of anesthesia. Techniques of ligation, suturing, and cannulation. Use of respirators, gas analyzers, and other associated instruments. Permission of instructor required. One class hour and four laboratory hours a week. Credit 3 units.

BMed 660. *Biomedical Applications of Small Digital Computers.* Introduction to the use of digital computers in the laboratory.

Considerations in the choice of computer equipment and algorithms for the solution of laboratory and clinical problems. Examples of applications in data gathering and algorithms for the solution of laboratory and clinical problems. Examples of applications in data gathering and processing control of experiments, modeling, and simulation. Prerequisite, Electrical Engineering 360, Applied Mathematics and Computer Science 132, or permission of instructor. Credit 3 units.

Other Biomedical Engineering course offerings:

EE 490. *Biomedical Measurements and Instrumentation.*

BMed 545. *Hospital Electrical Systems and Instrumentation.*

BMed 549. *Engineering Aspects of Health Care Delivery.*

BMed 555. *Methods of Biomedical Statistics.*

BMed 573. *Electrobiology.*

BMed 576. *Sensory Communications.*

BMed 578. *Biological Control Systems.*

BMed 610. *Clinical Engineering Practicum I.* (For Technology in Health Care students only.)

BMed 611. *Clinical Engineering Practicum II.* (For Technology in Health Care students only.)

BMed 612. *Clinical Engineering Practicum III.* (For Technology in Health Care students only.)

BMed 651. *Applied Polymer Science.*

BMed 675. *Mathematical Methods in Physiology.*

For additional related courses, see Biomedical Computer Laboratory in this *Bulletin* and the *Bulletin of the School of Engineering and Applied Science*.

Allied Health Professions



Programs are conducted by the School of Medicine in health care administration, occupational therapy, physical therapy, radiologic technology, and for pediatric nurse practitioners. All courses are approved by the American Medical Association or other certifying agencies, and graduates qualify for certifying examinations. For further information write to the director or educational director listed under the particular program, 660 South Euclid Avenue, St. Louis, Missouri 63110.

GRADUATE PROGRAM IN HEALTH CARE ADMINISTRATION

The Setting

The Graduate Program in Health Care Administration is designed to provide an educational opportunity for individual students through learning, clinical experience, and research. The faculty and staff are committed to providing a quality education leading to careers in the administration of health facilities and organizations, to sponsoring scholarly research concerning health services, and

to make a beneficial contribution to the community through advice and service.

Curriculum and Sequence of Study

The curriculum of the graduate program is designed to provide the student with the knowledge, skills, and attitudes necessary to enter and progress in the field as a professional health administrator. As a result, the curriculum interfaces the study of the delivery of health care and the value our society places on human life with the areas of finance, organizational behavior, law, quantitative methods, and health planning, among others.

Each student has the option of completing a thesis, independent study, or applied research project in partial fulfillment of the requirements for conferment of the Master of Health Administration (M.H.A.) degree. A total of 60 hours is required for graduation with all courses being pursued through the graduate program.



The didactic content for the Master of Health Administration degree requires four semesters (15 months), with each class matriculating annually in June. The time sequence is: First Semester (Summer); Second Semester (Fall); Third Semester (Spring); and Fourth Semester (Summer). Following the didactic period, there is a nine-month administrative residency (September through May) for a total of 24 months.

Administrative Residency

The nine-month off-campus administrative residency is an integral part of the graduate program's educational sequence and is required regardless of the student's previous experience. The residency assignment, as approved by the faculty, is served in an affiliated hospital, agency, or association as recommended by the faculty. The purpose of the residency is to provide the graduate student with an opportunity to observe in the field those concepts and principles learned during the on-campus didactic sequence. The requirement is completed under the direction of a well-qualified and experienced administrator who is given an annual adjunct faculty appointment at the Washington University School of Medicine.

The on-campus faculty maintains close communication with the administrative resident and the off-campus faculty. The preceptor must file an educational plan that outlines the administrative resident's activities for the coming year. The preceptor will also send periodic progress evaluation reports to the director of the graduate program.

An on-campus faculty member also visits residency sites to meet with the preceptor and resident. The preceptor is invited to return at least once each year to the campus. These site and campus visits enable faculties to review jointly the resident's progress and to evaluate and refine the educational program.

Stipends are received by graduate students

during the administrative residency and vary from one site to another. The residency is also approved for Veterans Administration educational benefits for eligible graduate students.

Admission Requirements

Applicants are required to have a bachelor's degree from an accepted university or college acceptable to Washington University. The aptitude test of the Graduate Record Examination is required of all applicants.

Tuition per semester effective 1976\$1,725
 (Four semesters6,900)
 Books and supplies (per semester) ..\$75-100
 Application fee (nonrefundable)\$15

Associate Professor and Director

James O. Hepner, B.A., University of Iowa, 1955; M.H.A., Washington University, 1959; Ph.D., University of Iowa, 1964.

Associate Professor and Deputy Director

Donald J. Horsh, B.S.B.A., University of Nebraska, 1941; M.H.A., Washington University, 1951; J.D., St. Louis University, 1953.

Associate Professor

David A. Gee, B.A., DePauw University, 1949; M.H.A., Washington University, 1951.

Assistant Professors

Stuart B. Boxerman, B.S.E.E., Washington University, 1963; M.S.E.E., 1965; D.Sc., 1970.

Robert J. Hickok, B.S., Washington University, 1953; M.H.A., 1971. (See Program in Physical Therapy)

Linn B. Perkins, B.A., Amherst College, 1949; M.H.A., Washington University, 1951.

Assistant Professors (Adjunct)

Ted Bowen, B.S., Austin College, 1941; M.H.A., Washington University, 1948.

James A. Cenedy, B.A., Hastings College, 1950; M.H.A., Washington University, 1952.

Donald W. Cordes, A.B., Hope College, 1940; M.A., University of Michigan, 1941.

Robert E. Frank, B.S., St. Louis University, 1950; M.A., 1962.

Frank S. Groner, A.B., Baylor University, 1934; LL.D., East Texas Baptist College, 1946; Union University, 1952; Baylor University, 1969.

James D. Harvey, B.A., University of South Dakota, 1950; M.H.A., University of Minnesota, 1952.

David H. Hitt, B.S., University of Alabama, 1949; M.Sc., 1950; M.H.A., University of Minnesota, 1952.

Roy C. House, A.B., Evansville College, 1939; M.S.H.A., Northwestern University, 1949.

Boone Powell, LL.D., Baylor University, 1958.

Mary Roch Rocklage, B.S., St. Xavier College, 1961; M.H.A., St. Louis University, 1963.

Robert F. Scates, B.A., Baylor University, 1939.

Glenn N. Scott, B.A., Oklahoma Baptist University, 1956; M.H.A., Washington University, 1962.

Gail L. Warden, A.B., Dartmouth College, 1960; M.H.A., University of Michigan, 1962.

Instructor and Associate Director

Beverly B. Monical, B.S., Washington University, 1960; M.H.A., 1972. (See Program in Physical Therapy)

Instructors (Adjunct)

Richard W. Brown, B.A., Philips University, 1968; M.H.A., Washington University, 1970.

Patricia A. Cahill, B.A., Emanuel College, 1959.

Sister Mary Dorothy Calhoun, B.A., St. Louis University, 1960; M.H.A., 1968.

William E. Claypool, B.A., Knox College, 1943; M.H.A., Washington University, 1949.

Arthurline Clingman, B.S., University of Houston, 1957; M.H.A., Washington University, 1959.

Robert J. Coleman, B.A., Stonehill College, 1961; M.H.A., Xavier University, 1968.

Albert Curtis, B.S., Northwestern University, 1947.

Dan L. Dearen, B.S., Texas Technological University, 1958; M.A., Arizona State University, 1962; Ed.D., 1968.

Charles M. Edwards, B.S., Central Missouri State University, 1952; M.H.A., Washington University, 1956.

Richard P. Ellerbrake, B.A., Elmhurst College,

- 1955; B.D., Eden Theological Seminary, 1958; M.H.A., Washington University, 1964.
- Gary L. Filerman**, B.A., University of Minnesota, 1959; M.H.A., 1961; M.A., 1963; Ph.D., 1970.
- Thomas W. Fourqurean**, B.B.A., Texas College of Arts and Industries, 1939; M.B.A., University of Chicago, 1949.
- Max D. Francis**, A.B., Kansas Wesleyan University, 1962; M.H.A., Washington University, 1966.
- Aladino A. Gavazzi**, B.S., Columbia University, 1953; M.S.H.A., 1955.
- Phillip H. Goodwin**, B.A., Hendrix College; 1943; M.H.A., Washington University, 1968.
- Joe S. Greathouse, Jr.**, B.S., University of Kentucky, 1951; M.S., Northwestern University, 1957.
- Jack A. L. Hahn**, B.A., Evansville College, 1943; LL.D., 1958; M.H.A., Northwestern University, 1948.
- Thomas J. Hartford, Jr.**, B.A., George Washington University, 1950; M.H.A., Washington University, 1958.
- Howard L. Hays**, B.S., University of Omaha, 1957; M.H.A., Washington University, 1959.
- William Hope**, B.S., University of Tennessee, 1960; M.S., 1962; M.P.H., Johns Hopkins University, 1968; Sc.D., 1971.
- Duane T. Houtz**, B.A., University of Kansas, 1955; M.H.A., Washington University, 1960.
- Mabel P. Howell**, B.Ed., Southern Illinois University, 1941; M.H.A., Washington University, 1966.
- James B. Humphreys**, B.A., Westminster College, 1963; M.S.H.A., Trinity University, 1969.
- David A. Johnson**, B.A., Augustana College, 1951; M.B.A., University of Chicago, 1955.
- Richard L. Johnson**, B.S., Northwestern University, 1947; M.B.A., University of Chicago, 1950.
- Lemuel R. Jordan**, B.A., Amherst College, 1947; M.A., Columbia University, 1949.
- Joseph B. Mackey**, A.B., University of Missouri, 1951; M.H.A., St. Louis University, 1954.
- Joseph C. Mackney**
- Richard H. Malone**, B.S., Louisiana State University, 1950; M.H.A., University of Chicago, 1958.
- Robert W. McCuiston**, A.B., Hendrix College, 1949; J.D., University of Arkansas, 1952.
- Roger W. Metz**, B.A., University of Washington, 1958; M.H.A., University of Minnesota, 1962.
- Harry C. Mobley**, B.S., Fairmont College, 1958; M.H.A., Washington University, 1962.
- Stephen M. Morris**, B.B.A., Southwestern University, 1952; M.H.A., Washington University, 1954.
- Keyton H. Nixon**, A.B., Drury College, 1952; M.S., Northwestern University, 1954.
- John H. Norwood**, B.S., North Carolina State University, 1953; M.S.H.A., Northwestern University, 1958.
- Elwood A. Opstad**, B.S., State University of Iowa, 1947; M.H.A., Washington University, 1949.
- David S. Ramsey**, B.S., University of Michigan, 1953; M.S., 1954; M.H.A., 1962.
- Carl C. Rasche**, B.A., Elmhurst College, 1939; L.H.D., 1960; B.D., Eden Theological Seminary, 1943.
- J. Larry Read**, B.S., Lamar University, 1968; M.H.A., Washington University, 1974.
- Bryan A. Rogers**, B.A., University of Akron, 1949; M.H.A., Washington University, 1954.
- John O. Rohde**, B.S.B.A., Oklahoma City University, 1961; M.H.A., Washington University, 1964.
- George D. Rountree**, B.S., Lamar State College of Technology, 1960; M.H.A., Washington University, 1963.
- Walter J. Schriver**, B.S., Elmhurst College, 1962; M.S., Eden Theological Seminary, 1970; M.H.A., Washington University, 1972.
- Franklin E. Simek**, B.S., John Carroll University, 1949; M.H.A., Washington University, 1954.
- James H. Sullivan**, B.A., Michigan State University, 1950; M.H.A., University of Michigan, 1957.
- Robert C. Terrill**, B.A., University of Oklahoma, 1948; M.H.A., Iowa State University, 1954.
- Charles E. Thoele**, B.S.C., St. Louis University, 1961.
- Hugh R. Vickerstaff**, B.S., Iowa State College, 1949; M.H.A., Washington University, 1951.
- Kenneth R. Wagner**, B.S., Iowa State College, 1950.

Samuel T. Wallace, B.S., University of Missouri, 1965; M.H.A., Washington University, 1970.

F. Dale Whitten, B.S., Eastern Illinois University, 1964; M.H.A., Washington University, 1967.

Neil C. Wortley, B.S., Southwest Missouri State College, 1950; M.H.A., Washington University, 1952.

Paul R. Wozniak, B.S., St. Louis University, 1950; M.H.A., 1955.

Paul H. Wunderlich, B.A., Valparaiso University, 1962; M.H.A., Washington University, 1967.

Lecturers

Albert P. Ameiss, B.S., St. Louis University, 1947; M.S., 1950; Ph.D., 1968.

Rodney M. Coe, B.S., Iowa State University, 1955; M.A., Southern Illinois University, 1959; Ph.D., Washington University, 1962.

James D. Collom, B.S., Ball State Teachers College, 1954; M.H.A., Washington University, 1961; Ph.D., University of Iowa, 1971.

Raymond L. Hilgert, B.A., Westminster College, 1952; M.S.B.A., Washington University, 1961; D.B.A., 1963.

Harold Hinderer, B.A., College of St. Thomas, 1952.

William A. Kamman, B.S.I.E., Washington University, 1958.

Merlin E. Lickhalter, B.A., Massachusetts Institute of Technology, 1957.

Harry E. Panhorst, B.S., Missouri University, 1938; M.H.A., Washington University, 1949.

Kenneth W. Peters, B.A., Luther College, 1950; M.H.A., Baylor University, 1958.

Colin C. Rorrie, Jr., B.A., Beloit College, 1964; M.A., University of Iowa, 1966; Ph.D., 1968.

PROGRAM IN NURSE ANESTHESIA

The Barnes Hospital School of Anesthesia, established in 1929, offers an accredited two-year program to graduate nurses. Applicants for admission must be registered nurses from an accredited nursing school and should rank in the upper one-third of their class. Personal and professional qualifications of the applicant must be of the highest quality.

The aim of this program is to develop well-trained nurses in the specialty of anesthesia, which is an essential service to the care of the patient before, during, and after surgery.

Approximately 400 didactic hours are presented to the students in anatomy, physiology, chemistry, physics, anesthetic agents, and all subjects related to the field of anesthesia. Approximately 1,000 anesthetics are administered by each student under supervision. Clinical experience is received in all types of operating procedures and all anesthetic agents, using all types of anesthetic techniques. Students also receive experience in pre- and post-anesthesia care, inhalation therapy, and respiratory and cardiac intensive care units.

Upon graduation from this program, the student is qualified to sit for the accredited examination of the American Association of Nurse Anesthetists, which when completed, confers the title of Certified Registered Nurse Anesthetist (C.R.N.A.)

Tuition (for entire 24-month program) \$200

Stipend and maintenance	
First year (per month)	\$325
Second year (per month)	\$385

Instructor and Director

Helen A. Ogle, R.N., C.R.N.A., Barnes Hospital School of Anesthesia, 1940.

Instructor and Educational Director

Louise S. Grove, R.N., C.R.N.A., Barnes Hospital School of Anesthesia, 1960.

Clinical Instructors

- Leslie Alikhan, R.N., C.R.N.A.
- Robert Ayres, R.N., C.R.N.A.
- Ann Bailey, R.N., C.R.N.A.
- Linda Brennan, R.N., C.R.N.A.
- June Crafton, R.N., C.R.N.A.
- James D. Cuddeford, R.N., C.R.N.A.
- Margaret Eilerman, R.N., C.R.N.A.
- Donald Flacke, R.N., C.R.N.A.
- Norman Hampton, R.N., C.R.N.A.
- Florence Hess, R.N., C.R.N.A.
- Patricia Klump, R.N., C.R.N.A.
- Beverly Krause, R.N., C.R.N.A.
- Ronald Lynch, R.N., C.R.N.A.
- Timothy Piontek, R.N., C.R.N.A.
- Germaine Rheume, R.N., C.R.N.A.
- Betty Strzelec, R.N., C.R.N.A.
- LaVerne J. Will, R.N., C.R.N.A.
- Carmen Wright, R.N., C.R.N.A.



PROGRAM FOR PEDIATRIC NURSE PRACTITIONERS

The School of Medicine, through the Department of Pediatrics and the Division of Health Care Research, has established a program for training Pediatric Nurse Practitioners. It encompasses a period of eight and one-half months beginning in September of each year. The Program was developed to help meet the challenge of expanded health services needed by the pediatric community and to provide nurses with an opportunity to extend the range and depth of their skills.

The curriculum is divided into a seventeen-week didactic period, followed by a seven-week practicum. The practicum may be obtained through the facilities of the program or, by special arrangement, at the site of future employment for those nurses who are sponsored by an employer or agency guaranteeing an appropriate position upon the completion of training. The instruction is centered at the St. Louis Children's Hospital and the Division of Health Care Research.

Other resources of the Medical Center, the city, and the offices of private pediatricians are utilized. The major portion of the instruction is provided by the Department of Pediatrics.

The Pediatric Nurse Practitioner (PNP) is a registered nurse whose special training enables her to play a larger role in providing pediatric services. She obtains histories, performs physical examinations, and appraises physical, psychological, and intellectual growth and development. She is competent to counsel families in matters concerning nutrition, accident prevention, and child rearing. With the physician, she participates in the management of acute and chronic illnesses.

Applicants must be registered nurses. A B.S. degree in nursing from an accredited

program and experience in pediatrics are preferred but not required. On completion of training, the PNP is qualified to serve anywhere in the country where pediatric services are offered. The Program complies with the guidelines for such training as proposed by the American Academy of Pediatrics and the American Nurses' Association.

Tuition (full program)\$1,600
Tuition (practicum elsewhere) 1,300

ST. LOUIS INTERINSTITUTIONAL PHYSICIAN'S ASSISTANT TRAINING PROGRAM

Washington University, in conjunction with St. Louis University and the St. Louis Veterans Administration Hospital, participates in the St. Louis Interinstitutional Physician's Assistant Training Program administered through the St. Louis University School of Nursing and Allied Health Professions. This A.M.A.-accredited 24-month program consists of three phases: basic sciences, clinical in-patient and out-patient rotations, and a twenty-week preceptorship. Students are trained to collect historical and physical data and to perform various diagnostic and therapeutic procedures. The goal is to produce individuals capable of assisting the primary care physician and extending the effectiveness of his/her medical practice. For application forms and further information contact:

Director
Physician's Assistant Program
1504 South Grand Boulevard
St. Louis, Missouri 63104

PROGRAM IN OCCUPATIONAL THERAPY

The efforts of the Program in Occupational Therapy are directed toward providing students with a thorough background in occupational therapy in preparation as practitioners in a rapidly developing field. The primary focus of occupational therapy is the development of adaptive skills and improved performance, not only in the realm of working for a living but also in tasks and activities concerned with leisure, daily living, and avocations. It follows that the occupational therapist must be concerned with external and environmental barriers as well as biological or psychological problems which inhibit occupational performance. The therapist must be equally alert to factors which enhance performance.

Within this context of concerns, occupational therapists work with individuals whose abilities to cope with tasks of living are threatened or impaired by such problems as the aging process, physical illness or injury, psychological and/or social disability, chronic conditions, poverty and cultural differences, or deficits in perceptual-sensory-motor control or in cognitive, emotional, or social development.

Applicants for admission must present sixty semester hours of credit from an accredited college or university with a cumulative GPA of at least B. There are specified requirements in English, biology, chemistry, physics, psychology, and sociology.

Upon completion of four academic semesters at the School of Medicine, the degree Bachelor of Science in Occupational Therapy is conferred. Six months of supervised field work experience is required following graduation.

Tuition (four semesters),
per semester\$1,725
Fee, field work experience 500

Professor and Elias Michael Director

Jerry A. Johnson, B.S.O.T., Texas Woman's University, 1953; M.B.A., Harvard University, 1961; Ed.D., Boston University, 1970.

Assistant Professor and Associate Director

Ellen T. Tyson, B.S., Syracuse University, 1949; M.A., 1950; Cert.in O.T., University of Pennsylvania, 1952.



Assistant Professor

Garth D. Tubbs, B.S., Wisconsin State College, 1953; Cert.in O.T., Washington University, 1955.

Instructors

Susan M. Kusama, B.S.O.T., Washington University, 1965.

Mary L. Rath, B.S.O.T., Tufts University, 1969; M.S., University of Hartford, 1972.

Instructors (Clinical)

Mercedes Abella

Julia M. Anstey

Theresa C. Burmeister

Marion A. Calph

Marilyn K. Dien

Irene G. Doell

Virginia H. Drawing

Vickie G. Fausz

Barbara N. Goldsmith

Linda Golubovich

LaVerne W. Grady

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Carol Meador

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Joanne Silhavy

Martha S. Skillman

Dixie H. Sleight

Mary Brendon Smith

Marlene R. Swan

Martha Van Sweden

Jane VendeBogert

Marian S. Warack

Janet Williamson

PROGRAM IN PHYSICAL THERAPY

The program of instruction in physical therapy in the School of Medicine consists of the junior and senior years of a four-year college curriculum leading to the degree of Bachelor of Science in Physical Therapy.

Students entering this program must have satisfactorily completed sixty semester hours in an accredited college or university. Required are courses in English, psychology, biology, physics, chemistry, and social sciences.

The program includes courses in the basic medical sciences, medical and surgical lectures as applied to the practice of physical therapy, theory and application of physical therapy procedures, and a minimum of 800 hours of clinical experience.

The aim of the program is the development of competent physical therapists whose broad cultural backgrounds and thorough professional training prepare them to accept appropriate responsibilities in the comprehensive care program of modern medicine.

Tuition (three semesters),
per semester\$1,725
Tuition, final clinical semester 1,150

Further information may be secured by direct correspondence with the Program in Physical Therapy, Box 8083, 660 South Euclid Avenue, St. Louis, Missouri 63110.

Associate Professor and Director

Beatrice F. Schulz, B.S., Washington University, 1949; M.A., 1955.

Assistant Professor and Associate Director

Isabelle M. Bohman, B.S., Skidmore College, 1951; M.S., University of Illinois, 1954.

Assistant Professors

Lorraine F. Lake, B.S., Washington University, 1950; M.A., 1954; Ph.D., 1962. (See Departments of Anatomy and Neurobiology and Preventive Medicine and Public Health, and Irene Walter Johnson Institute of Rehabilitation)



Barbara Nash, B.S., Washington University, 1950; M.Ed., University of Florida, 1973.

Instructor

Robert J. Hickok, B.S., Washington University, 1953; M.H.A., 1971. (See Program in Health Care Administration)

Instructors (Clinical)

Patricia A. Csengody
Karen L. Disbrow
Elvera C. Guebert
Carolyn Halstead
Joseph R. Haralson
Donald E. Honey
Jo A. Jones
Kathleen M. Keller
Sean E. Maloney
Kathryn M. Milinowicz
Eileen C. Myers
Roberta Peddicord
Richard F. Roettger
Janet M. Rosenkoetter
Mary A. Smith
Marye J. Songer
George E. Soper
Janet S. Sternat
Evelyn I. Walter

Lecturer

Beverly B. Monical, B.S., Washington University, 1960; M.H.A., 1972. (See Program in Health Care Administration)

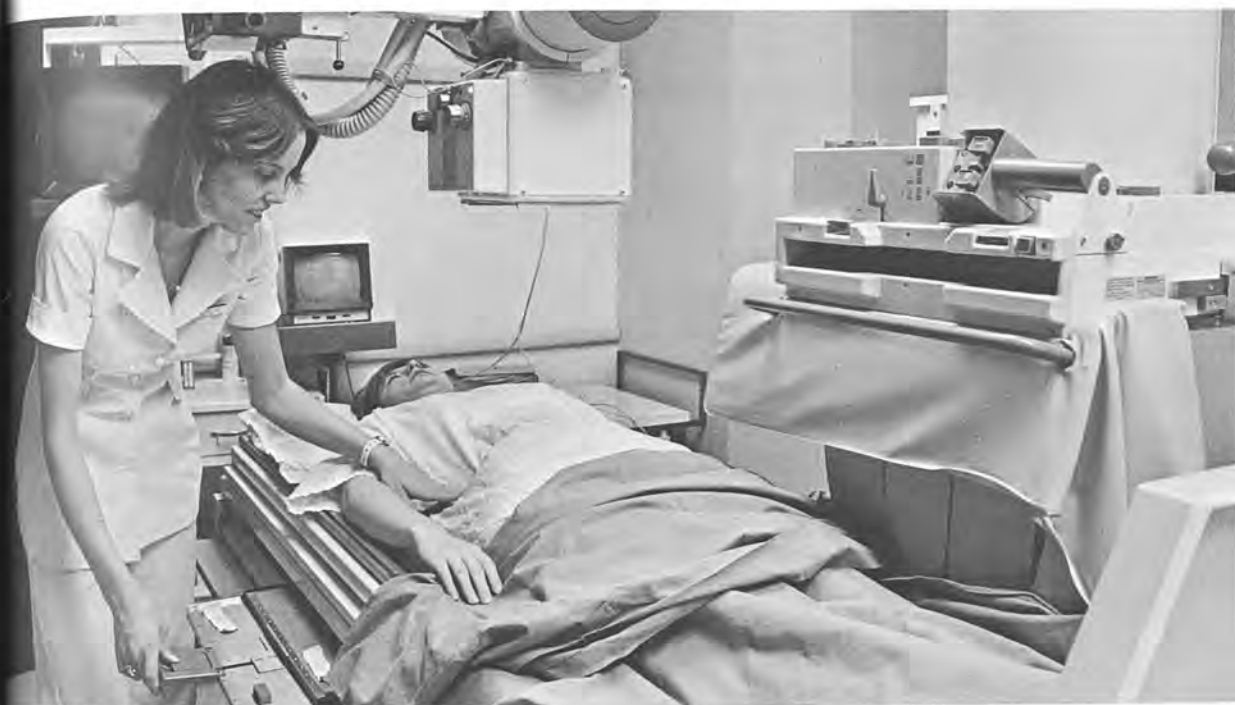
PROGRAMS IN RADIOLOGIC TECHNOLOGY

The Department of Radiology, which has its headquarters in the Edward Mallinckrodt Institute of Radiology, offers a basic course in X-ray technology and two one-year post-graduate courses. Each course leads to a certificate awarded by the Washington University School of Medicine, Department of Radiology.

X-ray Technology. This two-year program is approved by the American Society of Radiologic Technologists, the American College of Radiology, the Joint Review Committee on Education in Radiologic Technology, the Council on Medical Education of the American Medical Association, and the Veterans Administration. It includes the following courses: radiation protection, professional ethics, anatomy and physiology, nursing procedures, radiation physics, medical terminology, survey of medical and surgical diseases, radiographic positioning, dark-room processing procedures, radiation therapy, radiation biology, nuclear medicine, special procedure radiography, room design and selection of equipment, and introduction to business administration and personnel management. Course work totals approximately 600 hours.

During the first six months, a student is on probation. Upon satisfactory completion of this work, he will be paid a monthly stipend of \$50 for the next six months. This stipend increases to \$75 for the third six months and \$100 for the last six months. During the twenty-four months, the student is assigned tours of duty in various diagnostic and therapeutic areas for practical experience, amounting to a total of 30 contact hours a week.

Candidates for admission must be graduates of an accredited secondary school and should rank in the upper third of their class. Special consideration is given to graduates of schools of nursing that are recognized by



the State Board of Nurse Examiners and to students who have passed a college entrance examination. A one-year postgraduate course is offered in the fields of therapy and nuclear medicine.

Nuclear Medicine Technology. This course covers twelve consecutive months divided between didactic course material (319 hours) and practical experience. The student receives a monthly stipend of \$300. Candidates for admission must be registered technologists (A.R.R.T.) or registered nurses with two years of college or with a baccalaureate degree. Medical technologists or persons having a B.S. degree with a major in biology, chemistry, or physics may also be considered if they have completed basic courses in human anatomy and physiology of at least 60 class hours.

Graduate Course in Radiation Therapy Technology. The division of Radiation Oncology offers a twelve-month postgraduate

course in radiation therapy technology. This course consists of 260 hours of didactic material plus extensive practical experience and training in the clinical application and dosimetry procedures of radiation therapy. Approximately 1,400 new patients are treated each year. The equipment includes a 35 MeV linear accelerator, a 4 MeV linear accelerator, a 25 MeV betatron, a cobalt unit, and a superficial ortho-voltage machine. Students obtain experience on each of the therapy machines, as well as in the dosimetry and treatment planning area, and in nursing procedures. Two on-site computers are used for dosimetry and treatment planning computations. In addition, a simulator is available for treatment planning and the students are assigned to this area for a portion of their training.

Lecturer and Educational Director

Armand Diaz, R.N., R.T., Havana University School of Medicine, 1948. (See Department of Radiology)

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Clinical Representative to the Executive Faculty
Dorothy Jones
Clinical Representative to the Executive Committee of the Faculty Council

¹Part-time faculty representative to the Executive Faculty during 1975-76.

²Honorary member.

³Representing the Faculty Council during 1975-76.

⁴The Dean is ex officio a member of all standing committees.

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 John C. Herweg, *ex officio*
 Mabel Purkerson, *ex officio*
 Robert E. Thach
 John L. Schultz, *ex officio*

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 Roy R. Peterson
 John L. Schultz, *ex officio*

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David Goldring
Donald W. Goodwin
Dorothy J. Jones
Harvey Liebhaber
Douglas Meeks



Register of Students

DOCTOR OF MEDICINE DEGREE

Fourth-Year Class 1975-76

Internship 1976-77

Anschuetz, Robert Hilpert, A.B., Harvard College, '65—Loyola University Affiliated Hospitals, Maywood, Illinois

Ater, Stewart Bruce, University of Colorado—Case-Western Reserve Affiliated Hospitals, Cleveland, Ohio

AufderHeide, John Frederick, A.B., University of Missouri, '72—Hospitals of the University of Pennsylvania, Philadelphia, Pennsylvania

Baglan, Robert Joseph, B.S.M.E., University of Kentucky, '65; Ph.D., University of California, '70—Barnes Hospital, St. Louis, Missouri

Baron, Richard Lewis, B.A., Yale University, '72—Yale-New Haven Medical Center, New Haven, Connecticut

Baumwell, Sterling Howard, B.A., University of Rochester, '72—SUNY Affiliated Hospitals, Buffalo, New York

Belcher, James Edward, B.S., Texas Southern University, '72—SUNY Affiliated Hospitals, Buffalo, New York

Bernhoft, Robin Alvin, A.B., Harvard College, '68—University of California Hospitals, San Francisco, California

Blanchard, Lawrence Eley III, B.A., Duke University, '72—Jewish Hospital, St. Louis, Missouri

Blumenthal, Mark Frederick, A.B., Dartmouth College, '72—Barnes Hospital, St. Louis, Missouri

Bosker, Gideon, B.A., University of Pennsylvania, '72—University of Chicago Clinics, Chicago, Illinois

Boyer, Richard Alan, B.A., California State College, '71—Letterman Army Medical Center, San Francisco, California

Brigham, Christopher Roy, A.B., Rutgers College, '72; M.M.S., Rutgers Medical School, '74—Eastern Maine Medical Center, Bangor, Maine

Brinkman, Robert Allen, B.S., Creighton University, '72—Barnes Hospital, St. Louis, Missouri

Buckley, Patrick Joseph, B.S., University of North Dakota, '65; Ph.D., University of Penn-

sylvania, '72; B.S.Med., University of North Dakota, '74—Barnes Hospital, St. Louis, Missouri

Butcher, Eugene Corning, B.S., Massachusetts Institute of Technology, '72—Stanford University Hospital, Stanford, California

Canny, Christopher Richard, A.B., Stanford University, '68—Yale-New Haven Medical Center, New Haven, Connecticut

Cantieri, John Stephen, University of Chicago—Massachusetts General Hospital, Boston, Massachusetts

Carlile, Paul Vore, Jr., B.A., University of Oklahoma, '72—University of Texas SW Affiliated Hospitals, Dallas, Texas

Chausow, Alan Martin, B.S., University of Illinois, '72—Michael Reese Hospital, Chicago, Illinois

Cheng, Tien Hsin, B.S., University of California at Davis, '67; Ph.D., State University of New York at Stony Brook, '72—Peter Bent Brigham Hospital, Boston, Massachusetts

Chiu, Lillian Wah-Ying Shen, A.B., University of California at Berkeley, '72—St. Louis Children's Hospital, St. Louis, Missouri

Collins, Myra Lou, B.S., Duke University, '68—University of Chicago, Chicago, Illinois

Connolly, Mary Elizabeth, B.S., St. Lawrence University, '71—Cincinnati General Hospital, Cincinnati, Ohio

Cooke, Dennis Brian, University of California at Santa Barbara—Grady Memorial Hospital, Atlanta, Georgia

Cooper, Thomas Warren, B.A., Johns Hopkins University, '72—Barnes Hospital, St. Louis, Missouri

Croom, Dorwyn Wayne II, B.S., Southwestern at Memphis, '72—Duke University Medical Center, Durham, North Carolina

Culbertson, Charles Evans, B.A., Northwestern University, '72—Jewish Hospital, St. Louis, Missouri

Dalton, Randall Elliott, B.S., Howard University, '72—Barnes Hospital, St. Louis, Missouri

Delbaum, Andrew Robert, B.A., Yale University, '67; M.M.S., Rutgers Medical School, '74; Ph.D., Indiana University, '74—University of Michigan Affiliated Hospitals, Ann Arbor, Michigan

Deutsch, David Dominic, B.S., North Dakota State University, '70—Los Angeles County, University of Southern California Medical Center, Los Angeles, California

Douglas, James Reyburn, Jr., A.B., Dartmouth College, '70—Ochsner Foundation Hospital, New Orleans, Louisiana

Edelen, Donald Benedict, B.S., University of Notre Dame, '72—University of Kentucky Medical Center, Lexington, Kentucky

Eider, Wendy Roberta, B.A., Queens College of the City University of New York, '71—Barnes Hospital, St. Louis, Missouri

Elliot, Diane Louise, University of Oregon—University of California Hospitals, San Francisco, California

Ensz, Gary Richard, University of Nebraska—University of Nebraska Affiliated Hospitals, Omaha, Nebraska

Ferrigni, Filippo John, B.A., Yale College, '72; M.M.S., Rutgers Medical School, '74—Jewish Hospital, St. Louis, Missouri

Flicker, Michele Rhona, A.B., Radcliffe College, '68; Ph.D., Massachusetts Institute of Technology, '73—Children's Hospital, San Francisco, California

Flint, Coleen Kyle, University of Redlands—U.S. Naval Hospital, San Diego, California

Frank, Bruce Sherwin, B.S., Massachusetts Institute of Technology, '72—Mount Sinai Hospital, Milwaukee, Wisconsin

Garrison, Patricia Jane, A.B., Mount Holyoke College, '71; B.M.S., Dartmouth Medical School, '74—Mary Imogene Bassett Hospital, Coopers-town, New York

Gibbs, Lynn Ralph, B.S., Kansas State University, '71—Barnes Hospital, St. Louis, Missouri

Glazer, Harvey Stanford, A.B., Washington University, '71—Barnes Hospital, St. Louis, Missouri

Goble, Edwin Marlowe, University of Utah—University of Utah Affiliated Hospitals, Salt Lake City, Utah

Goldman, Daniel Isser, B.A., University of Chicago, '72—Barnes Hospital, St. Louis, Missouri

Goran, David Alan, A.B., University of Michigan, '72—Jewish Hospital, St. Louis, Missouri

Greenberger, Jonathan Carl, B.S., Purdue University, '72—University Hospital, San Diego, California

Haar, Richard Henry, A.B., Case-Western Reserve University, '72—Medical College of Virginia, Richmond, Virginia

Hagedorn, Curt, A.B., Rutgers College, '72; M.M.S., Rutgers Medical School, '74—Vanderbilt University Affiliated Hospitals, Nashville, Tennessee

Hammer, Helen Lois, B.S., University of Redlands, '72—University of Oklahoma Hospitals, Oklahoma City, Oklahoma

Hammerman, Albert Mark, Washington University—Jewish Hospital, St. Louis, Missouri

Hammons, Glenn Terrill, B.A., University of Kansas, '66—Barnes Hospital, St. Louis, Missouri

Handler, Glenn Andrew, B.S., Massachusetts Institute of Technology, '71; M.S., University of Michigan, '72—Medical College of Wisconsin Affiliated Hospitals, Milwaukee, Wisconsin

Hardy, Joseph Paul, B.S., University of Nevada, '73—Good Samaritan Hospital, Phoenix, Arizona

Hartmann, Thomas Gerard, B.S.Ch.E., Washington University, '71—University of Maryland Hospital, Baltimore, Maryland



- Henry, Catherine Gail Hegge**, B.A., St. Olaf College, '72—St. Louis Children's Hospital, St. Louis, Missouri
- Henry, William John**, B.A., Augsburg College, '72—Barnes Hospital, St. Louis, Missouri
- Herbold, David Robert**, A.B., Washington University, '68—Barnes Hospital, St. Louis, Missouri
- Heritier, Francoise Jacquelin**, M.S., University of Paris, '68; Ph.D., Washington University, '72—University of Paris, France
- Hetland, Ruth Ellen**, Cornell College—Barnes Hospital, St. Louis, Missouri
- Hood, Terry William**, B.A., Northwestern University, '72—Barnes Hospital, St. Louis, Missouri
- Hsieh, Karl Su**, A.B., Vassar College, '73—Case-Western Reserve Affiliated Hospitals, Cleveland, Ohio
- Hurt, Allen Vincent**, West Virginia University—Los Angeles County, University of Southern California Medical Center, Los Angeles, California
- Jackson, Darwin Clinton**, B.S., Ohio State University, '72—Barnes Hospital, St. Louis, Missouri
- Johnson, Courtney Reagor**, A.B., Harvard College, '67—St. Louis Children's Hospital, St. Louis, Missouri
- Jolley, Stephen G.**, B.S., University of Utah, '72—University of Utah Affiliated Hospitals, Salt Lake City, Utah
- Kendrick, Edward George**, B.A., University of Minnesota, '66; Ph.D., Washington University, '73—University Hospitals, Madison, Wisconsin
- Kiyomura, Robert Shigeru**, B.A., University of California at San Diego, '72—University of Utah Affiliated Hospitals, Salt Lake City, Utah
- Koppenbrink, Walter Edwin III**, A.B., University of Missouri at Columbia, '72—Maricopa County General Hospital, Phoenix, Arizona
- Kream, Steven Jonathan**, B.A., New York University, '72—Mount Sinai Hospital, Milwaukee, Wisconsin
- Krettek, John Edwin, Jr.**, B.S., Regis College, '70—University of California Hospital, Los Angeles, California
- Krohn, Jacqueline Anne**, B.S., University of New Mexico, '72—University of Arizona Medical Center, Tucson, Arizona
- Lai, Cheong Fay**, B.S., California Institute of Technology, '71—University of Washington Affiliated Hospital, Seattle Washington
- Lamberg, Robert Louis**, B.S., University of Missouri at St. Louis, '72—Los Angeles County, University of Southern California Medical Center, Los Angeles, California
- Lewis, Michael**, B.S., Washington University, '72—Barnes Hospital, St. Louis, Missouri
- Litovitz, Toby Lynn**, Oberlin College—Beth Israel Hospital, Boston, Massachusetts
- Lockmiller, Richard Gordon**, A.B., University of Illinois, '72—University of Oklahoma Hospitals, Oklahoma City, Oklahoma
- Loney, Linda Christine**, B.A., University of Kansas, '71—St. Louis Children's Hospital, St. Louis, Missouri
- Lowry, Emily Gerow**, A.B., Boston University, '72—Albany Hospital, Albany, New York
- Lyss, Alan Philip**, A.B., Washington University, '72—Ohio State University Hospitals, Columbus, Ohio
- Magarik, David Eric**, B.S., State University of New York at Stony Brook, '72—Jewish Hospital, St. Louis, Missouri
- Malas, Kenneth Lee**, B.S., Juniata College, '69—University of Minnesota Hospitals, Minneapolis, Minnesota
- Manigo, Oliver, Jr.**, B.S., Savannah State College, '71—Jewish Hospital, St. Louis, Missouri
- Matthews, O. L.**, Tuskegee Institute—Wayne State University Affiliated Hospitals, Detroit, Michigan
- Mavrelis, Peter George**, B.A., University of Chicago, '72—Medical College of Wisconsin Affiliated Hospitals, Milwaukee, Wisconsin
- Mellon, Monte Tim**, B.A., University of Colorado, '71—U.S. Naval Hospital, Jacksonville, Florida
- Mendenhall, Milton Toshio**, B.S., Spring Hill College, '72—Tripler Army Medical Center, Honolulu, Hawaii
- Metcalf, John Holland**, B.A., De Pauw University, '72—U.S. Naval Hospital, San Diego, California
- Milton, John Anthony**, B.A., College of the Holy Cross, '72—University of Louisville Affiliated Hospitals, Louisville, Kentucky
- Mitchell, Bonnie L.**, B.A., Dillard University,

- '67; M.A., Bryn Mawr College, '70—Barnes Hospital, St. Louis Missouri
- Moss, Kenneth Steven**, University of Missouri at St. Louis—University of Texas Southwest Affiliated Hospitals, Dallas, Texas
- Moxley, George Forest**, B.A., Kansas State University, '72—Medical College of Virginia, Richmond, Virginia
- Myers, Michael Steven**, B.A., University of Missouri at St. Louis, '72—Jewish Hospital, St. Louis, Missouri
- Myers, Stuart Ira**, Temple University—Barnes Hospital, St. Louis, Missouri
- Newsome, Carlton Morris**, B.S., Philander Smith College, '72—Bronson-Borgess Hospitals, Kalamazoo, Michigan
- Olson, Neal Reinhart**, A.B., Washington University, '72—University of Minnesota Hospitals, Minneapolis, Minnesota
- Pfaller, Michael Andy**, B.A., Linfield College, '72—Jewish Hospital, St. Louis, Missouri
- Pohlman, Thomas Ralph**, B.A., St. Louis University, '72—University of Kentucky Medical Center, Lexington, Kentucky
- Pratt, Pamela Jo**, A.B., Washington University, '71—Walter Reed Army Medical Center, Washington, D.C.
- Rasmussen, Kent Robert**, B.S.E., Arizona State University, '72—University of Texas Southwest Affiliated Hospitals, Dallas, Texas
- Rasmussen, Virginia Diane Deever**, A.B., Grinnell College, '72—Children's Medical Center, Dallas, Texas
- Ringenberg, Beverly June**, B.A., Northwestern University, '72—Barnes Hospital, St. Louis, Missouri
- Risch, Samuel Craig**, A.B., Stanford University, '72—University Hospital, San Diego, California
- Robins, James Matthew**, Harvard College—Harlem Hospital, New York, New York
- Rugh, Kenneth Scott**, B.S., U.S. Air Force Academy, '72—Malcom-Grow Air Force Medical Center, Washington, D.C.
- Samuels, Lawrence Elliott**, B.A., University of Texas, '72—Barnes Hospital, St. Louis, Missouri
- San Antonio, Richard Patrick**, B.S., Worcester Polytechnic Institute, '71—Walter Reed Army Medical Center, Washington, D.C.
- Schall, James Edward**, Franklin and Marshall College—Geisinger Medical Center, Danville, Pennsylvania
- Schilling, John Philip**, B.A., Cornell College, '69—University of Iowa Hospitals, Iowa City, Iowa
- Schwartz, Lawrence Barry**, B.S., University of Illinois, '70—Barnes Hospital, St. Louis, Missouri
- Seaworth, John Fortune**, B.S., North Dakota State University; B.S.Med., University of North Dakota School of Medicine, '74—Wilford Hall Air Force Medical Center, San Antonio, Texas
- Shanahan, Dennis Francis**, A.B., Middlebury College, '71—Tripler Army Medical Center, Honolulu, Hawaii
- Sherman, Neil Edward**, B.S., Pennsylvania State University, '68—Letterman Army Medical Center, San Francisco, California
- Siegfried, Barry Alan**, B.S.Ch.E., Washington University, '72—University of Utah Affiliated Hospitals, Salt Lake City, Utah
- Siemers, Carolyn Marie**, A.B., Lindenwood College, '70—Barnes Hospital, St. Louis, Missouri
- Simpson, Reed Earl**, B.A., Wabash College, '72—Barnes Hospital, St. Louis, Missouri
- Skinner, Stanley A.**, A.B., Washington University, '73—Jewish Hospital, St. Louis, Missouri
- Snyder, Scott Walter**, B.A., University of Colorado, '72—Jewish Hospital, St. Louis, Missouri
- Spencer, Richard Beck**, B.S., University of Utah, '72—Barnes Hospital, St. Louis, Missouri
- Stapler, Patricia Anne**, B.S., University of Arizona, '72—Walter Reed Army Medical Center, Washington, D.C.
- Stempel, Laurence Eric**, B.S., Michigan State University, '72—Ohio State University Hospitals, Columbus, Ohio
- Sumers, Karen Deborah**, B.A., University of Pennsylvania, '72—Michael Reese Hospital, Chicago, Illinois
- Teranishi, Allan Yo**, B.S., University of California at Berkeley, '68; Ph.D., Massachusetts Institute of Technology, '73—Mount Zion Hospital, San Francisco, California
- Terpenning, Marilou**, A.B., Douglass College, '71; M.M.S., Rutgers Medical School, '74—University of Michigan Affiliated Hospitals, Ann Arbor, Michigan
- Thorncroft, Ian Hall**, A.B., University of

California at Berkeley, '64; M.A., University of Oregon, '66; Ph.D., '68—Los Angeles County, University of Southern California Medical Center, Los Angeles, California

Todd, Kathleen Gail, B.A., Pomona College, '72—University of Washington Affiliated Hospitals, Seattle, Washington

Trice, Jill Ellen, B.S., Philander Smith College, '72—St. Louis Children's Hospital, St. Louis, Missouri

Turk, John Wayne, A.B., Washington University, '70—University of Chicago Clinics, Chicago, Illinois

Turnbaugh, Thomas Ray, A.B., University of Missouri at Columbia, '72—Johns Hopkins Hospital, Baltimore, Maryland

Votava, Henry John, B.S., University of North Dakota, '67; Ph.D., University of North Carolina, '72; B.S.Med., University of North Dakota School of Medicine, '74—University of Minnesota Hospitals, Minneapolis, Minnesota

Wasdyke, Wesley Roger, A.B., Hope College, '64; B.D., Episcopal Theological Seminary, '69—Medical Center Hospital of Vermont, Burlington, Vermont

Weiner, Evelyn Sarah, A.B., Goucher College, '71—Baltimore City Hospitals, Baltimore, Maryland

Weissman, Michael H., B.M.E., Cooper Union, '63; M.S., Northwestern University, '65; Ph.D., '67—Bronx Municipal Hospital Center, Bronx, New York

Willis, Thomas Malcolm, B.A., University of Colorado, '72—Barnes Hospital, St. Louis, Missouri

Wilson, James David, B.S., University of Texas, '72—University of Texas Southwest Affiliated Hospitals, Dallas, Texas

Zide, Sheldon Lawrence, A.B., Washington University, '72—Jewish Hospital, St. Louis, Missouri

Zimmerman, Donald Eugene, B.S.E.E., Massachusetts Institute of Technology, '70; M.S.E.E., '70—Memorial Hospital, Long Beach, California

Zotos, Veronica Demetra, A.B., Washington University, '72—Jewish Hospital, St. Louis, Missouri

Third-Year Class 1975-76

Abensohn, Meryl Kaye, A.B., Washington University, '72—Washington, D.C.

Adams, Jerry Winston, B.S., Morehouse College, '73—Atlanta, Georgia

Adams, Jesse William, B.S., University of California at Berkeley, '73; B.M.S., Dartmouth Medical School, '75—Honolulu, Hawaii

Altmeyer, Vickie Lee, B.S., Yale College, '73—St. Louis, Missouri

Armbruster, Robert George, B.A., University of Notre Dame, '69—Hempstead, New York

Askew, Edward Ray, Jr., A.B., Harvard University, '73—Memphis, Tennessee

Ater, Joann Lynette Miller, A.B., Washington University, '73—Greeley, Colorado

Aul, Christopher Taylor, B.A., Wabash College, '73—Brookfield, Ohio

Baker, Gary Lynn, A.B., University of Nebraska at Lincoln, '73—Omaha, Nebraska

Ballou, Carol Bryan, A.B., Oberlin College, '70—St. Louis, Missouri

Barredo, Victor Hugo, B.S., University of Missouri at Columbia, '72; M.S., '73—Fayette, Missouri

Bell, Laird Arthur, B.S., University of Illinois, '73—Overland Park, Kansas

Berkowitz, Ellis Richard, A.B., Washington University, '73—Leonora, New Jersey

Bernfeld, Barry David, B.A., Queens College, '71—St. Louis, Missouri

Bischoff, Marshall Burnice, B.S., University of Illinois, '60; M.S., '62—St. Louis, Missouri

Bitz, Donald Michael, B.S., University of Illinois, '73; M.S., '73—Freeport, Illinois

Bobzien, Bonnie Ruth, A.B., University of Illinois, '73—Antioch, Illinois

Born, Christopher Paul, B.S., University of Illinois, '73—Normal, Illinois

Bortz, Sheri Lee, A.B., University of Illinois at Urbana, '72—Highland Park, Illinois

Bowen-Williams, Janne Emlyn, B.A., Reed College, '73—Winston-Salem, North Carolina

Bragdon, Andrew Cook, B.S., Bates College, '71; B.M.S., Dartmouth Medical School, '73—Lebanon, New Hampshire

Bridwell, Keith Happ, A.B., Washington University, '73—St. Louis, Missouri

- Brody, Steven Andrew**, A.B., Brown University, '73; M.M.Sc., Brown University School of Medicine, '74—Brooklyn, New York
- Brown, James Trig Perdue**, Drury College—Springfield, Missouri
- Bryan, Bruce Lohrmann**, B.S.M.E., Purdue University, '73—Elgin, Illinois
- Buck, Stanley Wellington**, B.S.E., Princeton University, '73—St. Louis, Missouri
- Campbell, John William**, A.B., Washington University, '73—Louisville, Kentucky
- Carrasco, Charles Ray**, Weber State College—Ogden, Utah
- Chennell, Irene Louise**, A.B., University of California at Santa Cruz, '72—Santa Barbara, California
- Clabots, Joseph Paul**, B.A., St. Louis University, '73—Deerfield, Illinois
- Clardy, David Jerome**, B.A., University of Chicago, '73—Chicago, Illinois
- Clayton, Frederic Christie**, B.A., Rice University, '73—Peoria, Illinois
- Collier, David Harris**, B.A., California Institute of Technology, '73—Fresno, California
- Cornatzer, Nancy Freeman**, B.A., University of North Dakota, '73—Grand Forks, North Dakota
- Davis, James Lawrence**, B.S.E.E., Stanford University, '72—Columbia, Missouri
- Desper, David Dale, Jr.**, A.B., Washington University, '73—St. Louis, Missouri
- Duncombe, Mary Helena**, A.B., Whitman College, '73—Ethete, Wyoming
- Dutton, Jonathan Joseph**, B.A., Queens College, '65; A.M., Harvard University, '67; Ph.D., '71; M.M.S., Rutgers Medical School, '75—Highland Park, New Jersey
- Dwyer, Patrick Nagle**, B.S., University of Notre Dame, '73—Baltimore, Maryland
- Edelstein, Richard David**, A.B., Columbia College, '73—Huntington, New York
- Eggerding, Caroline**, B.S., University of Illinois, '73—Red Bud, Illinois
- Feil, Paul Alan**, B.A., Colorado College, '73—Deming, New Mexico
- Fete, Timothy Joseph**, University of Dayton—St. Louis, Missouri
- Fink, Mitchell Phillip**, B.S., University of California at Davis, '70; M.A., University of California at Irvine, '71—San Rafael, California
- Foster, Norman Louis**, B.A., MacMurray College, '73—Jacksonville, Illinois
- Freeman, Pamela Gail**, B.A., Vanderbilt University, '73—Clarkston, Georgia
- Galster, Allen Dale**, B.S., University of South Dakota, '73—Sioux Falls, South Dakota
- Gilmore, Richard Millard, Jr.**, A.B., Washington University, '73—Tulsa, Oklahoma
- Gleason, Daniel Lee**, B.A., Portland State University, '73—Lake Oswego, Oregon
- Gollobin, Glenn Stephen**, A.B., Oberlin College, '73—Teaneck, New Jersey
- Goodman, Allan Lee**, B.S., University of Illinois, '73—Highland Park, Illinois
- Greene, Warner Craig**, A.B., Stanford University, '71—Mesa, Arizona
- Greenwood, Scott Douglas**, University of Nebraska—Shenandoah, Iowa
- Hanish, Sidney Joseph**, B.A., North Dakota State University, '73; B.S.Med., University of North Dakota School of Medicine, '75—Fargo, North Dakota
- Hatlelid, John Michael**, B.A., St. John's University, '70; B.S.Med., University of North Dakota Medical School, '75—Grand Forks, North Dakota
- Hershey, Charles Owen**, B.A., DePauw University, '69—St. Louis, Missouri
- Hisken, Eric Carnot**, B.S.E.E., University of Washington, '73—Seattle, Washington
- Horstmann, Jonathan William**, A.B., Colgate University, '68—Schenectady, New York
- Ingle, Robert Maurice**, B.A., Florida State University, '69—Tallahassee, Florida
- Jacobson, Peter Lars**, A.B., Princeton University, '73—St. Louis, Missouri
- Johnson, Jeneene Carolyn**, B.S., Upsala College, '64; M.S., Rutgers Graduate School, '66; Ph.D., '71; M.M.S., Rutgers Medical School, '75—New Britain, Connecticut
- Johnson, Richard Anthony**, B.S., University of Washington, '73—Stanwood, Washington
- Jones, Judson Edward**, Purdue University—Aurora, Illinois
- Koch, Gary Alan**, A.B., Grinnell College, '73—East Peoria, Illinois
- Kochan, Andrew**, B.A., Miami University, '73—Oxford, Ohio

Kovnar, Edward Harry, B.S.E.E., Washington University, '73—Omaha, Nebraska

Krauss, Elliot Aryeh, University of Rochester—Teaneck, New Jersey

Kroenke, Kurt Kyle, B.S., Valparaiso University, '73—Shawano, Wisconsin

Lammert, Gary Reyburn, B.S., Purdue University, '72—Greenwood, Indiana

Lanzer, William Linwood, B.A., University of California at Los Angeles, '68; M.Ed., North Carolina State University, '71; M.M.S., Rutgers Medical School, '75—Rutherford, New Jersey

Lee, Kerwin Jong, B.A., University of California at San Diego, '72—Palo Alto, California

Leiner, Matthew Saul, A.B., Rutgers University, '70—Highland Park, New Jersey

Lewis, Edward Sibley, B.A., University of Texas, '73—Austin Texas

Ley, Carl Eugene, B.A., University of Colorado, '66—Greeley, Colorado

Maksem, Adelbert, B.S., John Carroll University, '73—Parma, Ohio

Marcella, Joseph John, A.B., Rutgers University, '72—Fair Lawn, New Jersey

McDonnell, William Foskey III, B.S.E., Tulane University, '72—Gulfport, Mississippi

McLain, Pamela Fullmer, B.S., Birmingham-Southern College, '74—Metairie, Louisiana

Meckler, Gary Mitchell, B.S., Ohio State University, '73—Cleveland, Ohio

Michael, Helen Elizabeth Blair, A.B., Washington University, '73—Boulder, Colorado

Miller, Kay, B.A., University of California at San Diego, '72—Mill Valley, California

Mitzel, Duane Lee, B.S., University of California at Davis, '72—Vallejo, California

Moore, Eileen Emily, B.S., Furman University, '73—Chattanooga, Tennessee

Muntz, Harlan Ray, B.S., Miami University, '73—Dayton, Ohio

Murov, Roslyn Gail, A.B., Washington University, '73—Shreveport, Louisiana

Nesler, Cheryl Lynn, B.A., MacMurray College, '73—Villa Ridge, Missouri

Newman, Alan Philip, A.B., University of California at Berkeley, '73—San Francisco, California

Nottingham, Jane Louise, B.A., Colorado Col-



lege, '72—Morgantown, West Virginia

Nunnery, Eugene, Jr., B.S., Purdue University, '71; M.S., University of California at Berkeley, '73—Hammond, Louisiana

Ogle, John Wendelin, B.S.Ch.E., University of Colorado at Boulder, '73—Denver, Colorado

Paxton, Edward Scott, B.A., Knox College, '73—Evanston, Illinois

Phillips, Thomas Edward, B.A., University of Kansas, '73—Overland Park, Kansas

Pierson, Steven Bruce, B.A., University of Colorado, '73; M.M.S., Rutgers Medical School, '75—Pennington, New Jersey

Ponce, Pamela Neff, A.B., Washington University, '72—St. Louis, Missouri

Pugsley, Mary Phyllis, B.A., Southern Methodist University, '72—Oklahoma City, Oklahoma

Raymond, Kent Howard, Purdue University—St. Louis, Missouri

Reynolds, Barbara Jane, A.B., Connecticut College, '70—St. Louis, Missouri

Rhoades, Daniel Jay, Jr., A.B., Stanford University, '73—Fremont, California

Rich, Eugene Carroll, B.A., University of Mississippi, '73—Gulfport, Mississippi

Ritter, Melody Joy, A.B., Stanford University, '73—Pinckneyville, Illinois

Robbins, Frank Edward, Jr., A.B., Earlham College, '73—LaGrange, Illinois

Robinson, Margaret Lynn, B.S., Stanford University, '73—Los Altos, California

Rollings, John William, Washington University—Springfield, Missouri

Ruddock, Martin Dennis, A.B., Washington University, '73—Hastings, Michigan

Rusche, John Michael, B.S.Ch.E., University of Notre Dame, B.S.Ch.E., University of Notre Dame, '73—LaCrosse, Wisconsin

Sacks, Steven H., B.E., Cooper Union, '72—Bronx, New York

Sato, Richard William, B.A., Johns Hopkins University, '73—St. Louis, Missouri

Schier, John Joseph, B.S.E., Princeton University, '73—St. Louis, Missouri

Schlanger, Stuart Rayfer, B.A., New York University, '70—New York, New York

Schuster, Victor Leonard, University of Nebraska—Lincoln, Nebraska

Seaworth, Barbara Joyce, B.S., North Dakota State University, '70—Grand Forks, North Dakota

Shirley, Frank Arthur, B.A., DePauw University, '73—Indianapolis, Indiana

Shore, Bernard Larry, B.S., Washington University, '72—Cleveland Heights, Ohio

Shore, John William, B.A., University of New Hampshire, '68; B.S.Med., University of North Dakota School of Medicine, '75—Grand Forks, North Dakota

Siegel, Richard Lawrence, A.B., Washington University, '70—Miami, Florida

Slaughter, Margaret Ann, A.B., Talladega College, '68; M.P.H., Yale University, '70—Gadsden, Alabama

Spiegel, Gregory W., A.B., Washington University, '67—St. Louis, Missouri

Spoering, Craig Allen, B.S., Washburn University, '73—Topeka, Kansas

Steger, James Warren, B.S., University of Michigan, '72—Bay Village, Ohio

Steinmetz, William Lee, B.S., Eastern Illinois University, '73—Charleston, Illinois

Strominger, Adele Iris, A.B., University of Chicago, '56; M.S., '60—Delmar, New York

Terrell, Calvin Byron, A.B., Washington University, '73—St. Louis, Missouri

Thiel, Christopher William, B.S., University of Illinois, '73—Mattoon, Illinois

Tobin, Hugh McNair, B.S., Iowa State University, '72—Ames, Iowa

Toth, Phillip Dennis, B.S., Purdue University, '72—Indianapolis, Indiana

Wald, Mark Steven, A.B., Oberlin College, '72—St. Louis, Missouri

Welgus, Howard Glenn, B.A., Rice University, '73—Flushing, New York



Wells, Lionelle Dudley, Jr., B.A., University of Pennsylvania, '73—Weston, Massachusetts
Wheeler, Carroll Ray, B.S., Cameron State College, '71—Lawton, Oklahoma
Williams, Richard Frank, B.S.Ch.E., Washington University, '73—Mount Vernon, Missouri
Willis, Rudolph, B.A., Northwestern University, '73—Chicago, Illinois
Willsky, Eric Michael, B.S.C.E., Massachusetts Institute of Technology, '73—Morristown, New Jersey
Younkin, Scott Wiley, A.B., University of Illinois, '73—Springfield, Illinois

Second-Year Class 1975-76

Albert, Moses Kadranel, B.S., Georgetown University, '74—Arlington, Virginia
Amusa, Kweli Johara, B.S., University of Illinois, '73—Chicago, Illinois
Auffenberg, Robert John, Colorado State University—St. Louis, Missouri
Bastian, Robert Wilfred, B.A., Greenville College, '74—Greenville, Illinois
Blaufuss, Mark Charles, B.S., University of North Dakota, '74—Hebron, North Dakota
Brewer, Keith Frederic, A.B., Indiana University, '74—Wilmington, Delaware
Brown, Laura Jane, B.A., Vassar College, '74—Madison, Wisconsin
Burzloff, Diane Claire, B.S., University of Nebraska, '73; B.S.Med.Tech., '74—Lubbock, Texas
Capps, Robert James, B.S., Stanford University, '74—St. Louis, Missouri
Clark, Carolyn Sue, B.A., Grand Valley State College, '69—Coopersville, Michigan
Clayburgh, Robert Henry, B.A., St. Olaf College, '74—Grand Forks, North Dakota
Colter, Kim David, B.S., University of Missouri at Rolla, '73—Downers Grove, Illinois
Couper, Nicholas Beemer, B.A., University of Virginia, '74—Lexington, Virginia
Crump, Nathaniel Lloyd, B.S., Howard University, '74—St. Louis, Missouri
David, Laura Jean, B.A., Grinnell College, '74—St. Louis, Missouri

Davidson, Raymond Pearson II, B.S., Washington and Lee University, '74—Joplin, Missouri
Demers, Renee Carol, B.A., Northwestern University, '74; M.S., '74—West Orange, New Jersey
Dickler, Andrew Cronson, B.A., University of Hawaii, '74—St. Louis, Missouri
Elterman, Joseph, A.B., Washington University, '74—Little Neck, New York
Engelhardt, Sister Jeffrey, B.A., Briarcliff College, '63—Sioux City, Iowa
Finkel, Richard Sanford, B.A., Washington and Jefferson College, '74—Pittsburgh, Pennsylvania
Frisse, Mark Edwin, B.S., University of Notre Dame, '74—Highland, Illinois
Gallin, Pamela Frances, A.B., Washington University, '74; B.S., '74—White Plains, New York
Galloway, Anthony, B.S., Southern Illinois University, '73—East St. Louis, Illinois
Geggel, Harry Steven, A.B., Princeton University, '74—Elkins Park, Pennsylvania
Gibb, Marcy Lynn, B.S., Washington State University, '72—Bellingham, Washington
Gluck, Charles Arthur, Emory University—New York, New York
Goran, Daniel David, A.B., Washington University, '73—St. Louis, Missouri
Grassie, Charles Robert, B.A., Swarthmore College, '72; M.S., University of Illinois, '74—Hockessin, Delaware
Gunn, Debra Clark, B.A., Fisk University, '72—Greenville, Mississippi
Hartley-Brewer, Valerie Forbes, University of Birmingham—Birmingham, England
Henry, Ann Katherine, B.S., University of Nebraska, '74—Lincoln, Nebraska
Hochreiter, Margaret Campbell, B.S., Maryville College, '66; Ph.D., Johns Hopkins University, '70—Rockville Centre, New York
Holers, Vernon Michael, B.S., Purdue University, '73—Napoleon, Ohio
Hoover, Richard Glenn, B.S., University of Notre Dame, '74—Ramsey, New Jersey
Horn, Mary O'Flaherty, B.A., University of Idaho, '74—Rolling Hills, California
Huck, Robert Love, A.B., Middlebury College, '74—Tarrytown, New York

Jemison, Ada Sue, Wesleyan University—Chicago, Illinois

Juergens, Andrew Louis, Montana State College—Dillon, Montana

Kennerly, Donald Alan, A.B., Harvard College, '74—Darien, Connecticut

Kent, Harold Lee, B.A., Kansas State College of Pittsburgh, '74—Asbury, Missouri

King, Frances Allene, B.S., University of Oklahoma, '66—St. Louis, Missouri

Kirk, Scott Harold, B.S., University of Illinois, '75—River Forest, Illinois

Kleyman, Thomas Ralph, B.S., Syracuse University, '73—St. Louis, Missouri

Koller, Hermann Michael, B.S., Stanford University, '74—Minneapolis, Minnesota

Kreiss, Joan Kathryn, B.A., Reed College, '73—Princeton, New Jersey

Kurlan, Roger Mark, B.A., University of Rochester, '74—Rochester, New York

Kurnik, Brenda Chinn, B.S., Massachusetts Institute of Technology, '74—Flemington, New Jersey

Kurnik, Peter Barry, B.S., Massachusetts Institute of Technology, '74; M.S., '74—Manlius, New York

Kwong, Kwong-Fai, B.S.Ch.E., Washington University, '74; A.B., '74—Kowloon, Hong Kong

Laux, Brian Edward, B.A., University of Delaware, '74; B.S., '74—Wilmington, Delaware

Levinson, Mark Allen, A.B., University of Missouri at Columbia, '73—St. Louis, Missouri

Ley, Timothy James, B.A., Drake University, '74—Des Moines, Iowa

Littman, Dan Rudolf, A.B., Princeton University, '74—Wynnewood, Pennsylvania

Lloyd, Frances Ann, B.A., Millsaps College, '74—Jackson, Mississippi

Ludvigsen, Carl William, Jr., B.A., University of Colorado at Boulder, '74—Littleton, Colorado

Margulies, Thomas Daniel, B.S., University of Iowa, '74—Iowa City, Iowa

Marquardt, Donald Nilan, A.B., Grinnell College, '69; Ph.D., Stanford University, '74—Omaha, Nebraska

Marvel, Carol Ann, B.S., Purdue University, '74—West Lafayette, Indiana



McQueen, Charles Edward, B.S., University of Illinois, '74—Tiskilwa, Illinois

Meldi, Dominic Matthew, B.S., University of Illinois, '74—Wilsonville, Illinois

Merrill, Charles Robert, B.S., University of Southern California, '74—Hemet, California

Michalski, Martha Caroline, B.A., Oakland University, '71—Chevy Chase, Maryland

Milbrandt, Jeffrey Dean, B.S., University of Nebraska, '74—Hooper, Nebraska

Mirikitani, Nola Tamayo, B.A., Wellesley College, '71—Honolulu, Hawaii

Montana, Margaret Anne, B.A., Colorado College, '74—Denver, Colorado

Mooney, Ellen, B.S., University of Utah, '74—Ytri-Njardvik, Iceland

Moran, Stanford Mark, B.S., University of Oklahoma, '70—Oklahoma City, Oklahoma

Morgan, Ross Eric, B.S., Colorado State University, '72; B.S., '74—Wheat Ridge, Colorado

Mullenger, Keith Lee, B.S., Iowa State University, '74—Larchmont, New York

Murphy, Thomas Aquinas, B.S., University of Notre Dame, '74—South Bend, Indiana

Mustin, Henry Dutton, B.A., Haverford College, '73—Haverford, Pennsylvania

- Nasca, David**, A.B., Stanford University, '73—Lockport, New York
- O'Connor, John James**, B.A., University of Missouri at St. Louis, '74—St. Louis, Missouri
- Oldham, John Timothy**, A.B., Washington University, '74—Wheaton, Illinois
- Orlowski, Richard**, B.A., Southern Illinois University at Carbondale, '74—West Frankfort, Illinois
- Ozanich, Katherine Mary**, B.S., University of Pittsburgh, '71—McKees Rocks, Pennsylvania
- Palmer, Ronald Lee**, B.S., University of Florida, '73—Clearwater, Florida
- Pearse, Carlton Sherman**, B.S.Ch.E., University of Colorado at Boulder, '73—Denver, Colorado
- Poindexter, Theresa Parker**, B.A., Pomona College, '73—Pasadena, California
- Portnoff, Lee Stuart**, B.S., Purdue University, '72; M.A., University of California at Berkeley, '74—St. Louis, Missouri
- Reed, Barbara Diane**, Purdue University—Columbus, Indiana
- Renie, William Andrew**, A.B., Washington University, '73—Springfield, Missouri
- Rhinehart, Kenneth Bernard**, B.S., Duke University, '74—Winston-Salem, North Carolina
- Risch, Janet Narkewicz**, A.B., Stanford University, '72; A.M., Washington University, '74—Palos Verdes Estates, California
- Robinette, Charles Leonard, Jr.**, B.E., Vanderbilt University, '65—Seattle, Washington
- Rose, Carol Grammer**, B.S., Duke University, '74—Centreville, Virginia
- Rubin, Jeffrey Steven**, A.B., Harvard College, '74; A.M., '74—New City, New York
- Schieber, Marc Hudson**, A.B., Washington University, '74—Winter Park, Florida
- Schmitz, Robert Lowell**, A.B., Stanford University, '74—Menlo Park, California
- Schwartz, Mary Rebecca**, A.B., Stanford University, '74—Stanford, California
- Schweitzer, John B.**, B.S.E.E., Washington University, '74—St. Louis, Missouri
- Shega, John Francis**, B.S.E.E., University of Pittsburgh, '74—McKeesport, Pennsylvania
- Sisk, Clark Edmund**, A.B., Stanford University, '74—St. Louis, Missouri
- Spaulding, Sandra Louise**, B.A., Montana State University, '74—Helena, Montana
- Spellen, Carol Denise**, B.S., Duke University, '74—Atlanta, Georgia
- Spoon, Donald Ray**, B.S., United States Air Force Academy, '64—Pleasant Hill, Missouri
- Spratt, Lorenzo**, B.S., Prairie View A and M College, '69—McCamey, Texas
- Stillings, Susan Nelson**, A.B., Oberlin College, '69; A.M., '71—St. Louis, Missouri
- Stricker, Charles**, A.B., University of Missouri at Columbia, '73—St. James, Missouri
- Stull, John Davis**, B.S., University of Illinois, '74—Olney, Illinois
- Sweeney, Thomas Kevin**, A.B., Cornell University, '74—Ithaca, New York
- Thaler, Bruce Jay**, A.B., Hamilton College, '74—Laurel Hollow, New York
- Thompson, Jimmie Lee**, B.S., Tougaloo College, '72—Madison, Mississippi
- Tollefsen, Douglas Meyer**, A.B., Grinnell College, '70—St. Louis, Missouri
- Turner, Donn Martin**, B.A., Colorado College, '74—Denver, Colorado
- Wahl, Richard Leo**, B.A., Wartberg College, '74—Waverly, Iowa
- Walker, Gaylord Tenold**, B.A., University of the South, '74—Mobile, Alabama
- Watkins, David Lynn**, A.B., University of Missouri at Columbia, '74—Lancaster, Missouri
- Webber, Paul Michael**, B.S., U.S. Military Academy, '74—St. Louis, Missouri
- Weber, Rochelle**, B.A., Wellesley College, '74—Baldwin, New York
- Wesson, Donald Everett**, B.S., Massachusetts Institute of Technology, '74—Centreville, Illinois
- White, David Scott**, Antioch College—St. Louis, Missouri
- White, John Robert**, B.S., University of Kentucky, '74—Marion, Kentucky
- Wilkenson, Robin Ann**, B.A., University of Texas at Austin, '74—Austin, Texas
- Wincek, Thomas John**, B.S., University of Minnesota, '70—Salt Lake City, Utah
- Witkowski, Francis Xavier**, B.S.E.E., Manhattan College, '69; M.S., Northeastern University, '72—Long Island City, New York

Young, Stephen Granville, A.B., Princeton University, '74—Topeka, Kansas

First-Year Class 1975-76

Adams, Ava Marie, B.S., Loyola University, '75—Chicago, Illinois

Anderson, Dale Johnson, A.B., Oberlin College, '75—St. Louis, Missouri

Armbruster, Thomas John, B.A., Adelphi University, '75—Rockville Centre, New York

Attiah, Augustine Kwadno, University of Chicago—Crystal Lake, Illinois

Babcock, Susan Kay, B.A., Augsburg College, '75—Anoka, Minnesota

Barker, Kendall Howard, A.B., Oberlin College, '75—Grosse Pointe Farms, Michigan

Bartmess, John Edgar, B.A., Vanderbilt University, '74—Sheffield, Alabama

Beatie, William Edward, B.S., Northwestern University, '74—Chicago, Illinois

Blodi, Christopher Frederick, B.A., University of Iowa, '75—Iowa City, Iowa

Bradley, Stephen Kent, B.A., Duke University, '75—Lenexa, Kansas

Breitmeyer, James Bradley, University of California at Santa Cruz—Atherton, California

Brotherson, Kurt Jeffrey, A.B., Washington University, '75—Springfield, Illinois

Brown, Harry William, B.A., Grand Valley State College, '75—Muskegon, Michigan

Brown, Stephanie Cordell, Williams College—Brooklyn, New York

Bucy, Ralph Patterson, B.A., Austin College, '75—Sherman, Texas

Burger, Gerald Arthur, Jr., B.S., U.S. Naval Academy, '75—Overland Park, Kansas

Burroughs, Kim D., B.A., University of Colorado, '75—Littleton, Colorado

Camuto, Alice Ackerman, A.B., Sarah Lawrence College, '75—New York, New York

Chaitkin, George Alan, B.S., Stanford University, '74—Skokie, Illinois

Cichon, Jeffrey Peter, St. Louis University—Clifton, New Jersey

Clark, John Ross, B.S., Brown University, '75—Philadelphia, Pennsylvania

Clifton, Devoree Ann, B.S., Regis College, '75—Denver, Colorado

Coe, Jeffrey Dean, B.S.E.E., University of Notre Dame, '75—San Antonio, Texas

Connor, Robert Emmet, B.S., Massachusetts Institute of Technology, '75—Ossining, New York

Cook, Debra Lynn, B.S., Denison University, '75—Park Ridge, Illinois

Craver, Jeffrey Lloyd, A.B., Cornell University, '75—Pelham Manor, New York

Derechin, Neil Mark, B.A., Brown University, '75—St. Paul, Minnesota

DiMarco, Jack Peter, B.S., St. John's University, '75—Jackson Heights, New York

Doan, Nancy Grace, B.A., St. Olaf College, '75—Minnetonka, Minnesota

Dooley, David Patrick, B.S., University of Notre Dame, '75—Sharonville, Ohio

Dumler, Thomas Lee, B.A., Colorado College, '74—Denver, Colorado

Ferguson, Thomas Bruce, Jr., B.A., Williams College, '75—St. Louis, Missouri

Fillingame, Ralph Alan, B.S., University of California at Davis, '75—Red Bluff, California

Fishman, Leslie E., B.S., University of Michigan, '75—Pittsburgh, Pennsylvania

Fitts, William Elton, B.A., Boise State University, '75—Boise, Idaho

Fogel, Sandy Lewis, A.B., Washington University, '75—Monsey, New York





Forstate, William Jacob, B.A., Washington and Jefferson College, '68—North Miami Beach, Florida

Frame, John Raymond, University of Oklahoma—Mequon, Wisconsin

Frankel, Scott Jay, A.B., Grinnell College, '75—St. Louis, Missouri

Freter, Carl Ernest, B.A., University of California at San Diego, '75—San Diego, California

Fricke, William Allen, A.B., Washington University, '71—Jacksonville, Illinois

Friedman, Kenneth Stan, B.A., Kenyon College, '75—Lawrence, New York

Garnes, Arista, University of Chicago—Baltimore, Maryland

Georgieff, Michael Kara, B.A., Yale University, '75—St. Louis, Missouri

Gibson, John Ragan, B.A., Vanderbilt University, '73—Nashville, Tennessee

Goodman, Andrew Kemper, B.A., University of Wisconsin, '72—West Orange, New Jersey

Green, Michael Richard, B.S., University of Wisconsin, '74—St. Louis, Missouri

Gregorie, Erik Martin, B.A., Lehigh University, '75—Alexandria, Virginia

Gregory, Donald Wayne, B.A., Pacific College of Fresno, '75—Fresno, California

Gross, Robert Alan, A.B., Harvard College, '75—Worcester, Massachusetts

Hairston, Cheryl Cole, B.A., Fisk University, '74—Jacksonville, Florida

Hairston, Frank Noel, B.A., Fisk University, '74—Martinsville, Virginia

Hanson, John Stephen, B.A., University of Missouri at St. Louis, '74—St. Louis, Missouri

Holliman, Cecil James, B.S., Duke University, '75—Blackburg, Virginia

Hu, David Chung Kuen, B.S., University of Minnesota, '75—Kowloon, Hong Kong

Jackson, Gregory Donald, A.B., Indiana University, '69; B.S., '70; O.D., '72—Wichita, Kansas

Jacobs, Danny Odell, A.B., Harvard College, '75—Camden, Arkansas

James, Arthur Ruebin, B.A., Stanford University, '74—Los Angeles, California

Johnston, Kathryn Joyce, B.S., University of California at Davis, '75—Oakdale, California

Kaczmar, Theodore, Jr., A.B., Princeton University, '75—Cheltenham, Pennsylvania

Karwoski, Gene Gary, Colorado State University—St. Paul, Minnesota

Kimmey, Michael Bryant, A.B., Washington University, '75—Grand Junction, Colorado

Kolb, Susan Elizabeth, Johns Hopkins University—LaVale, Maryland

Kraemer, Bruce Alan, B.S., University of Tulsa, '75—Tulsa, Oklahoma

Kunkel, Steve Edward, A.B., University of Missouri at Columbia, '75—Mankato, Minnesota

Langguth, Steven David, A.B., Drury College, '75—Overland, Missouri

- Larsen, Robert Allen**, B.A., Colorado College, '74—Denver, Colorado
- Lebovitz, Russell Martin**, University of Michigan—Pittsburgh, Pennsylvania
- Leonard, Patrice Ann**, B.A., University of Colorado, '74—Boulder, Colorado
- Liu, Kathy Jung-Mei**, A.B., Washington University, '74—St. Louis, Missouri
- Lovejoy, Bette Anne**, B.S., Tufts University, '75—Pittsfield, Massachusetts
- Lowenstein, Gail Irene**, B.S., Fordham University, '75—New York, New York
- Lund, Robert Herluf, Jr.**, B.A., Williams College, '75—St. Louis, Missouri
- Manigo, Dora Heard**, B.S., Savannah State College, '71—Elberton, Georgia
- Maret, Christopher Richard**, A.B., Washington University, '75—St. Louis, Missouri
- Marquardt, Diana Lee**, B.A., David Lipscomb College, '75—Vail, Colorado
- McGee, Steven Roy**, B.S., Oregon State University, '75—Portland, Oregon
- Melman, Kenneth Howard**, A.B., University of Michigan, '75—St. Louis, Missouri
- Miller, Edward Charles**, B.S.E.E., University of Missouri at Columbia, '75—St. Louis, Missouri
- Mitchell, Carol Marie**, B.S., University of Southern California, '75—St. Louis, Missouri
- Molitoris, Bruce Albert**, B.S., University of Illinois, '73—New Berlin, Illinois
- New, Nancy Beth**, University of Colorado—Scottsdale, Arizona
- Opila, Donald Andrew**, B.S., Michigan State University, '75—Chicago Heights, Illinois
- Owen, James Wilson III**, B.A., Southern Methodist University, '75—Bartlesville, Oklahoma
- Parker, Keith Langston**, Williams College—St. Louis, Missouri
- Patton, Timothy John**, University of Washington—Seattle, Washington
- Piercy, Stephen Lester**, B.A., Greenville College, '74—Ellery, Illinois
- Poindexter, James Milton, Jr.**, B.A., Northwestern University, '75—Chicago, Illinois
- Ratcliffe, Stephen Douglas**, B.S., Bethany College, '74—New Martinsville, West Virginia
- Robinson, David Edward**, B.S., Duke University, '74—Bethesda, Maryland
- Roden, Raymond Alan**, B.S., Northern Illinois University, '74—South Holland, Illinois
- Rosenberg, Robert David**, University of California at Riverside—Encino, California
- Rowell, David Paul**, B.S., Oregon State University, '75—Salem, Oregon
- Rudloff, Mary Anne**, B.A., University of North Carolina, '71—Eglin AFB, Florida
- Sando, William Craig**, B.S.E., Duke University, '75—Kettering, Ohio
- Sanofsky, Stephen Jay**, B.A., Northwestern University, '75—St. Louis, Missouri
- Sayre, Robert Lynn**, B.S., Colorado State University, '75—Delta, Colorado
- Schmitt, Philip John**, B.S.Ch.E., Washington University, '75—Kansas City, Missouri
- Schwob, James Edward**, B.S., University of Iowa, '75—Iowa City, Iowa
- Scissors, Kenneth Neil**, Tulane University—St. Louis, Missouri
- Secor, Mark Richard**, B.A., Johns Hopkins University, '75—Omaha, Nebraska
- Sedman, Allen Jeffrey**, B.S.Ch.E., University of Michigan, '69; B.S., '69; M.S., '73; Ph.D., '74—Southfield, Michigan
- Shapiro, Martin Robert**, A.B., Hamilton College, '75—Sands Point, New York
- Sheffner, Steven Elliott**, B.S., Tulane University, '75—Livingston, New Jersey
- Shipp, Margaret Ann**, B.S., Southern Methodist University, '75—Houston, Texas
- Sidorow, Barry Jay**, A.B., Washington University, '74—Oceanside, New York
- Silverman, Howard Jay**, B.A., Skidmore College, '75—Massapequa, New York
- Smith, Gary Mark**, B.S., U.S. Air Force Academy, '64; M.S.Astr., Purdue University, '65—Duarte, California
- Sortwell, Cynthia Gerry**, B.A., Boston University, '75—Sherborn, Massachusetts
- Stiverson, Richard Kent**, B.S., Colorado State University, '74—Northglenn, Colorado
- Stuart, Catherine Hyde**, A.B., Cornell University, '74—Garden City, New York
- Sundermann, Richard Henry, Jr.**, B.A., Vanderbilt University, '74—Little Rock, Arkansas
- Swensson, Erik Earl**, A.B., Drury College, '75—Springfield, Missouri

Tabas, Ira Abram, B.S., Tufts University, '75—Cheltenham, Pennsylvania

Terrell, Wanda Tyrone, A.B., Washington University, '75—Memphis, Tennessee

Trout, Anne Carla, A.B., Washington University, '75—Denver, Colorado

Udey, Mark Charles, B.S., University of Wisconsin at Madison, '75—Fort Atkinson, Wisconsin

Weinstein, James Barry, A.B., Washington University, '74—Pittsburgh, Pennsylvania

Weltin, Gregory Gerhardt, B.S.E.E., Washington University, '75—St. Louis, Missouri

Wen, Julia Youkar, B.A., Wellesley College, '75—Hong Kong

Wershil, Barry Kent, A.B., Washington University, '75—East Massapequa, New York

Wheeler, Dawn Elaine, B.S., University of Minnesota, '75—St. Paul, Minnesota

Whitehead, Daniel William, Jr., Drexel University—Sharon Hill, Pennsylvania

Willer, Gary Alan, A.B., Washington University, '74—St. Louis, Missouri

Wilson, Arthur Jewell III, B.A., University of Chicago, '75—Chicago, Illinois

Winokur, Thomas Seth, B.S., Stanford University, '75—Iowa City, Iowa

Wright, Jeffrey Mason, B.S., Vanderbilt University, '75—St. Louis, Missouri

Yeh, Shirley, B.S., Purdue University, '75—West Lafayette, Indiana

Zakem, James Francis, B.S., University of Michigan, '74—Grosse Pointe Park, Michigan

SUMMARY OF STUDENTS IN THE SCHOOL OF MEDICINE

First-year Class	129
Second-year Class	118
M.S.T.P. Students in Graduate Phase of Program	23
Third-year Class	133
Fourth-year Class	138
Total	541

MEDICAL SCIENTIST TRAINING PROGRAM

Doctor of Medicine and Doctor of Philosophy Degrees

Eighth-Year Trainees 1975-76

Collins, Myra Lou, B.S., Duke University, '68—Marshville, North Carolina

Herbold, David Robert, A.B., Washington University, '68—St. Louis, Missouri

Spiegel, Gregory W., A.B., Washington University, '67—St. Louis, Missouri

Seventh-Year Trainee 1975-76

Schmidt, Robert Edward, A.B., Washington University, '69—St. Louis, Missouri

Sixth-Year Trainees 1975-76

Clark, Howard Brent, B.A., Macalester College, '70—Truman, Minnesota

Douglas, James Reyburn, Jr., A.B., Dartmouth College, '70—Memphis, Tennessee

Krettek, John Edwin, Jr., B.S., Regis College, '70—Council Bluffs, Iowa

Schwartz, Lawrence Barry, B.S., University of Illinois, '70—Glencoe, Illinois

Siegel, Richard Lawrence, A.B., Washington University, '70—Miami, Florida

Tollefsen, Douglas Meyer, A.B., Grinnell College, '70—St. Louis, Missouri

Turk, John Wayne, A.B., Washington University, '70—Crystal City, Missouri

Fifth-Year Trainees 1975-76

Bedford, Michael Ray, B.S.E.E., Northwestern University, '71—Watertown, Wisconsin

Boron, Walter Frank, B.A., St. Louis University, '71—Elyria, Ohio

Frost, John James, A.B., Washington University, '71—Tulsa, Oklahoma

Greene, Warner Craig, A.B., Stanford University, '71—Mesa, Arizona

Mayers, Douglas Bruce, A.B., Washington University, '71—Coral Gables, Florida

Nelson, Donald Michael, B.A., Cornell College, '71—Oneida, Illinois

Rubin, Eugene Harold, B.A., University of Rochester, '71—Brookline, Massachusetts

Stricklin, George Putnam, B.A., David Lipscomb College, '71—Palatka, Florida

Fourth-Year Trainees 1975-76

Estridge, Mitchael Gene, B.A., Berea College, '72—Berea, Kentucky

Leavitt, Randi Yvette, B.S., Brooklyn College, '72—Brooklyn, New York

Pischell, Ken Donald, B.S., California Institute of Technology, '72—Santa Barbara, California

Saper, Clifford Baird, B.S., University of Illinois, '72—Highland Park, Illinois

Silverman, Robert Eliot, B.A., University of Pennsylvania, '72—Silver Spring, Maryland

Warren, Robert Wells, B.A., Yale College, '72—Athens, Georgia

Third-Year Trainees 1975-76

Chaplin, David Dunbar, A.B., Harvard College, '73—St. Louis, Missouri

Gorin, Fredric Austin, B.S., University of California at Davis, '73—Hillsborough, California

King, Gregory Steven, B.A., University of Kansas, '73—Lenexa, Kansas

Lichtman, Jeff William, A.B., Bowdoin College, '73—Rehoboth, Massachusetts

Miletich, Joseph Paul, B.S., Michigan State University, '72—Akron, Ohio

Perlmutter, Roger Matthew, B.A., Reed College, '73—Denver, Colorado

Salzer, James Lawrence, Stanford University—Worcester, Massachusetts

Whittenberger, Brock Poston, B.A., Amherst College, '73—Grand Rapids, Michigan

Second-Year Trainees 1975-76

Kennerly, Donald Alan, A.B., Harvard College, '74—Darien, Connecticut

Laux, Brian Edward, B.A., University of Delaware, '74; B.S., '74—Wilmington, Delaware

Li, Ellen, B.S., Stanford University, '74—Chicago, Illinois

Littman, Dan Rudolf, A.B., Princeton University, '74—Wynnewood, Pennsylvania

Ludvigsen, Carl William, Jr., B.A., University

of Colorado at Boulder, '74—Littleton, Colorado

Portnoff, Lee Stuart, B.S., Purdue University, '72; M.A., University of California at Berkeley, '74—St. Louis, Missouri

Rubin, Jeffrey Steven, A.B., Harvard University, '74; A.M., '74—New City, New York

Schieber, Marc Hudson, A.B., Washington University, '74—Winter Park, Florida

Sweeney, Thomas Kevin, A.B., Cornell University, '74—Ithaca, New York

First-Year Trainees 1975-76

Breitmeyer, James Bradley, University of California at Santa Cruz—Atherton, California

Bucy, Ralph Patterson, B.A., Austin College, '75—Sherman, Texas

Freter, Carl Ernest, B.A., University of California at San Diego, '75—San Diego, California

Green, Michael Richard, B.S., University of Wisconsin, '74—St. Louis, Missouri

Gross, Robert Alan, A.B., Harvard College, '75—Worcester, Massachusetts

Lebovitz, Russell Martin, University of Michigan—Pittsburgh, Pennsylvania

Parker, Keith Langston, Williams College—St. Louis, Missouri

Schwob, James Edward, B.S., University of Iowa, '75—Iowa City, Iowa

Tabas, Ira Abram, B.S., Tufts University, '75—Cheltenham, Pennsylvania

Udey, Mark Charles, B.S., University of Wisconsin at Madison, '75—Fort Atkinson, Wisconsin

Wilson, Arthur Jewell III, B.A., University of Chicago, '75—Chicago, Illinois

GRADUATE PROGRAM IN HEALTH CARE ADMINISTRATION

Second-Year Class 1975-76

- Arnold, James M.**, B.A., St. Mary's College, '70—Chicago, Illinois
- Baldoni, Samuel V.**, A.B., Indiana University, '71—South Bend, Indiana
- Beasley, Dean M.**, A.B., University of Chattanooga, '66—Chattanooga, Tennessee
- Berry, James M.**, B.S., University of Texas, '64—Graham, Texas
- Britton, James M.**, B.S., Morehouse College, '72—St. Louis, Missouri
- Carver, John W.**, B.A., Trinity University, '74—Corpus Christi, Texas
- Dauten, Thomas C.**, B.S.B.A., Washington University, '73—Kirkwood, Missouri
- Davis, Frank H.**, B.A., DePauw University, '74—Boston, Massachusetts
- Day, Dennis M.**, B.A., Western Illinois University, '69—Brentwood, Missouri
- Dooling, M. Joan**, B.S., St. Louis University, '69—Oklahoma City, Oklahoma
- Foresman, William W.**, B.A., University of Oklahoma, '73; M.A.P.A., '74—Tulsa, Oklahoma
- Frey, Billy R.**, B.S., University of Illinois, '71; M.Ed., Georgia State University, '73—Kankakee, Illinois
- Gebhardt, Robert K.**, A.B., University of Missouri, '73—St. Louis, Missouri
- Goodman, Bernard**, B.S., Bethune-Cookman College, '73—New York, New York
- Gritzke, Kevin A.**, B.A., University of Pennsylvania, '73—Auburn, New York
- Grossmeier, John C.**, B.A., University of Wisconsin, '73—Milwaukee, Wisconsin
- Hartman, Andrew P.**, B.S., University of Florida, '67; M.B.A., University of Montana, '71—Philadelphia, Pennsylvania
- Herzog, Barry D.**, B.A., Yankton College, '72—Brooklyn, New York
- Holder, Judd F.**, B.A., Southern Illinois University, '70; M.A., '71—Murphysboro, Illinois
- Hooton, Carl J.**, B.S.B.A., Quincy College, '73—Hannibal, Missouri
- Jones, Craig W.**, A.B., Grove City College, '74—Birmingham, Michigan
- Lancaster, Elizabeth**, B.A., Southwestern at Memphis, '73—Bay City, Texas
- Macfarland, Henry J.**, B.A., University of Kansas, '71—Highland Park, Illinois
- Marshall, Robert V.**, B.A., Texas Christian University, '67—Fort Riley, Kansas
- Maurer, Robert P.**, B.S., University of Cincinnati, '73—Cincinnati, Ohio
- Moss, Robert J.**, B.S., The Citadel, '68—Yakima, Washington
- Olson, Gary R.**, B.A., Illinois State University, '72—Rockford, Illinois
- Page, Beryl C.**, B.S., Washington University, '74—St. Louis, Missouri
- Pellicer, Sister Mary**, B.S., Barry College, '73—St. Augustine, Florida
- Price, Thomas W.**, B.S., North Missouri State University, '74—Brookfield, Missouri
- Privett, James E.**, B.S., University of Louisville, '74—Stearns, Kentucky
- Register, Odell S.**, B.S., Kansas State College, '64; M.S., University of Kansas, '68—Kansas City, Kansas
- Robinson, Calvin R.**, B.S., Tougaloo College, '73—Trinidad, West Indies



Sattley, William R., A.B., Webster College, '70; A.M., Washington University, '72—Inglewood, California

Schmieding, Janet L., B.S., Northwestern University, '60—Ballwin, Missouri

Stokes, Gary L., B.S., Bethany Nazareth College, '73—Denver, Colorado

Templeton, Robert J., B.A., University of South Dakota, '69—Anniston, Alabama

Vance, Robert J., B.S., Indiana University, '71—Gary, Indiana

First-Year Class 1975-76

Ambrosius, Mark R., B.B.A., University of Cincinnati, '73—Cincinnati, Ohio

Breckenridge, Mary E., B.S.N., St. Louis University, '72—Charleston, Missouri

Brinkers, John A., B.S., University of Cincinnati, '65; M.S., '69—Cincinnati, Ohio

Brown, Scott E., B.S., Brigham Young University, '70; M.S., '72—Provo, Utah

Burleson, Roger D., B.A., Ohio State University, '72—Eccles, West Virginia

Call, Scott J., B.S., Brigham Young University, '69—Soda Springs, Idaho

Callahan, Keith L., B.A., Trinity College, '74—Detroit, Michigan

Carlson, Leslie D., B.S., Elmhurst College, '75—Chicago, Illinois

Dick, Marvin E., B.A., St. Meinrad College, '57; M.A., Indiana University, '64—Evansville, Indiana

Fale, Randall J., B.S., University of Wisconsin, '69—Sheboygan, Wisconsin

Flanders, William R., B.S., Arizona State University, '71—Oak Park, Illinois

Frank, Russell A., A.B., Washington University, '74—Baltimore, Maryland

Gustafson, Philip P., B.A., MacMurray College, '69; M.S., Southern Illinois University, '72—Clinton, Massachusetts

Hines, Chester, B.A., Harris Teachers College, '69; A.M., Washington University, '74—Macon, Mississippi

Hutchinson, Arless E., B.S., Louisiana State University, '74—Baton Rouge, Louisiana

Jordan, Stephen M., B.A., University of Texas, '74—Dallas, Texas



Kaja, Stephen M., B.S., University of Missouri, '72—Topeka, Kansas

Keller, Suellen M., B.S., Washington University, '75—Fort Dodge, Iowa

Kilani, Rawhi Z., B.S., University of Madrid, '71—Nazareth, Jordan

Krekeler, Barbara S., A.B., Washington University, '73—Valparaiso, Indiana

Kretchmer, Keith R., A.B., Washington University, '73—Evanston, Illinois

Kulesher, Robert R., B.A., Villanova University, '74—Washington, D.C.

Luehrs, Paul R., B.S., North Dakota State University, '72—Sheboygan, Wisconsin

Marmurek, Steven R., B.A., University of Ne-

braska, '75—Lincoln, Nebraska

McKean, Sister Mary Faith, B.A., Mount St. Agnes College, '51; M.A., University of Michigan, '52; Ph.D., Catholic University of America, '59—Washington, D.C.

Menard, Dennis A., B.S., University of New Hampshire, '71—Woonsocket, Rhode Island

Mikola, Richard, B.A., Belmont Abbey College, '73—Olean, New York

Nelson, Victoria E., B.A., Washburn University, '75—St. Louis, Missouri

Pence, Roger L., B.B.A., University of Cincinnati, '74—Sidney, Ohio

Person, James M., B.A., Macalester College, '73—Springfield, Missouri

Rabideau, Meredith A., B.A., Occidental College, '75—Los Alamos, New Mexico

Rallison, Stephen J., B.S., Brigham Young University, '73—Logan, Utah

Ramer, James E., B.S., Lambuth College, '74—Jackson, Tennessee

Richardson, Darrel C., B.S., University of Missouri, '75—Brookfield, Missouri

Ripcho, Stanley W., P.P., University of Notre Dame, '75—Cleveland, Ohio

Rosenbaum, Donald H., B.A., DePauw University, '74—Gary, Indiana

Schopp, David N., B.S., Iowa State University, '75—Milwaukee, Wisconsin

Scott, Thomas D., B.M.E., University of Evansville, '55; B.S., '72—Sturgis, Kentucky

Sensenbrenner, Peter, B.A., Denison University, '75—Appleton, Wisconsin

Shafer, Jerald E., B.S., South Dakota State University, '69; M.S., University of Arkansas, '74—Burke, South Dakota

Small, Norma F., B.A., Miami University, '56—Cleveland, Ohio

Suellentrop, Blair R., B.S., Oklahoma State University, '75—San Bernadino, California

Syron, Edward P., B.S., Ithaca College, '71—Schenectady, New York

Thornton, Daryl W., B.S., Wichita State University, '75—Wichita, Kansas

Wintringham, Karen, B.A., Colby College, '73—Somerville, New Jersey

Wolfard, Rodney B., B.A., University of Oklahoma, '68—Charleston, West Virginia

PROGRAM IN OCCUPATIONAL THERAPY

Senior Class 1975-76

Bartley, Margaret Eileen, Washington University—Cincinnati, Ohio

Barton, Patricia Marion, Southeastern Iowa Community College—Burlington, Iowa

Berg, Lisa Michen, Illinois Central College—Peoria, Illinois

Blumenthal, Dorothy Ann, University of Illinois—Skokie, Illinois

Bobnar, Roseann Marie, University of Missouri, St. Louis—Ballwin, Missouri

Bonskowski, Cynthia Yewell, University of Missouri, St. Louis and Columbia—Eureka, Missouri

Borgardt, Phyllis Lucille, California State University, Fresno—St. Louis, Missouri

Center, Valerie Joan, University of New Hampshire—New Milford, Connecticut



- Cherrick, Debra Sue**, Washington University—St. Louis, Missouri
- Gielow, William Charles, Jr.**, Meramec Community College—St. Louis, Missouri
- Grund, Lisa Kay**, University of Minnesota—Des Moines, Iowa
- Hohn, Carol Ann**, Washington University—St. Louis, Missouri
- Lipschutz, Cynthia Frances**, Washington University—Poughkeepsie, New York
- Seagraves, Patricia Ann**, University of Missouri—St. Louis, Missouri
- Utley, Belinda Mary**, Westark Junior College—Fort Smith, Arkansas
- Wenzel, Louise Marie**, Washington University—Glen Ellyn, Illinois
- Wilson, Susan Ann**, Jefferson College—Arnold, Missouri
- Woods, Francesca Owen**, Washington University—St. Louis, Missouri

Junior Class 1975-76

- Bascomb, Sara Anne**, Cornell College—St. Louis, Missouri
- Benz, Denise Frances**, B.S., University of Missouri (St. Louis), 1975—St. Louis, Missouri
- Bogy, Doris Lue**, Washington University—Pine Bluff, Arkansas
- Caruso, Lynn Anne**, University of South Florida—Mt. Kisco, New York
- Costa, Martha Mary**, Maryville College—Springfield, Illinois
- Eichler, Linda Carolynn**, Washington University—St. Louis, Missouri
- Fredlich, Lauren Cay**, Washington University—St. Louis, Missouri
- Geders, Mary Claire**, Meramec Community College—St. Louis, Missouri
- Harder, Linda Susan**, University of Delaware—Wilmington, Delaware
- Januschka, Susan Rose**, B.A., University of Minnesota, 1975—LeSueur, Minnesota
- Kagen, Cheryl Sue**, Washington University—Milwaukee, Wisconsin
- Kreiter-Bertram, Cynthia Lynn**, Kellogg Community College—Battle Creek, Michigan
- Leighton, Judith Louise**, Rockland Community College—Spring Valley, New York
- McCarthy, Mary Elizabeth**, University of Missouri, Columbia and St. Louis—St. Louis, Missouri
- McCloskey, Ellen Brooke**, Tulsa Junior College—Tulsa, Oklahoma
- Mandel, Robin Joy**, University of Missouri (Columbia and St. Louis)—St. Louis, Missouri
- Meyers, Susan K.**, Washington University—St. Louis, Missouri
- Moxey, Daniel**, MacMurray College—Nassau, Bahamas
- Oates, Deborah Ann**, Washington University—St. Louis, Missouri
- Regan, Kathleen Ann**, Florissant Valley Community College—St. Louis, Missouri
- Rothstein, Anne Therese**, Washington University—Rockford, Illinois
- Staenberg, Beth**, Colorado State University—Omaha, Nebraska
- Topolewski, Carol Sue**, Elgin Community College—Elgin, Illinois



Toyne, Mary Ann, Iowa State University—Pilot Mound, Iowa

Weitz, Carol Lynn, El Camino College—Hawthorne, California

Wolff, Tziona Rae, Northwestern Illinois University—Chicago, Illinois

PROGRAM IN PHYSICAL THERAPY

Senior Class 1975-76

Berman, Carol Elyse, Washington University—Larchmont, New York

Carruth, Mary Kent, Washington University—New Orleans, Louisiana

Chapman, Randy Lee, Syracuse University—Closter, New Jersey

Cheng, Alison Po-Wai, Southern Illinois University (Carbondale)—Kowloon, Hong Kong

Ciarocco, Vicki Jo, Ohio University—Ravenna, Ohio

Duff, David George, Illinois State University—Pontiac, Illinois

Goldman, Deena Pearl, A.B., Washington University, '72—St. Louis, Missouri

Hale, Melba Adkins, Wartburg College—St. Louis, Missouri

Hurt, Jerald Lynn, B.A., University of Missouri (Columbia), '68—St. Louis, Missouri

Kennedy, Linda Fay, B.A., Luther College, '74—Albany, Georgia

Lesch, Dennis Charles, Meramec Community College—St. Louis, Missouri

Martin, Margaret Susan, Wartburg College—Streator, Illinois

McCormick, Debra Olson, South Dakota State University—Mandan, North Dakota

Oslick, Loretta Elizabeth, Washington State University—Moses Lake, Washington

Petersen, Marjorie Lillian, University of Iowa—Tinley Park, Illinois

Schwartz, Rene Carol, Washington University—Chevy Chase, Maryland

Thayer, Julie Ann, Washington University—Summit, New Jersey

Vierse, Jan Elise, University of Missouri (Columbia)—St. Louis, Missouri

Wright, Robert Arden, University of Maryland—Meadville, Pennsylvania

Wyble, Pamela Flo, Copiah-Lincoln Junior College—Brookhaven, Mississippi

Young, Jeannine, Utah State University (Logan)—Provo, Utah

Junior Class, 1975-76

Auslander, Abby Fern, Washington University—Great Neck, New York

Bowser, Ruth Marie, Washington University—Kansas City, Missouri

Bryant, Leslie Lynne, Washington University—Rolling Meadows, Illinois

Chapman, Louise Anne, Washington University—Peterborough, New Hampshire

Decker, Colette Ann, Wartburg College—Westgate, Iowa

Greek, Holly Jane, Heidelberg College—Pepper Pike, Ohio

Gyllenhaal, Dennis Keith, Washington University—Huntingdon, Pennsylvania

Harris, Jacalyn Denise, B.A., State University of New York at Stony Brook '75—Oakland, California

Hughes, Sallie Caton, University of Colorado at Boulder—Aurora, Colorado

Jevey, Deborah Lynn, Washington University—Forest Park, Illinois

Labrie, Jane Joan, Montana State University—Butte, Montana

Marentette, Joan Brockman, University of Missouri (St. Louis)—St. Louis, Missouri

Miller, Barbara Ellen, Washington University—Greatneck, New York

Parsons, Kimberly Sue, Washington University—St. Louis, Missouri

Perkins, Elaine Louise, Washington University—Cincinnati, Ohio

Sloboda, Josephine Mary, Washington University—St. Louis, Missouri

Sloss, Katherine Middleton, University of Tulsa—St. Louis, Missouri

Vogt, Lori Lynn, Washington University—Metairie, Louisiana

Weiss, Brad Richard, Bemidji State College—Granite City, Illinois

Willner, Ellen Barbara, Washington University—Roslyn, New York

Index of Staff Members

- Aach, Richard D., 61, 181
Abboud, Nabil, 45
Abdel-Bari, Waquih M., 97
Abel, Charles C., 68
Abel, Oliver III, 68
Abella, Mercedes, 174
Abrams, Morris, 143
Abramson, Charles L., 135
Ackerman, Lauren V., 95
Adler, Benard C., 91
Aff, Helen M., 106
Agrawal, Harish C., 105
Agress, Harry, 68
Ahmed, Khwaja S., 66
Ahumada, Gail A., 67
Aitken, Louis F., 68
Akin, William M., 178
Alegre, Jorge M., 68
Alex, Morris, 65
Alexander, France, 65
Aleksander, Bernardo G., 127
Alikhan, Leslie, 172
Allen, Hubert L., 83
Allen, Robert H., 62
Allen, Willard M., 82
Allen, William E., Jr., 133
Allison, James H., 126
Alpers, David H., 61, 181
Alvarez, Luis, 96
Alvis, Bennett Young, 86
Alvis, Edmund B., 86
Amanat Ebrahim, 149
Ambos, Hans D., 70
Ameiss, Albert P., 171
Amin, Nevinkumar J., 88
Anderson, Charles B., 141
Anderson, John M., 126, 181
Anschuetz, Robert R., 141
Anstey, Julia M., 174
Antoniou, Christos A., 107
Anthony, E. James, 149
Arnot, John P., 144
Apirion, David, 74, 182
Apostol, Alma, 127
Aquino, Tomas, 97
Arias, Fernando, 82
Arneson, A. Norman, 82, 133
Arnzen, Robert J., 148
Arribas, Neva P., 86
Arthur, R. Martin, 148, 165
Askin, Frederic B., 96
Asmar, Pierre, 83
Assaf, Richard A. E., 47
Atkinson, John P., 63
Auer, Arthur I., 142
Auguste, Jean M., 108
Avioli, Louis V., 61
Ayata, Sedat M., 46
Ayres, Robert, 172
Badger, Thomas M., 128
Badger, Virginia M., 144
Baenziger, Nancy L., 65
Bagby, James W., 68
Bagwe, Ranjit M., 67
Bahl, Madhu, 97
Bahl, Om P., 65
Bailey, Ann, 172
Ballinger, Walter F., 140, 180
Banaszak, Leonard J., 49, 114, 180
Banton, William C. II, 121
Bardsley, John L., 135
Barker, Edward T., 107
Barnes, Zane E., 178
Barrow, Jack, 65
Bartlett, Robert W., 140
Barry, C. David, 114
Barton, Leslie L., 106
Barton, Robert W., 65
Bass, Libby G., 129
Bauer, Eugene A., 63
Bauer, John D., 97
Bauer, Joseph A., 107
Bauer, Walter C., 93, 95, 152
Baumann, Mary L., 70
Baumgarten, Walter M., Jr., 68
Bauschard, Frederick D., 68
Beare, J. Byron, 145
Becker, Bernard, 86, 180, 181
Becker, Stanley C., 86
Belew, Joe E., 83
Bell, C. Elliott, Jr., 63, 96
Bell, Martin J., 105, 145
Bell, Robert M., 129
Belluci, David R., 91
Benham, Lee, 121, 151
Bennett, Kenneth J., 141
Benoist, Walter F., 107
Berens, Randolph L., 70
Berg, Edward F., 86
Berg, Leonard, 77
Berger, Edward J., 122
Berger, Louetta, 149
Berger, Nathan A., 63
Berger, Sosamma J., 111
Bergman, Martin, 143
Bergmann, John F., 127
Berman, William, 82

- Bergner, Grace E., 65
 Berry, John W., 65
 Bhatnagar, Y. Mohan, 83
 Bice, Thomas W., 121, 151
 Bier, Dennis M., 63
 Bieri, Michael D., 127
 Biggs, John T., Jr., 126
 Bilchik, Ronald C., 88
 Binder, Morton A., 65
 Birenbaum, Aaron, 68
 Birge, Clifford A., 63, 151
 Birge, Stanley J., Jr., 63, 181
 Bischoff, E. Richard, 43
 Bisno, Daniel, 86
 Black, Joseph T., 78
 Blackwell, Charles R., 46
 Blaine, G. James III, 147
 Blair, Vilray P., Jr., 144
 Blamoville, Huldah C., 107
 Blaustein, Mordecai, 113
 Blondin, Joan, 63, 181
 Bloomberg, Gordon R., 107
 Bohigian, George M., 87
 Bohman, Isabelle M., 175
 Bohne, Barbara A., 91
 Boime, Irving, 82, 111
 Boles, C. Read, 105
 Bomze, Howard A., 122, 165
 Bond, Leslie F., 142
 Bondurant, Bryce H., 83
 Boniuk, Isaac, 87
 Boonshaft, Benje, 68
 Borowsky, Benjamin A., 65
 Bortnick, Arthur R., 82
 Boswell, Dee C., 68
 Bowen, Sarah W., 149
 Bowen, Ted, 169
 Bowles, William T., 143
 Boxerman, Stewart, 165, 169
 Boyarsky, Saul, 111, 143, 165
 Bradley, Anna K., 127
 Bradley, Richard V., 141
 Bradshaw, Ralph A., 49
 Brajtburg, Janina M., 65
 Brandt, Karen B., 135
 Brennan, Linda, 172
 Brennan, Ruth E., 116, 122
 Bricker, Eugene M., 140
 Brigham, Fransiska Lee, 133
 Briles, David E., 74
 Brodman, Estelle, 42, 178, 181
 Brooke, Michael H., 77
 Brookes, Robert D., 127
 Brot, Frederick E., 108
 Brown, Barbara I., 50, 180
 Brown, Bruce L., 62, 151
 Brown, David H., 50, 181, 182
 Brown, Elmer B., Jr., 61, 178
 Brown, Richard W., 169
 Brownstone, Jane B., 126
 Bruce, Robert M., 63
 Bryan, James H., 87
 Bryan, Marion P., 91
 Bryan, William T. K., 91
 Bucy, James G., 143
 Buehler, Georgana P., 179, 181
 Buerkert, John E., 63
 Buettner, John B., 141
 Bunge, Mary B., 43
 Bunge, Richard P., 42
 Burch, Helen B., 111
 Burch, P. Trueheart, 67
 Burde, Ronald M., 77, 86
 Burford, Thomas H., 143
 Burgess, Dean B., 88
 Burmeister, Theresa C., 174
 Burstein, Robert, 82
 Burton, Harold, 43, 114
 Burton, Robert M., 111
 Butcher, Harvey, R., Jr., 140, 152, 182
 Byrd, Richard B., 63
 Byrne, Joseph D., 67
 Cahill, Patricia A., 169
 Calhoun, Mary Dorothy, 169
 Calodney, Martin, 106
 Calph, Marion A., 174
 Calvin, Lincoln B., 127
 Camel, Greta, 67
 Camel, H. Marvin, 82, 152
 Canaan, Samuel A., Jr., 87
 Canedy, James A., 169
 Cannady, Edward W., 68
 Cannon, Marguerite, 127
 Capps, George H., 178
 Carl, Juanita L., 128
 Carlin, M. Richard, 143
 Carlson, Elaine M., 67
 Carmody, Sharon E., 70
 Carr, Archie D., 78
 Carr, Charles D., 91
 Carroll, James E., 78
 Carver, William F., 91
 Cary, John M., 68
 Cass, Loretta K., 149
 Catanzaro, Francis J., 65
 Chambers, Maurice R., 178
 Chaplin, Hugh, Jr., 61, 120

- Charles, Benjamin H., 68
Chase, Lewis R., 62
Chaudry, Irshad H., 141
Cheng, Chuan Huan, 122
Chesanow, Robert L., 77
Chieffi, Margaret, 68
Chilson, Oscar P., 50
Chin, Chang-chen, 83
Cho, Kyu Sop, 144
Choi, Sei Young, 127
Choi, Sung C., 121
Chraplyvy, Maria, 98
Chuan, Huan Cheng, 122
Cibis, Lisa M., 88
Cicero, Theodore J., 43, 125
Claeys, Donald W., 45
Clare, Margaret H., 77
Clark, Edwin M., 179
Clark, Richard E., 143, 165
Claypool, William E., 169
Clayton, Paula J., 125
Cleary, Thomas G., 108
Clendenin, William W., 129
Clifford, Clark M., 178
Clingman, Arthurline, 169
Cloninger, C. Robert, 126
Cobb, Milton L., 45
Coben, Lawrence A., 77, 181
Coe, Rodney M., 171
Cohen, Adolph I., 42, 86
Cohen, Edward, 135
Cohen, Frank, 68
Cohen, Robert S., 82
Cole, Barbara R., 105
Coleman, Ralph E., 169
Collins, Jack R., 45
Collins, John A., 140
Collins, Robert C., 78
Collom, James D., 171
Comegys, Thomas H., 91
Comens, Philip, 68
Cone, Alfred J., 91
Cone, William W., 129
Connelly, Mark A., 43
Conrad, Adolph H., Jr., 65
Conrad, Marshall B., 144
Constant, Marguerite A., 182
Cook, Sam B., 178
Cooksey, Jon D., 63, 122, 154
Cooper, Dorothy G., 88
Cope, Mary L., 122
Copp, Ralph, Jr., 68
Cordes, Donald W., 169
Cordonnier, Justin J., 143
Cori, Carl F., 49
Corr, Peter B., 67
Corvalan, Juan C., 129
Costello, Cyril J., 141
Costen, William S., 144
Costrini, Nicholas V., 67
Courtney, John, 74
Covey, Thomas H., Jr., 141
Cowan, W. Maxwell, 42, 165, 180, 181
Coward, Edmund V., Jr., 129
Cox, Jerome R., Jr., 113, 147, 151, 165
Cox, Mary E., 129
Coxe, William S., 78, 152
Cozart, Duane E., 68
Crafton, June, 172
Craig, Alan G., 127
Crane, James P., 82
Crawford, Charles E., Jr., 108
Crawford, Katherine J., 142
Crespin, Stephen R., 65
Crimi, Felipe, 127
Criscione, James R., 142
Cross, David A., 45
Croughan, Jack L., 126
Crowley, David, 91
Crozier, Judith Ann, 91
Cryer, Philip E., 63
Csapo, Arpad I., 82, 182
Csengody, Patricia A., 122, 176
Cubillo, Enrique, 134
Cuddeford, James D., 172
Cullen, Susan E., 52, 74
Curtis, Albert, 169
Custer, Marcia S., 108, 151
Cutler, Harold M., 91
Czerwinski, Edmund W., 114
Dahlgren, Robert R., 97
Dalton, Arthur R., 141
Danforth, William H., 61, 178, 179, 180
Dankner, Arnold, 65
Datuin, Alejandro M., 129
Daughaday, William H., 61, 182
Dauten, Carl A., 178, 180
David, Chella S., 52
Davidenas, Joseph A., 91
Davidson, John D., 65
Davidson, John L., Jr., 179
Davidson, Morris, 91
Davie, Joseph M., 73, 93, 95, 180
Davis, W. Bob, 134
Davis, Gustave L., 96
Davis, Hallowell, 90, 113
Davis, James E., 63, 96

- Davis, Mary, 129
 Daw, Nigel W., 86, 114, 181
 Deakin, Rogers, 143
 Dearen, Dan L., 169
 Debnam, James W., Jr., 134
 Deitchman, Robert B., 126
 Delevett, Allen F., 62, 151
 Del Rosario, Luis Q., 96
 deMello, Vincent R., 67
 Deming, Frederick L., 178
 Deutch, Max, 105
 DeVivo, Darryl C., 77, 105
 Dew, Thomas A., 68
 De Weer, Paul J., 114
 Deza, Plaridel C., 126
 Diaz, Armand, 135, 177
 Dick, Earl P., 127
 Dickler, Donald J., 45
 Dien, Marilyn K., 174
 Dietzler, David N., 108, 111
 Disbrow, Karen L., 176
 Dodge, Philip R., 77, 104, 179, 180
 Dodson, W. Edwin, 78, 105
 Doell, Irene G., 174
 Donaldson, Robert C., 141
 Dooley, Joseph M., Jr., 78
 Doucette, Raymond C., 82
 Dowell, George H., 129
 Drawing, Virginia H., 174
 Drews, Robert C., 86
 Drey, Norman W., 68
 Drysdale, George R., 50, 182
 Dubach, Anna R., 65
 Duemler, Robert H., 82
 Duffy, Frances G., 46
 Duggins, Oliver H., 43
 Duling, Gerald J., 107
 Dumadag, Virgilio P., 97
- Eades, Joseph W., 145
 Eagleton, Mark D., Jr., 133
 Eaton, Royal J., 68
 Edelstein, Mark B., 134
 Edmund, Beauvoir H., 135
 Edwards, Charles M., 169
 Edwards, Isaac A., 78
 Edwards, Joseph C., 65
 Eggebrecht, Russell E., 67
 Ehrlich, Carl F., 91
 Eichling, John O., 133
 Eilerman, Margaret, 172
 Eisen, Arthur Z., 61
 Eisen, Seth A., 63
 Eldredge, Donald H., 90
- Eliasson, Sven G., 77, 122, 154
 Eller, C. Howe, 121
 Ellerbrake, Richard P., 169
 Ellsasser, James C., 143
 El-Mofty, Samir K., 96
 Elson, Julius, 68
 Emerson, William A., 63
 Engebretson, A. Maynard, 148
 Engelhardt, Robert C., 46
 Erlanger, Margaret W., 70
 Escoffery, Richard F., 88
 Esslinger, Arthur T., 83
 Etheredge, Edward E., 141
 Evens, Ronald G., 132, 180, 181
- Fabian, Leonard W., 45, 104
 Fair, William, 143
 Fallon, Richard H., 141
 Fausz, Vickie G., 174
 Feibel, Robert M., 87
 Feigin, Ralph D., 104, 180
 Feldman, David, 68
 Felts, James A., 45
 Ferguson, Thomas B., 143
 Ferrendelli, James A., 77, 111
 Ferro, Anthony L., 129
 Fiete, Dorothy J. Vervynck, 98
 Filerman, Gary L., 170
 Finger, Donald H., 62
 Fingert, Hyman H., 127
 Finke, Edward H., 98
 Fish, Virgil O., 141
 Fishman, Marvin A., 77, 105, 116, 121, 153, 181
 Fishman, Philip M., 128
 Flacke, Donald, 172
 Flance, I. J., 62
 Fleischman, Julian B., 74
 Fleishman, Alfred, 68
 Fletcher, Anthony P., 62
 Fletcher, Norma A., 62
 Ford, Lee T., Jr., 144
 Forrest, John V., 133
 Forsyth, B. Todd, 68
 Foster, Norman, 181
 Fourqurean, Thomas W., 170
 Francis, Darryl R., 178
 Francis, Max D., 170
 Frank, Robert E., 169
 Franssila, Kaarle C., 96
 Frazier, William A., 43, 50
 Freedman, Ruth S., 88
 Freeman, David M., 88
 Freeman, Sandra K. Bocelka, 98
 Freiman, S. Michael, 83

- Freund, Paul A., 178
 Frieden, Carl, 50
 Friedman, Ira J., 106
 Friedman, Paul L., 46
 Friedman, Robert H., 106
 Friedrich, Ernst R., 82
 Fryer, Minot P., 145
 Fukami, Yasushi, 114
 Fuller, Thomas R., 134
 Furlow, Leonard T., 78
- Gado, Mokhtar, 132
 Galakatos, Andrew, 83
 Gale, Arthur H., 68
 Gall, Ira C., 83
 Garcia-Ferrer, Eduardo A., 127
 Garfinkel, Bernard T., 62
 Gaskin, Fred W., 127
 Gavazzi, Aladino A., 170
 Gearhart, Wilbur H., 129
 Gee, David A., 169
 Geisse, Guillermo C., 133
 Gelb, Lawrence D., 63, 74
 Geller, David M., 111
 Gellman, Elliot F., 107
 Gentsch, Kenneth W., 68
 Germuth, Frederick G., Jr., 96
 Gerth, Vernon W., Jr., 147
 Ghani, Mohammad F., 63
 Gibb, Marey, 181
 Gieselman, Ralph V., 62
 Gildea, Edwin Francis, 125
 Gildea, Margaret C.-L., 126
 Gilden, Jerome J., 144
 Gilpin, Clifford, 127
 Gilpin, Doris C., 149
 Gilson, Arthur S., Jr., 113
 Gilster, John, 106
 Gilula, Louis A., 133
 Glaser, Luis, 49, 180
 Glasgow, Glenn P., 134
 Glew, Richard H., 63
 Godfrey, Donald A., 111
 Godinez, Marye H., 45
 Goell, Robert S., 83
 Goldman, Arnold M., 68
 Goldman, Gordon M., 83
 Goldman, Melvin L., 65
 Goldring, David, 104, 182
 Goldring, Sidney, 77, 78, 180
 Goldstein, Benjamin M., 68
 Goldstein, Marcy A., 145
 Goldstein, Milton N., 43, 96
 Goldstein, Robert, 128
- Goldsmith, Barbara N., 174
 Gollub, Samuel W., 106
 Golubovich, Linda, 174
 Goodwin, Donald W., 125, 182
 Goodwin, Phillip H., 170
 Gorman, William S., 149
 Gottlieb, David I., 43, 50
 Gowda, K. S., 67
 Gould, Philip L., 165
 Grabau, Gene H., 106
 Grady, LaVerne W., 174
 Grady, Ronald K., 68
 Graff, Ralph J., 74, 140
 Grant, John M., 66
 Grant, Neville, 62
 Grant, Samuel B., 65
 Greathouse, Joe S., Jr., 170
 Greenman, Marshall B., 106
 Greensfelder, Edward B., 179
 Greensfelder, Linda B., 149
 Gregory, Walter T., 70
 Greider, Marie H., 96
 Griffin, W. L. Hadley, 178
 Griggs, George A., 67
 Grodzki, Walter J., 88
 Gronau, Axel R., 68
 Groner, Frank S., 169
 Grove, Louise S., 45, 171
 Grubb, Robert L., Jr., 78, 133
 Grummon, Ruth, 174
 Guebert, Elvera C., 176
 Gukhool, Premlall, 135
 Gulick, Charles R., 82
 Gulmen, Suleyman, 96
 Gupta, Jitendra K., 68
 Gupta, Santosh, 107
 Gurgo, Sandra Bridges, 97
 Gutierrez, Jose A., 127
 Guze, Samuel B., 62, 125, 178, 179, 180
- Haddad, John G., Jr., 62
 Haddock, James N., 127
 Haffner, Heinz, 140
 Hagemann, H. Frederick, Jr., 178
 Hagemann, Paul O., 62
 Hahn, Bevra H., 63, 122
 Hahn, Jack A. L., 170
 Hahn, Theodore J., Jr., 63
 Hajek, Anthony S., 70
 Hajek, Shirley A., 70
 Halikas, James A., 126, 181
 Hall, Julian C., 126
 Hall, William K., 66
 Halstead, Carolyn, 176

- Halverson, John D., 141
 Hammes, Roman E., 107
 Hammond, David T., 66
 Hampton, Norman, 172
 Hampton, Oscar P., Jr., 144
 Hampton, Stanley F., 66
 Hanaway, Joseph, 43, 78
 Hankin, Norman, 106
 Hanley, John W., 178
 Hansel, French K., 90
 Haralson, Joseph R., 176
 Haralson, Kathleen M., 122
 Hardy, Guerdan, 91
 Harford, Carl G., 61, 151
 Harper, Fleming B., 141
 Harris, Foster, 70
 Harrison, Lee B., 68
 Harrison, Stanley L., 105
 Harter, Herschel R., 63
 Hartford, Thomas J., Jr., 170
 Hartman, Boyd K., 43, 126
 Hartman, Doris M., 174
 Hartman, Jacqueline, 122
 Hartmann, Alexis F., Jr., 104
 Hartroft, Phyllis M., 96, 182
 Hartnett, Anna E., 149
 Hartstein, Jack, 87
 Harvey, James D., 169
 Harvey, Joseph E., 43, 90, 182
 Harwell, J. Larry, 107
 Harwig, John F., 134
 Harwig, Sylvia S., 135
 Hatfalvi, Bela L., 45
 Hayes, W. Alfred, 178
 Haymond, Morey W., 105
 Hays, Howard L., 170
 Hayward, John H., 178
 Healy, Lucile, 126
 Hecht, Julius, 135
 Heersma, James R., 107
 Heins, James N., 66
 Helzer, John E., 126
 Henderson, Kenneth O., 70
 Henry, Philip D., 63
 Hepner, James O., 169
 Herjanic, Barbara M., 105, 126
 Herjanic, Marijan, 126
 Hernandez, Antonio, Jr., 105
 Hershey, Falls B., 140
 Hershey, Phyllis, 181
 Hertel, Ronald C., 144
 Herweg, John C., 104, 178, 180, 181
 Herzig, Geoffrey P., 63
 Herzog, Godofredo M., 83
 Hesker, Albert E., 135
 Hess, Florence, 172
 Hewitt, Thomas E., 97
 Hickok, Robert J., 169, 175, 179
 Hicks, Robert S., 127
 Hieb, Barry R., 65
 Higgins, Carol, 135
 Hildreth, Howard Rommel, 86
 Hilgert, Raymond L., 171
 Hill, George J. II, 140
 Hill, Helene Z., 180
 Hill, Rexford L., 133, 148
 Hill, Sheila L., 149
 Hill, Shirley Y., 127
 Hillman, Laura S., 105
 Hillman, Richard E., 105, 181
 Hinderer, Harold, 171
 Hinkley, William E., 68
 Hipps, Paul P., 127
 Hirsh, Ira J., 90
 Hitt, David H., 169
 Hixon, Barbara B., 122
 Hobbs, John E., 82
 Hochmuth, Robert M., 165
 Hoffman, Michael K., 50
 Hoffsten, Phillip E., 63
 Holemon, R. Eugene, 127
 Holland, William H., 50, 129
 Holloszy, John O., 64, 116, 121, 154
 Holloway, Robert B., 45
 Holmberg, Nels J., 88
 Holmes, William F., 50, 148, 165
 Holscher, Edward C., 144
 Holt, Earl P., Jr., 143
 Holtmann, Barbel, 145
 Holtz, Sumner, 133
 Honey, Donald E., 176
 Hookerman, Bruce J., 68
 Hoover, Gerald S., 87
 Hope, William, 170
 Horner, John L., 68
 Horsh, Donald J., 169
 House, Roy C., 169
 Houtz, Duane T., 170
 Howell, Mabel P., 170
 Hruska, Keith A., 64
 Huck, Richard F., 69
 Hudgens, Richard W., 126
 Huebener, Donald V., 106, 133
 Huebner, Paul F., 70
 Huete, Isidro L., 134
 Hughes, Arthur L., 135
 Hughes, Charles P., 78
 Hulbert, Bernard, 66

- Humphreys, James B., 170
 Hunt, Carlton C., 113, 180, 181
 Hunter, F. Edmund, Jr., 111
 Huntsinger, Merl M., 178
 Hutchinson, James H., Jr., 66
 Hutto, A. Herman, 83
- Inukai, Joseph, 78
 Isserman, Michelle, 174
 Iwane, Akira, 45
- Jackson, Craig M., 50
 Jacobs, Charles C., 91
 Jacobs, Frederick A., 105
 Jacobs, Laurence S., 64
 Jacobs, Myron H., 69
 Jacques, Clemens H., 88, 151
 Jaffe, Bernard M., 141
 Jamshidnejad, Javad, 135
 Janes, Cynthia L., 149
 Jarett, Leonard, 61, 93, 95
 Jaudon, Joseph C., 105
 Jean, J. Ted, 68
 Jebb, Anthony H., 43
 Jeffrey, John J., Jr., 50, 62, 180
 Jenkins, James J., 45
 Jick, Sidney, 66
 Joffe, William S., 88
 Joftus, Morris, 69
 Johnson, David A., 156, 170
 Johnson, James Lee, Jr., 178
 Johnson, Jerry A., 174
 Johnson, John Martin, 97
 Johnson, Mary C., 70
 Johnson, Mary I., 43, 78, 106
 Johnson, Richard L., 170
 Johnston, Glen P., 87
 Joist, Johann H., 64, 96
 Jones, Andrew B., 77
 Jones, Dorothy J., 105, 180, 182
 Jones, Edward G., 42
 Jones, Edwin S., 178
 Jones, James D. II, 45
 Jones, Jo A., 176
 Jones, Landon Y., 179
 Jones, Richard S., 179
 Jones, Robert W., 135
 Jones, Sara T., 45
 Jonsson, Valgard, 97
 Jordan, Lemuel R., 170
 Joseph, Harold J., 66
 Jost, R. Gilbert, 133
 Juergens, William G., Jr., 66
- Kahn, Lawrence I., 105, 151
 Kaiser, Kenneth K., 78
 Kamman, William A., 171
 Kantor, Owen S., 66
 Kao, Ming-Shian, 82, 152
 Kaplan, Alex H., 126
 Kapp-Pierce, Judith A., 74, 97
 Karl, Diane M., 67
 Karl, Irene E., 62
 Karl, Michael M., 62
 Karsh, Robert S., 63
 Kasai, Takashi, 74
 Kashfi-Lari, Ali, 127
 Kass, Michael A., 86
 Kaufman, Robert L., 66
 Kayes, Jack, 87
 Keating, James P., 105, 180
 Keating, Susan K., 108
 Keay, Leonard, 74
 Keister, Hugh F. S., 46
 Keller, David W., 82
 Keller, Kathleen M., 176
 Keller, Maurice J., 106
 Kelley, Robert W., 66
 Kelly, John J., 66
 Kendall, Barbara S., 129
 Kennell, David E., 73
 Kenney, Eleanore T., 150
 Kenton, Thomas, Jr., 179
 Kerr, David N., 69
 Kessler, Gerald, 96
 Kessler, Sheldon, 107
 Kheim, Teofil, 67
 Khodadoust, Kavous, 97
 Kilo, Charles, 66
 Kim, Duck O., 114
 King, Barry F., 43
 King, Donna, 122, 151
 King, M. Kenton, 61, 121, 178, 179, 180, 182
 Kingsbury, Robert J., 141
 Kingsland, Robert C., 66
 Kinsky, Stephen C., 50, 111
 Kipnis, David M., 61, 180
 Kirstein, Melvin B., 69
 Kissane, John M., 93, 95, 104, 181
 Kissel, John H., 67
 Klahr, Saulo, 61
 Kleiger, Robert E., 62
 Klein, Jacob, 83
 Klein, Saul, 145
 Klinge, Frederick W., 142
 Klingele, Terence G., 87
 Klippel, Allen P., 141
 Klump, Patricia, 172

- Knock, Henry L., 107
 Knopf, Harry L. S., 88
 Knowles, John H., 178
 Knowlton, Norman P., Jr., 66
 Kobayashi, George S., 62, 74
 Koch, Muriel L., 179
 Koch, Robert E., 69
 Koerner, Kenneth A., 106
 Kolker, Allan E., 86
 Kolodny, Robert C., 69
 Konikov, Nadya, 97
 Kopman, A. Ercument, 45
 Kopp, Jules H., 145
 Korenblat, Phillip E., 66
 Kornfeld, Rosalind H., 62
 Kornfeld, Stuart A., 50, 61, 152
 Kotner, Lawrence M., Jr., 135
 Kovac, S. Robert, 83
 Kowert, Edward H., 126
 Kraetsch, Robert E., 69
 Kraft, William J., 98
 Kraner, Justin F., 83
 Kraus, Frederick T., 97
 Krause, Beverly, 172
 Krause, G. Lynn, Jr., 141
 Krone, Ronald, 64
 Kronemer, Norton S., 107
 Krupin, Theodore, 86
 Kuczer, Arnoldo, 91
 Kuhlman, Ralph F., 69
 Kuhlman, Robert E., 69, 143
 Kuhn, Charles, 96
 Kulczycki, Anthony, Jr., 67
 Kumar, Buddhiraju V., 70
 Kunz, Harold G., 135
 Kuo, Tseng-Tong, 96
 Kusama, Haruo, 126
 Kusama, Susan M., 174
 Kuttner, Marianne, 106
 Kyriakos, Michael, 96
- Labay, Peregrina N. C., 122, 165
 Lacy, Paul E., 95, 180, 181
 Ladenson, Jack H., 64, 96
 Lake, Lorraine F., 43, 122, 154, 175
 Lakshminarayanan, Natarajan, 127
 Lamb, Wanda M., 126
 Land, Vita J., 105
 Landau, William M., 77, 180, 181
 Lander, Harriet S., 150
 Lander, Jerrold J., 64
 Lane, Clinton W., 62, 69
 Lane, Daniel K., 69
 Lang, Stanley, 114
- Lansche, W. Edward, 144
 Larson, Kenneth B., 148, 165
 Lasater, Donald E., 178
 Lattore, Rodolfo A., 97
 LaValle, Maria C., 98
 Lavin, Mary A., 70
 Laycob, Leland M., 107
 Lee, Charles W., 70
 Lee, Robert, 179, 181
 Lee, Yu-Chiang, 70
 Lefrak, Stephen S., 64
 Lefton, Robert E., 150
 Levin, Marvin E., 63
 Levis, Gladys W., 178
 Levitt, Joseph, 66
 Levitt, Robert G., 135
 Levy, Irwin, 77, 181
 Levy, Jerome F., 141
 Levy, Morton A., 69
 Lewis, David S., 178
 Lewis, John W. III, 96, 148, 165
 Leydig, Stanley M., 144
 Liberman, Lee M., 178, 179
 Lichtenstein, Jack R., 64, 105
 Lickhalter, Merlin E., 171
 Lieberman, David M., 66
 Lieberman, Michael W., 96
 Liebhaber, Despina, 107
 Liebhaber, Harvey, 62, 74, 182
 Lilly, Douglas R., 66
 Lin, Hsiu-san, 74, 133
 Lins, Robert D., 107
 Lipsitz, Ellis S., 69
 Liss, Jay A., 129
 Lischer, Carl E., 140
 Little, J. Russell, Jr., 61, 74
 Loeb, Virgil, Jr., 63, 97
 Loewy, Arleen P., 70
 Loewy, Arthur D., 43
 Logie, MacDonald B., 135
 Londe, Alan M., 141
 Londe, Sol, 105
 London, Stanley L., 141
 Lonergan, Warren M., 69
 Long, Frank B., Jr., 83
 Lonsway, Maurice J., 106
 Lonsway, Maurice J., Jr., 106, 180
 Lottes, James O., 143
 Lowrey, Susan, 174
 Lowry, Oliver H., 111, 180, 181
 Lubowitz, Herbert, 62
 Lucas, George E., 46
 Ludbrook, Philip R., 64, 133
 Ludmerer, Kenneth M., 67

- Lugo, Samuel, 142
 Lumpkin, Bettie, 174
 Lund, Robert H., 141
 Lyman, Edward H., 91
 Lynch, John F., 178
 Lynch, Richard G., 96
 Lynch, Ronald, 172
 Lyss, Carl A., 69
 Lyss, Stanley B., 107
- MacCarthy, John P., 178
 Mackey, Joseph B., 170
 Mackney, Joseph C., 170
 Madyastha, Prema B., 108
 Magee, William E., 66
 Magill, H. Lynn, 135
 Majerus, Philip W., 50, 61, 181
 Malone, John D. G., 170
 Maloney, Sean E., 176
 Malt, Sherwin H., 141
 Manion, Maria E., 129
 Manley, Charles B., Jr., 105, 143, 181
 Mann, Elizabeth, 129
 Manske, Paul R., 144
 Manske, Sandra H., 151
 Marban, Manuel, 97
 Marcus, Morris D., 63
 Margolis, Richard, 106
 Margraf, Harry W., 141
 Mariz, Ida K., 67
 Marks, James E., 133, 152
 Marr, J. Joseph, 62, 96
 Marshall, Garland R., 50, 113
 Marshall, Richard E., 105
 Martin, Duane M., 108
 Martin, J. Barlow, 83
 Martin, Ronald L., 127
 Martin, Thomas F., 66, 148
 Martínez-Okrassa, Gustavo A., 127
 Martz, John C., 106
 Mashak, Nancy S., 174
 Mason, N. S., 165
 Massie, Edward, 62
 Masters, William H., 82
 Mathews, F. Scott, 50, 114
 Matschinsky, Franz M., 111, 181, 182
 Mattar, Adel G., 135
 Mauck, John C., 64, 97
 Maughs, Sydney B., 126
 Max, Paul F., 83
 Maxwell, Richard W., 69
 May, Morton D., 178
 Mayes, Ben R., Jr., 135
 Maze, Laurence E., 83
- Mazumdar, Debesh, 64
 McAfee, C. Alan, 140
 McAlister, William H., 104, 132
 McClure, David N., 106
 McClure, James N., Jr., 126
 McCormick, John R., 143
 McCown, Alan H., 134
 McCuistion, Robert W., 170
 McDaniel, Michael L., 96
 McDaniel, Robert, 97
 McDonald, Richard J., 74
 McDonnell, James S., 180
 McDonnell, Sanford N., 178
 McDougal, David B., Jr., 111
 McFadden, Susan M., 174
 McGinnis, Manon, 150
 McIlmoyle, Gaellan, 133
 McKee, Oliver A., 69
 McKeel, Daniel W., 97
 McKinney, Joe E., 127
 McKnight, Robert C., 64, 133
 McLaughlin, Kathleen S., 97
 McMahan, John H., 129
 McMullen, Margaret, 174
 McNeal, Theodore D., 178
 McRoberts, Robert H., 178
 Meador, Carol L., 122, 174
 Medoff, Gerald, 61, 74
 Meeks, Douglas, 182
 Meinberg, William H., 87
 Melechen, Patricia H., 174
 Melson, G. Leland, 132
 Mendelsohn, Robert S., 66
 Mendelsohn, Roy M., 149
 Menendez, Manuel F., 97
 Mennes, Paul A., 67
 Menton, David N., 43, 97
 Merrims, Theodore, 83
 Meyer, Jay, 129
 Meyer, John S., 96
 Meyers, Elsie F., 45
 Meyers, Jerry R., 141
 Michaelides, Maria C., 74
 Middelkamp, J. Neal, 104, 182
 Middleton, Jerry N., 84
 Midkiff, John L., 179
 Mikhael, Michael A., 135
 Milder, Benjamin, 86
 Milinowicz, Kathryn M., 176
 Mill, William B., Jr., 133
 Miller, Edward J., 66
 Miller, Elaine, 88, 107
 Miller, James E., 86, 104
 Miller, Stanley R., 178

- Miller, William V., 62, 96
 Millstone, I. E., 178
 Mimbs, James W., 67
 Minnich, Virginia, 61
 Mishkin, Marvin R., 143
 Mitchell, Eugene N., 141
 Mithen, Francis A., 43
 Mobley, Harry C., 170
 Mohapatra, Raj N., 142
 Molnar, Charles E., 113, 165
 Momtazee, Sam, 84
 Monat, Seymour M., 83
 Monical, Beverly B., 176
 Montgomery, Austen F., 69
 Moore, Blake W., 50, 125
 Moore, Morris, 65
 Morgan, Harry C., 144
 Morrin, Kevin C., 82
 Morris, Alan H., 144
 Morris, Stephen M., 170
 Morrison, Arlen E., 69
 Morrison, Aubrey R., 67
 Morrison, Hugh, 179
 Mortensen, Frede, 69
 Moses, Robert A., 86
 Mowrer, Marie O., 127
 Mueller, John F., 127
 Mueller, Robert J., 78
 Mullins, John E., 70
 Murdock, Nathaniel H., 84
 Murphy, George E., 125
 Murphy, Mary K., 174
 Murphy, William A., Jr., 135
 Murray, John P., 91
 Muschany, Norman K., 82
 Myers, Eileen C., 176
 Myers, Ivan T., 84
 Myers, Paul R., 43
- Nakeff, Alexander N., 133
 Nash, Barbara, 175
 Nash, Helen E., 105
 Nash, Homer E., Jr., 107
 Nathan, Lester J., 142
 Neavles, Jackson C., 129
 Needleman, Philip, 111, 180
 Nelson, James S., 93, 95, 104
 Nelson, J. Roger, 66
 Newman, Matthew, 87
 Newman, Susan K., 149
 Newmark, Leonard N., 69
 Newport, Gerald, 84
 Newton, Gordon, 66
 Newton, William T., 140
- Nickel, James F., 66
 Nixon, Keyton H., 170
 Norland, Charles C., 66
 Norton, Barbara J. H., 122
 Norwood, John H., 170
 Nulty, Walter L., Jr., 50
 Nuwayhid, Bahij S., 82
- Ochs, Lamar H., 69
 Ogilvie, Robert W., 97
 Ogle, Helen, 171
 Ogura, Joseph H., 90, 152, 180
 Okada, Shigeru, 68
 O'Keefe, Joseph D., 84
 Okun, Edward, 86
 Olin, John M., 178
 Olin, Spencer T., 178
 Oliver, G. Charles, 61
 Oliver, George A., 141
 Oliver, Ronald A., 127
 Olmsted, William H., 62
 Olney, John W., 126
 O'Neal, Edward A., 178
 O'Neal, Lawrence W., 141
 O'Neal, Patricia L., 126
 Opstad, Elwood A., 170
 Orgel, M. Norman, 66
 Orgel, S. Michael, 69
 Ostlund, Richard E., Jr., 64
 Ott, F. Thomas, 87
 Owen, Robert F., 69
 Owens, Odessa, 70
 Owens, William D., 45, 152
- Packman, Paul M., 126
 Packman, Robert C., 66
 Pagliara, Anthony S., 64, 105
 Paine, Robert, 62
 Painter, Audrey A., 70
 Painter, Paul H., 106, 149
 Pake, George E., 178
 Pal, Earni, 128
 Palkes, Helen, 106
 Palmberg, Paul F., 87
 Palmer-Hanes, Lily A., 133
 Paloheimo, Sakari, 91
 Panhorst, Harry E., 171
 Parker, Charles W., 61, 74
 Parker, Mary L., 63, 121, 179
 Parrino, Peter A., 135
 Parsons, Patricia A., 106
 Parsons, Richard P., 143
 Paulson, John D., 83
 Pavlovic, Thomas, 67

- Payne, Meredith J., 142
Payne, Richard, 97
Pearlman, Alan L., 77, 114, 182
Peck, William A., 61
Peddicord, Roberta, 176
Peden, James C., Jr., 66
Peden, Joseph C., Jr., 142
Pederson, Claire K., 70
Pennoyer, James, 83
Perez, Blanca M., 97
Perez, Carlos A., 132, 152
Perez-Mesa, Carlos, 97
Perkins, Kendall, 178
Perkins, Linn B., 169
Perkoff, Gerald T., 61, 121, 151
Permutt, Marshall A., 64
Perry, Betty F., 70
Perry, H. Mitchell, 61
Perry, William D., 63
Peters, Kenneth W., 171
Peterson, Frederick D., 106
Peterson, Leroy W., 145
Peterson, Roy R., 42, 181, 182
Pfeiffenberger, Mather, Jr., 142
Phillips, William J., 66
Philpott, Gordon W., 140, 151, 152
Pickard, William F., 165
Pickett, Patricia R., 122
Pieper, Carl S., 78
Pierce, Carl W., 74, 95
Pierce, Eugenia M., 107
Pierce, John A., 61
Pineda, Lourdes, 128
Piontek, Timothy, 172
Pipes, Keith E., 142
Pittman, David J., 126
Pittman, Susan, 107
Pitts, Ferris N., Jr., 126
Platt, Daniel W., 46
Platt, William R., 97
Plax, Steven L., 107
Poger, Marshall, 97
Polakoski, Kenneth V., 82
Porporis, Arthur A., 134
Post, Lawrence T., Jr., 87
Potter, Reese H., 129
Potts, Kathleen, 108, 151
Powell, Boone, 169
Prensky, Arthur L., 77, 104
Presant, Cary A., 64
Price, Joseph L., 43
Price, Kenneth C., 66
Price, Madelon T., 129
Probstein, J. G., 140
Proskey, Vincent J., 69
Pugh, Daniel, 126
Pulliam, Morris, 78
Pullon, Peter A., 96
Purdy, James Aaron, 133
Purkerson, Mabel L., 64, 106, 178, 181, 182
Purves, Dale, 114
Rachlin, Maxwell, 88
Rader, George B., 142
Ragan, Donald P., 133
Rahman, Mohammad H., 108
Rahmanian, Mohamad, 97
Raichle, Marcus E., 77, 132, 165
Rainey, Robert, 142
Rakowski, Robert F., 114
Ramsey, David S., 170
Rao, Bantwal R., 135
Rasche, Carl C., 170
Raskas, Heschel J., 74, 96, 152
Ratcheson, Robert A., 78
Rath, Mary L., 174
Ratkin, Gary A., 69
Ratkin, Gary T., 135
Ratzan, Richard, 67
Raza, Syed A., 149
Razek, Aly A., 133
Read, J. Larry, 170
Reagin, David Earl, 97
Reed, Charles A., 108
Reed, Jonathan R., 84
Reese, Lester T., 66
Reich, Theodore, 126
Reinhard, Edward H., 61, 135, 152
Reiter, Federico, 134
Rennard, Marvin, 83
Rennie, Michael J., 122
Reynolds, Fred C., 144
Rheaume, Germaine, 172
Ribo, Jose H., 78
Richards, Diana L., 128
Richards, Frank O., 142
Richardson, Thomas F., 129
Rieders, Elaine, 98
Riesenberg, Donald E., 70
Rinderer, Dorothy T., 179
Rizzo, Adolfo E., 149
Roa, Necita L., 45
Roberts, Harold K., 66
Roberts, Robert, 64
Robins, Eli, 125
Robins, Lee N., 125
Robinson, Alice, 70
Robinson, Edith C., 106

- Roblee, Melvin A., 82
 Robson, Alan M., 64, 104
 Rocklage, Mary Roch, 169
 Roden, Raymond, 181
 Rodriguez, Hector J., 67
 Roeder, Robert G., 50
 Roettger, Richard F., 176
 Rogers, Bryan A., 170
 Rogers, Howard E., 128
 Rogers, John C., 64
 Rogers, Lynn A., 43
 Rohde, John O., 170
 Rolf, Doris, 65
 Romero, Calixto A., 62, 151
 Roos, Albert, 45, 113
 Roper, Charles L., 143
 Roper-Hall, Gillian, 88
 Rorrie, Colin C., Jr., 171
 Rose, Dalton K., 143
 Rosenbaum, Harry D., 87
 Rosenbaum, Herbert E., 77
 Rosenkoetter, Janet M., 176
 Rosenzweig, Saul, 125
 Ross, William J., 107
 Roter, Alexander M., 84
 Rothman, David, 82
 Rountree, George D., 170
 Rouse, Ernest B. III, 70
 Rouse, Ernest T., 63
 Rovainen, Carl M., 114
 Rowland, Raymond E., 179
 Royce, Robert K., 143
 Royston, Grandison D., 82
 Rozenbom, Carlos V., 135
 Ruffey, Rodolphe, 67
 Rumelt, Michael B., 88
 Russ, Sandra W., 149
 Russell, Herman E., 144
 Russell, Jean E., 65
 Rutherford, W. Ernest, 64
 Ruwitch, Joseph F., 179
 Ruwitch, Joseph F., Jr., 64
- Sachar, Leo A., 141
 Sachs, Samuel C., 178
 Safdar, Shabbir H., 66
 Saghir, Marcel T., 127
 Sagel, Stuart S., 132
 Saha, Sudha R., 84
 Sahrman, Shirley A., 78, 114, 122
 Saifee, Salma, 83
 Sale, Llewellyn, Jr., 63
 Salmon, Mickey L., 88
 Salvador, Antonio, 98
- Sanders, Theodore E., 86
 Santelli, Maria G., 135
 Santiago, Julio V., 64, 106
 Sato, George, 105
 Sauer, Donald C., 142
 Sauvage, Jacques, 82
 Sawyer, James, 84
 Sayeed, Mohammed M., 141
 Saylor, Jack L., 70
 Scarpellini, JoAnne D., 78
 Scates, Robert F., 169
 Schaan, Robert C., 107
 Schechter, Samuel E., 70
 Schechtman, Judith L., 149
 Scheer, George E., 143
 Scheff, Harold, 62
 Scherrer, Floyce A., 88
 Schlaepfer, William W., 96
 Schlansky, Seymour M., 108
 Sclafford, Ursula, 98
 Schlesinger, Milton J., 74, 180
 Schlesinger, Sondra, 74
 Schlessinger, Alice R., 43
 Schlessinger, David, 74
 Schneider, Sam F., 141
 Schnewerk, Carla, 174
 Schnuck, Edward J., 178
 Schoedinger, George R. III, 144
 Schoentag, John S., 70
 Schonfeld, Gustav, 62, 116, 121
 Schriver, Walter J., 170
 Schultz, Earl R., 77, 126
 Schultz, John L., 179, 180, 181
 Schulz, Beatrice F., 175
 Schuster, Victor, 181
 Schwartz, Alfred S., 106
 Schwartz, Benjamin D., 65, 74
 Schwartz, Frederick Oscar, 86
 Schwartz, Henry G., 78, 181
 Schwartz, Melvin M., 83
 Schwartz, Ruth K., 174
 Schwartzman, Bernard, 106
 Scorza, Jacquelyn J., 91
 Scott, Glenn N., 169
 Scrivner, Willard C., 82
 Seddon, John W., 68
 Seetharam, B., 68
 Sekhon, Gurbax S., 106
 Seltzer, Jo L., 68
 Senior, Robert M., 62, 180
 Senturia, Ben H., 90
 Senturia, Hyman R., 133
 Sessions, Donald G., 90, 152
 Shackelford, Gary D., 106, 134

- Shackelford, Penelope G., 106
Shah, Suresh, 70
Shahan, Philip T., 87
Shaikun, Gerald L., 135
Shalen, Philip R., 135
Shanahan, Maureen, 98
Shank, Robert E., 61, 116, 120, 180, 182
Shapleigh, John B. II, 70
Shapleigh, Warren McK., 178
Shatz, Burton A., 63
Shearer, William T., 105
Shepley, Ethan A. H., Jr., 179
Sherman, Laurence A., 62, 96, 180
Sherman, Warren G., 107
Sherman, William R., 50, 125
Shieber, William D., 141
Shobe, Frank O., 126
Shreffler, Donald C., 52, 180
Siegel, Barry A., 133
Silberberg, Ruth, 95
Silbert, David F., 50
Silhavy, Joanne, 174
Silver, Bernd, 87
Silverman, S. Richard, 90
Simek, Franklin E., 170
Simmons, David J., 143
Simms, Ernest S., 74, 182
Simon, Nathan M., 129
Simons, Paul S., 106, 151
Simpson, Lloyd N., 78
Simril, Wayne A., 134
Sims, William A., Jr., 46
Sisk, James C., 66
Sisson, Richard G., 141
Skilling, David M., Jr., 68
Skillman, Martha S., 174
Skinner, John S., 70
Slatopolsky, Eduardo, 61
Sleight, Dixie H., 174
Sly, William S., 61, 104
Smiley, William L., 83
Smit, Herbert M., 91
Smith, Arthur A., 84
Smith, Carl H., 96, 105
Smith, Elizabeth M., 127
Smith, Emily L., 134
Smith, E. Kaye, 97
Smith, James B., 129
Smith, Jeanne M., 78
Smith, Kathleen, 125
Smith, Marc D., 108
Smith, Mary A., 176
Smith, Mary Brendon, 174
Smith, Morton E., 86, 95, 152
Smith, Robert B., 178
Snyder, Donald L., 148
Sobel, Burton E., 61
Sodha, Narendrakumar B., 78
Sohn, Richard S., 78
Solomon, David A., 67
Sommer, Ross B., 66
Songer, Marye J., 176
Sonnenwirth, Alexander C., 74, 96
Soorya, Narendir, 129
Soper, George E., 176
Soto, Alberto, 129
Soule, Samuel D., 82
Sparks, Robert E., 165
Spector, Gene W., 135
Spector, Gershon J., 90
Spencer, Andrew D., 141
Spilberg, Isaias, 65, 122
Spitz, Richard H., 107
Spivack, Alan R., 70
Spratt, John S., Jr., 142
Srisuro, Chotchai, 83
Stahl, Philip D., 114
Stalnaker, Armand C., 178
Stamper, Beulah S., 178
Stanley, Robert J., 132
Starcher, Barry C., 65
Stein, Arthur H., Jr., 144
Stein, Elliot H., 178
Stein, Paul M., 70
Steinberg, Franz U., 63, 121, 143
Stephen, C. Ronald, 45, 180
Stern, John A., 125
Sternat, Janet S., 176
Stevens, Sue Cassell, 97
Steward, Palmer G., 134
Stewart, Carleton C., 134
Stewart, Frances H., 83
Stickle, Arthur W., Jr., 88
Stoddard, Elizabeth A., 67, 122
Stokes, James M., 141
Straatmann, Maria G., 135
Strominger, Donald B., 105
Stroud, Malcolm H., 90
Strzelec, Betty, 172
Stutsman, A. Chesterfield, 91
Sullivan, James H., 170
Sullivan, Timothy J. III, 65
Sumer, Emel A., 149
Sunshine, Herbert, 145
Sunwoo, In Sook, 122
Susman, Noah, 134
Sutera, Salvatore, 165
Sutter, Richard A., 122

- Swan, Marlene R., 174
 Swanson, Larry W., 43
 Sweet, Frederick, 82
 Sweet, John, 128
- Taibleson, Mitchell, 125
 Tamphaichitr, Kongsak, 67
 Tao, William K. Y., 178
 Taussig, Barrett L., 65
 Taute, Herman, 84
 Taxman, Robert M., 70
 Taylor, Eugene D., 83
 Teitelbaum, Steven L., 96
 Ternberg, Jessie L., 104, 144, 181
 Ter-Pogossian, Michel M., 132, 165
 Terrill, Robert C., 170
 Thach, Robert E., 50, 181
 Thach, W. Thomas, Jr., 43, 77
 Thakur, Madhukar L., 135
 Thalmann, Isolde, 91
 Thalmann, Ruediger, 90
 Thawley, Stanley E., 91
 Thayer, Harold E., 178, 179
 Thiel, J. Allen, 70
 Thiele, Belmont R., 142
 Thies, Curt, 165
 Thoеле, Charles E., 170
 Thomas, Charles A., 178, 179
 Thomas, Lewis J., Jr., 45, 114, 147, 165
 Thompson, M. Bryant, 83
 Thomson, William M., 67
 Thurston, Donald L., 104
 Thurston, Jean H., 104
 Tillack, Thomas M., 43, 96, 152
 Tillman, Mary A. T., 107
 Tolmach, Leonard J., 43, 132
 Tomelleri, Carlos, 128
 Torack, Richard, 95
 Torin, Bernice A., 84
 Trotter, John L., 78
 Trotter, Mildred, 42, 135
 Tsifutis, Argyrios A., 106
 Tubbs, Garth D., 174
 Tucker, George L., 141
 Tumialan, Luis, 98
 Turner, James K., 106, 151
 Tuteur, Peter G., 65, 181
 Tyson, Ellen T., 174
- Valdes, Andres J., 97
 Valdes, Orestes S., 107
 Valeriotte, Frederick A., 132
 Vanderpearl, Robert H., 127
 Van Sweden, Martha, 174
- Vargas, Jaime, 128
 Vastola, Edward E., 77
 Vavra, John D., 61, 121, 151, 179, 182
 Velez, Mario, 98
 Velkley, Donald E., 135
 Venable, H. Phillip, 87, 181
 VendeBogert, Jane, 174
 Viamontes, Jorge A., 127
 Vickar, Gary M., 128
 Vickerstaff, Hugh R., 170
 Vietti, Teresa J., 133, 152
 Viers, Wayne A., 91
 Voege, Barbara N., 107
 Voerg, Marylyn, 149
 Volpe, Joseph J., 77, 105, 180
 Votaw, Robert E., 91
- Wagner, Kenneth R., 170
 Wald, Stanley M., 66
 Walker, J. Leslie, 83
 Walker, Willard B., 141
 Walkup, Donald W., 165
 Wallace, Samuel T., 171
 Walsh, James W., 70
 Walter, Evelyn I., 176
 Walters, John F., 179, 181
 Waltman, Stephen R., 86
 Walton, Franklin E., 140
 Walz, Bruce J., 134
 Wann, Donald F., 43, 165
 Warack, Marian S., 174
 Warden, Gail L., 169
 Warren, James C., 50, 82, 180
 Wasserman, Helman C., 83
 Waters, Hugh R., 70
 Watkins, George L., Jr., 141
 Watson, M. Frances, 121
 Wattenberg, Carl A., 143
 Waxelman, Roger J., 107
 Webster, William H., 178
 Wedner, H. James, 65
 Wee, George C., 141
 Weeks, Paul M., 122, 145, 154
 Weidman, Stuart W., 50, 122
 Weil, Richard K., 178
 Weis, Landy, 97
 Weiss, Alan N., 65
 Weiss, Edward S., 65
 Weiss, Stuart, 77
 Welch, Michael J., 132
 Weldon, Clarence S., 105, 143, 181
 Weldon, Virginia, 105, 180
 Welner, Amos, 126
 Welner, Zila, 106, 128

- Wenneker, Alvin S., 66
West, Joseph W., 91
West, Patricia A., 129
Wette, Reimut, 116, 121, 165
Wetzel, Richard D., 127
Weygandt, Glenn R., 45
White, Bruce L., 145
White, Harvey L., 113
White, Park J., 105
Whitten, F. Dale, 171
Wiant, James R., 70
Wiegand, Herbert C., 70
Wiest, Walter G., 50, 82
Wilbois, Ronald P., 83
Wilkins, George T., Jr., 107
Will, LaVerne J., 172
Willard, Mark B., 43, 50
Williams, Carol F., 83
Williams, Ray D., 65
Williamson, Janet, 174
Williamson, Joseph R., 95
Wilson, Hugh M., 132
Wilson, Keith S., 65
Winder, William W., 122
Windsor, Charles E., 87
Winters, Kathleen, 107
Wirth, Patricia E., 122, 151
Wise, Leslie, 130, 182
Wissmath, Frank S., 106
Wissner, Seth E., 83
Wittcoff, Raymond H., 178
Witztum, Joseph L., 65, 122
Wochner, R. Dean, 61, 121
Wochnik, Eliza E., 128
Wolf, Mitchel L., 86
Wolfe, Edward M., 70
Wolff, Gerald A., 66
Wolff, Harold D., 127
Wolfgram, Edwin D., 129
Wood, James A., 70
Wood, Patrick M., 43
Woodruff, Robert A., Jr., 125
Wool, Gerald, 108
Woolsey, Thomas A., 43
Word, Parker H., 84
Worland, Julien, 149
Wortley, Neil C., 171
Wozniak, Paul R., 171
Wray, Robert C., Jr., 145
Wright, Carmen, 172
Wulff, George J. L., Jr., 82
Wunderlich, Paul H., 171
Yang, Shiu S., 70
Yanow, Mitchell, 84
Yates, Jessie T., 70
Yoshida, Akira, 68
Youssef, T. K., 135
Yu, Shiu Y., 65
Yuhas, Donald E., 70
Zarkowsky, Harold, 105
Zawalich, Walter S., 108
Ziegler, Vincent E., 128
Zimmerman, Herbert B., 66
Zimmerman, Joan, 148
Zink, Oscar C., 134
Zivnuska, Frederick R., 135
Zografakis, George H., 145
Zuckerman, Gary R., 65
Zwirn, H. Benjamin, 108

Index

- Administration, 178
- Admission, 19
 - Advanced Standing, 21
 - American Medical College Application Service, 20
 - Application Procedure, 20
 - Entrance Requirements, 19
- Advanced Standing, 21
- Affiliated Hospitals, 34
- Allied Health Professions
 - Aids in, 28
 - Health Care Administration, 167
 - Nurse Anesthesia, 171
 - Occupational Therapy, 173
 - Pediatric Nurse Practitioners, 172
 - Physical Therapy, 175
 - Radiologic Technology, 176
 - St. Louis Interinstitutional Physician's Assistant Training Program, 173
- Alumni Association, 31
- Anatomy and Neurobiology, 40
- Anesthesiology, 44
- Application Procedure, 20
- Awards and Prizes, 27

- Beaumont-May Institute of Neurology, 152
- Biological Chemistry, 47
- Biology and Biomedical Sciences,
 - Division of, 155
- Biomedical Computer Laboratory, 34, 146
- Biomedical Engineering, 165
- Biophysics, *see* Physiology and Biophysics
- Board of Trustees, 179
- Buildings, 33

- Calendar, 4
- Child Psychiatry, 149
- Clinical Clerkship, 11
- Clock Hours, 10
- Combined M.D./Ph.D. Program, 12
- Committees of the Faculty, 181
- Cultural Opportunities, 31
- Curriculum, 9, 16

- Degrees
 - B.S.O.T., 173
 - B.S.P.T., 175
 - Combined M.D./Ph.D. degree, 12
 - M.D. degree, 12
 - M.H.A., 167

- Departments and Divisions of the School
 - Allied Health Professions, 166
 - Anatomy and Neurobiology, 40
 - Anesthesiology, 44
 - Biological Chemistry, 47
 - Genetics, 51
 - Graduate Training, 155
 - Medicine, 53
 - Microbiology and Immunology, 71
 - Neurology and Neurological Surgery, 75
 - Obstetrics and Gynecology, 79
 - Ophthalmology, 85
 - Otolaryngology, 89
 - Pathology, 93
 - Pediatrics, 99
 - Pharmacology, 109
 - Physiology and Biophysics, 112
 - Preventive Medicine and Public Health, 115
 - Psychiatry, 123
 - Radiology, 130
 - Surgery, 136
 - Teaching and Research Divisions, 146

- Early Decision Admission, 20
- Electives, 11
- Entrance Requirements, 19
- Executive Faculty, 180
- Expenses, 23

- Faculty Council, 180
- Faculty Index, 204
- Fees, 22, 29, 156, 169, 171, 172, 173, 175
- Fellowships, 17, 27
- Financial Assistance, 23, 156
- Financial Information, 22
- First-Year Curriculum, 16

- Genetics, 51
- Grades, 15
- Graduate Training
 - Biology and Biomedical Sciences, 155
 - Biomedical Engineering, 165
 - Gynecology, *see* Obstetrics and Gynecology
- Health Care Administration, 167
- Health Care Research, 151

- Health Service, 30
- Historical Perspective, 6
- Honors, 15
- Hospital Administration, *see* Health Care Administration
- Hospitals and Institutes, 34
- Hours, Required, 10
- Housing, 29

- Immunology, *see* Microbiology and Immunology

- Index of Staff Members, 204
- Individualized Programs, 15
- Instruments, *see* Expenses
- Internships, 18
- Interview, 21
- Irene Walter Johnson Institute of Rehabilitation, 153
- Lectureships, 31
- Library, 34
- Loan Funds, 25
- Medical Center, 34, 179
- Medical College Admissions Test, 20
- Medical Scientist Training Program, 12
- Medicine, 53
- Medicine, The Study of, 9
- Microbiology and Immunology, 71
- Microscope, 23
- Neurology and Neurological Surgery, 75
- Neurology, Institute of, 152
- Nondiscrimination, 19
- Nurse Anesthesia, 171
- Objectives, 9
- Obstetrics and Gynecology, 79
- Occupational Therapy, 173
- Officers and Committees, 180
- Olin Residence Hall, 29
- Ophthalmology, 85
- Otolaryngology, 89
- Parking, 30
- Pathology, 93
- Pediatric Nurse Practitioners, 172
- Pediatrics, 99
- Personal Interview, 21
- Pharmacology, 109
- Ph.D./M.D. Program, 12
- Philosophy and Objectives, 9
- Physical Therapy, 175
- Physician's Assistant Training Program, 173
- Physiology and Biophysics, 112
- Postdoctoral Training, 18
- Premedical Requirements, 20
- Preventive Medicine and Public Health, 115
- Prizes, 27
- Programs, Individualized, 15
- Promotions, 16
- Psychiatry, 123
- Public Health, *see* Preventive Medicine and Public Health
- Radiologic Technology, 176
- Radiology, 130
- Recreational Opportunities, 31
- Register of Students, 183
- Rehabilitation Institute of, 153
- Required Hours, 10
- Research Fellowships, 17
- Residencies, 18
- St. Louis, City of, 31
- St. Louis Interinstitutional Physician's Assistant Training Program, 173
- Scholarship Funds, 24
- Schools of the University, 224
- Second-Year Curriculum, 17
- Staff Members, Index of, 204
- Student Activities, 30
- Student Life, 30
- Student Research Fellowships, 17
- Students, Register of, 183
- Study of Medicine, The, 9
- Surgery, 136
- Table of Required Hours, 10
- Teaching and Research Divisions
 - Biomedical Computer Laboratory, 146
 - Child Psychiatry, 146
 - Health Care Research, 150
 - Neurology, Institute of, 152
 - Rehabilitation, 153
 - Tumor Services, 152
- Teaching Facilities, 33
- Transcripts, 15
- Transfer Students, 21
- Trustees, 179
- Tuition, 22, 29, 156, 169, 171, 172, 173, 175
- Tumor Services, 152
- Tutorials, 15
- Visiting Professorships, 31

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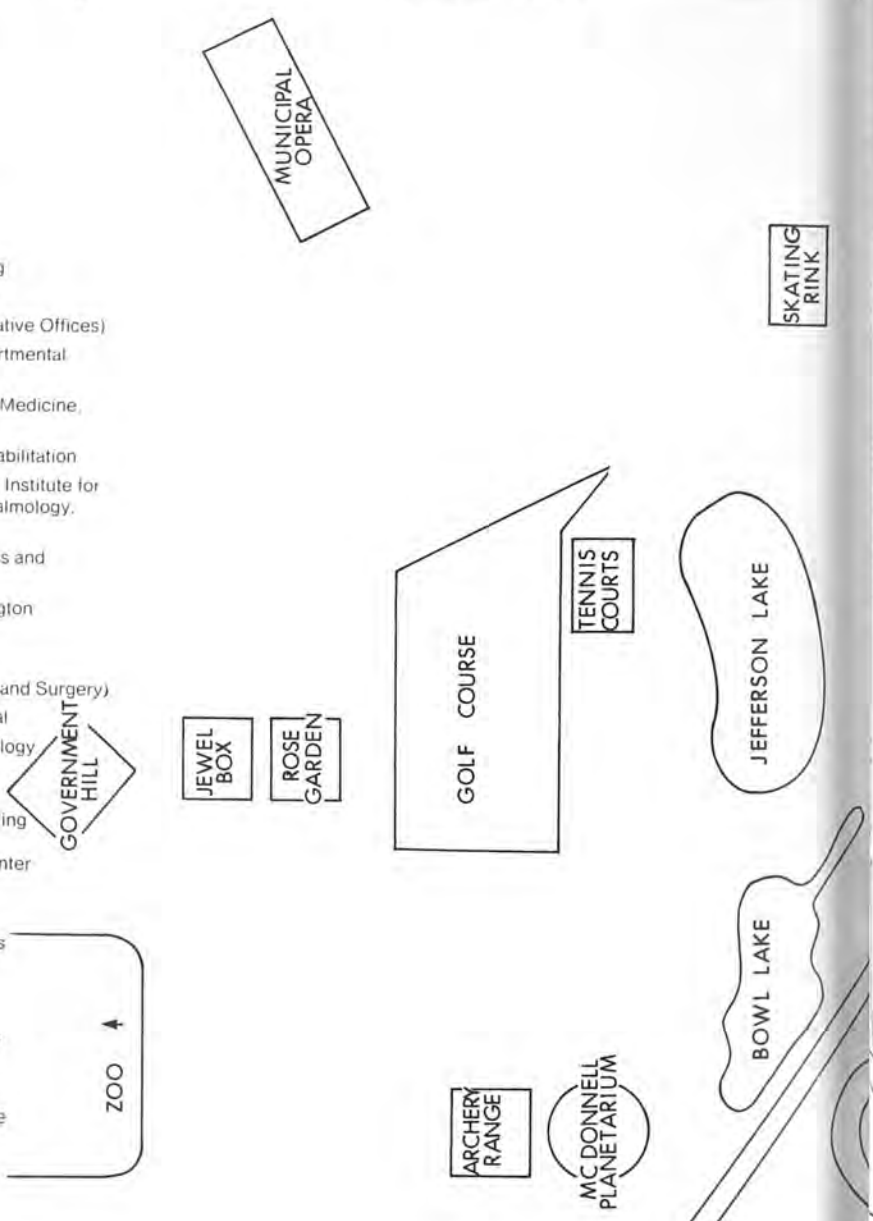
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Medical Center

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- 1 Spencer T. Olin Residence Hall
- 2 McDonnell Medical Sciences Building
- 3 North Building (Auditorium, Library)
- 4 Cancer Research Building (Administrative Offices)
- 5 South Building (Basic Sciences Departmental Offices)
- 6 West Building (Pathology, Preventive Medicine, Animal Quarters)
- 7 Irene Walter Johnson Institute of Rehabilitation
- 8 McMillan Hospital and Oscar Johnson Institute for Medical Research (Neurology, Ophthalmology, Otolaryngology)
- 9 St. Louis Maternity Hospital (Obstetrics and Gynecology)
- 10 David P. Wohl, Jr. Memorial—Washington University Clinics
- 11 Renard Hospital (Psychiatry)
- 12 David P. Wohl, Jr. Hospital (Medicine and Surgery)
- 13 Barnard Free Skin and Cancer Hospital
- 14 Edward Mallinckrodt Institute of Radiology
- 15 Barnes Hospital
 - a. Medical Wing
 - b. Rand-Johnson Memorial Surgical Wing
 - c. Queeny Tower
 - d. Diagnostic Laboratories; Service Center
 - e. East Pavilion
- 16 Clinical Research Building
- 17 St. Louis Children's Hospital (Pediatrics)
- 18 700 and 724 South Euclid Buildings
 - a. Biomedical Computer Laboratory
 - b. Physical Therapy
 - c. Hospital Administration, Biostatistics
 - d. Computer Systems Laboratory
- 19 Central Institute for the Deaf
- 20 Central Institute for the Deaf Residence
- 21 School of Dental Medicine
- 22 Occupational Therapy
- 23 Power Plant
- 24 Medical Care Group
- 25 Jewish Hospital
 - a. West Building
 - b. Shoenberg Pavilion
 - c. Medical Building
 - d. Nursing Residence
- 26 Parking
 - a. Public
 - b. Washington University Medical School Permit Parking Only
 - c. Jewish Hospital
 - d. Barnes Hospital Permit Parking Only
 - e. Underground Garage

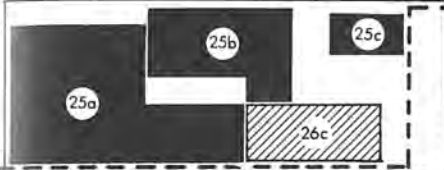


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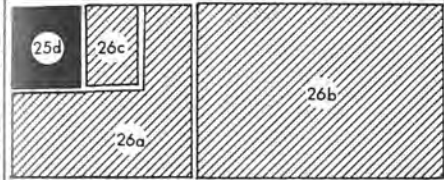
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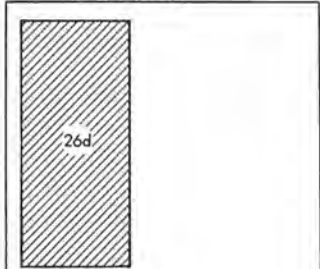
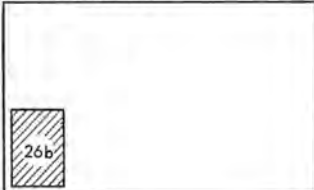


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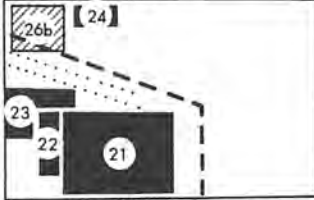
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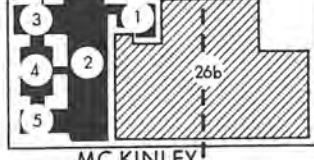
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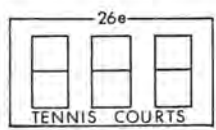


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The School of Architecture
The School of Business and Public Administration
The Graduate School of Business Administration
The School of Fine Arts
The School of Social Work
The School of Law
The School of Medicine
The School of Dental Medicine
University College
The Summer School

