

7-1949

Washington University Medical Alumni Quarterly, July 1949

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Published quarterly by Washington University School of Medicine, St. Louis 10, Mo.
Entered as second class matter December 14, 1937, at the Post Office at St. Louis, Mo.,
under the act of August 24, 1912.

The Washington University Medical Alumni Quarterly

VOL. XII

JULY, 1949

NO. 4

The Development and Application of Radiographic Equipment for the Automatic Rapid Serialization of X-Ray Exposures — the Tautograph and the Rapidograph

By Wendell G. Scott, M.D.

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In the past decade radiologists have made intense efforts to improve and make practical techniques for visualizing the arterial and venous system of the body and of the heart. Relatively innocuous chemicals that are opaque to x-rays have been available, but the chief stumbling block was the lack of automatic equipment that was capable of making a series of x-ray exposures in rapid sequence with a Potter-Bucky grid to obtain films of satisfactory clarity and contrast.

The object of this paper is to describe the development of two successful units for this purpose, the tautograph and the rapidograph, the latter having been selected for commercial production and distribution.

The idea of using a large continuous roll of x-ray film to examine functioning organs within the body first occurred to me in 1935 when I was trying to adapt kymography to the study of the excretory mechanism of the kidney and ureter. In reviewing the literature, I

read a report by Dr. Hans Jarre describing a "Cinex Camera" which he had developed and used in the radiographic examination of the urinary tract in 1928. After corresponding with Dr. Jarre, I went to Detroit to see this equipment. He had not used it for several years, but it was still workable. It was a compact, ingenious device, and was the first to use x-ray roll film. It could accommodate sizes varying from 4 to 11 inches in width. It was capable of making exposures at the rate of one every one-half second. At that time, unfortunately, the transformers and x-ray tubes did not have sufficient capacity to permit using a Potter-Bucky grid with the Cinex Camera and consequently the roentgenograms lacked contrast. It was for this reason largely that Dr. Jarre was unable to interest the manufacturers in developing his "Camera" for general use and the project was set aside.

The hope of ultimately using roll film for the examination of functioning organs persisted in my thoughts and in

1945 I witnessed a demonstration of a Fairchild aerial camera in the Photographic Department at a Naval Air Station. This camera utilized a film $9\frac{1}{2}$ inches wide and came in rolls about 100 feet long. This seemed like a feasible unit to adapt to radiographic purposes. Through the proper channels I secured the magazine of this camera and had started to alter it for "spot film" work in gastro-intestinal examinations when the war ended and put a stop to this undertaking.

With the return to peace-time status, I soon realized that the pediatricians, the cardiologists, the thoracic surgeons, and the neurological surgeons were all interested in improving their angiographic techniques whereby an opaque chemical, usually an iodine compound, was injected into the blood stream and roentgenograms were made as it passed through the heart and lungs, or through the arteries of the brain. In a study of these procedures, it was apparent that the most urgent need was the development of x-ray equipment that could take a continuous series of pictures in rapid sequence during the time the opaque chemical was circulating through the organs or vessels to be pictured. This, furthermore, should be done with automatically operated equipment to eliminate the failures caused by manual operation and by teams of technicians that were organized to change the individual x-ray films. The rapid serialization of x-ray exposures, plus assured automatic operation would make these angiographic techniques practical everyday diagnostic procedures. An additional and important advantage to be

gained by such equipment was the fact that a single and smaller injection of the opaque chemical would suffice and would avoid the repeated injections of larger amounts as were frequently necessary then to fully visualize a particular structure.

With this background the answer seemed to be in using large size x-ray roll film adapted to the magazine of the Fairchild Aerial Camera such as we had tried earlier, and altering it to run at a fast rate of exposure with all operations for advancing and stopping the film and making the x-ray exposure completely automatized and synchronized with a Potter-Bucky grid to obtain films of the greatest contrast and clarity. After going over the problem with Dr. Sherwood Moore, Professor of Radiology and Head of the Department, we decided it was feasible to make a unit of this order. Accordingly, in December, 1946, I arranged a meeting with Mr. C. E. Seibert of the Fairchild Camera Company in New York, where we went over our objectives. He kindly gave us a war surplus magazine of their A-5 aerial camera. After making preliminary drawings of the alterations and additions, Dr. Moore and I consulted Mr. R. H. Tontrup of St. Louis and arranged for him to carry out the mechanical construction.

Many interesting problems were presented for solution in this undertaking, for instance: X-ray film is coated with photo-sensitive emulsion on both sides and has a stiff cellulose base to prevent curling so that it will lie flat. The standard photographic film is coated only on one side and has a soft cellulose base

that curls easily. The magazine was originally designed to handle the pliable photographic film which was flattened and immobilized in the magazine by an air suction system at the moment of exposure. The x-ray film, however, was not only too stiff to be affected by this vacuum system, but for our purpose the film had to be exposed between two intensifying screens which could not be perforated for air holes. The problem was solved by making a large cam that raised and lowered the plate supporting the underneath intensifying screen. In this way greater pressure could be exerted by the lower screen against the upper and the film between them flattened and immobilized for the exposure.

Also, the magazine was designed to be powered by interlocking discs on the top surface, but for radiographic purposes it was necessary to place the Potter-Bucky grid as close to the top of the magazine as possible with just enough clearance to permit the grid to move. Consequently, a new drive shaft had to be constructed at the side of the magazine and connected with a motor.

The selection of the motor was not easy as the type, power, size, speed, and combination of reduction gears had to be determined with respect to the exposure rate at which the unit was to operate.

One of the most difficult problems was to speed up the rate of exposure from one every two seconds to an exposure rate of one every one-half second without damaging the original gears and bearings so the expense of constructing new and heavier ones could be avoided. Other changes that had to be worked

out included the installation of the two intensifying screens at the top of the magazine through which the x-ray film would be exposed; the construction of cams that would raise and lower one of the intensifying screens to permit the passage of the film and then bring them together quickly and in firm contact during the exposure; synchronization of the movement of the Potter-Bucky grid to occur at the moment the film was stopped and the x-ray exposure made; the construction of a device for recocking the Potter-Bucky grid while the exposed x-ray film was taken up and the new unexposed segment of film brought into position.

All of these factors and others had to be accomplished in accord with our basic premise that the finished unit would be small, compact and removable from the x-ray table so it could be taken to the darkroom where the exposed roll of film could be removed and processed. We wanted to retain as many of the basic construction features of the magazine as possible in order that the same tools, dies, castings, etc., that were used in the construction of the magazine for the Army Air Forces could be used in the construction of the rapidograph. This was important because it meant a great saving in the manufacturing cost which was necessary if it was to be available to the smaller radiological departments with limited funds.

After considerable work and many trials with repeated revisions, the above factors were all accomplished. The rapidograph is now in commercial production by the Fairchild Camera Company, which has arranged to distribute

it through the companies manufacturing x-ray equipment. It operates at an exposure rate of one every one-half second and mechanical failures have been reduced to practically zero. The unit is flexible and can be adapted by any manufacturer to fit his diagnostic tables of practically every vintage and model. If the radiologist prefers, the rapidograph can be set into a special end table which can be rolled into position. Some radiologists may even prefer to mount it on a Potter-Bucky grid stand or on head and sinus units.

CLINICAL APPLICATIONS

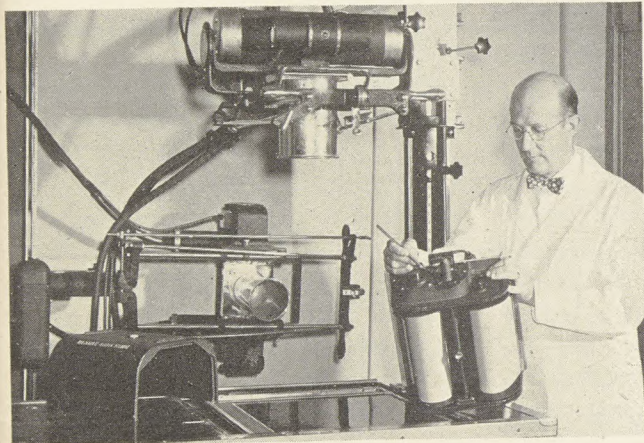
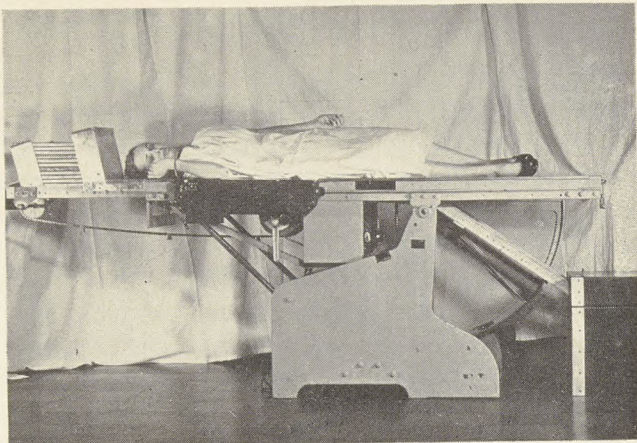
The first application of the rapidograph was in the study of children and infants with congenital malformations of the heart. The brilliant developments in cardio-vascular surgery by Gross of Boston, Blalock of Baltimore, and Potts of Chicago had stimulated great interest in these disorders, because for the first time something could be done for patients afflicted with them. Many had been rehabilitated by cardiac surgery and restored to lead a normal and active life. Unfortunately, not all types of congenital cardiac disorders could be corrected by surgical measures, and therefore, it became more important to diagnose accurately every patient and to appraise him as to whether or not he was a suitable candidate for surgery. In other words, a real need existed for better radiographic means of visualizing these defects in the heart and great blood vessels.

The introduction of angio-cardiography by Robb and Steinberg¹ in 1938

was a big step forward because it offered a means for visualizing the different chambers of the heart and the great blood vessels leading to and from it. This was done by quickly injecting an opaque chemical into an arm vein and then taking two roentgen films at the estimated moments it was passing through the right and left sides of the heart. Their technique, however, was only practical in the examination of adults who could remain immobile, control their respiration and stand erect against a standard chest cassette changer. Furthermore, it necessitated the determination of the circulation time in order to "guesstimate" the exact time the "bolus" of opaque chemical would arrive in a particular part of the heart and then make the roentgen exposure at that moment. It was difficult to accomplish this on only two films, but that was as many as could be taken in rapid sequence by standard equipment. Consequently, in many instances a second and even a third injection were required to obtain satisfactory visualization of the heart and lung circulation. Multiple injections increased the hazard of the examination and were to be avoided. Thus, while angiography was an achievement it was not practical for the examination of children and infants and new techniques had to be devised if the little ones who needed it the most were to be benefited. That is why we devised the tautograph and the rapidograph.

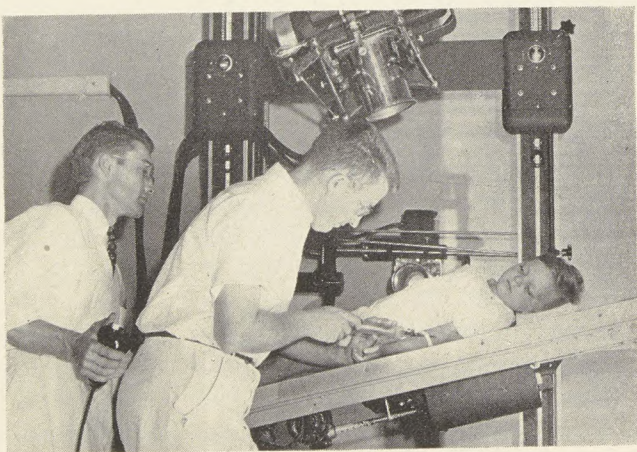
¹ Robb, G. P., and Steinberg, I., Practical Method of Visualization of the Chambers of the Heart, and Pulmonary Circulation, and the Great Blood Vessels in Man. *Journal Clinical Investigation*, 1938, 17, 507.

Side view of Tautograph constructed for the rapid serialization of individual x-ray cassettes. It operates at a continuous rate of one exposure per second. The bottom cassette in the magazine at head of table is carried under the patient by the chain conveyor, is stopped there for the exposure and is then retired into receiving bin on the floor at end of table. The Tautograph was the first fully automatized equipment synchronized with a Potter-Bucky grid for obtaining a series of films in quick succession.



Side view of total equipment with Dr. Wendell G. Scott holding the Rapidograph and pointing to the timing pin which closes the micro-switch for starting the Potter-Bucky grid which in turn initiates the x-ray exposure and turns it off. The light-proof cover has been removed from the magazine to demonstrate the supply and take-up spools with the large size x-ray roll film. The top of the Potter-Bucky grid has been taken off to show the grid and self-cocking mechanism. Two x-ray tubes at right angles to each other have been set up.

Dr. Wesley Fee, Assistant Resident in Radiology, is demonstrating the technique for making cardio-vascular angiograms. A special syringe and needle are inserted into the arm vein and the opaque material (diodrast 70% or neo-iopex 75%) injected extremely quickly. Mr. Ferguson, x-ray technician, starts exposures by pressing button before the injection is made and keeps it closed throughout the injection and from six to twelve seconds thereafter. Note electric motor and reduction gear unit beneath the table and connected to magazine by drive shaft.



The tautograph is a radiographic unit which I designed with the support of Dr. Sherwood Moore and which was constructed by Mr. R. H. Tontrup prior to the development of the rapidograph. The tautograph handles standard x-ray cassettes which are moved by a roller chain conveyor system beneath the top of the table between two channel irons equipped with brass rollers. A stack of 10 or more 11"x14" cassettes are placed in the magazine at the head of the table and the bottom one is picked off by a steel lug on the roller chain and carried into position beneath the patient's chest where it is stopped for $\frac{1}{3}$ of one second while an x-ray exposure of $\frac{1}{20}$ of one second is made. This cassette is then carried to the end of the table into a receiving bin at the same time a new cassette is brought into position. By this process a large number of films can be made in quick succession. The entire mechanism is automatized and only one technician is required to close one switch in order to put the equipment in operation. For the first time the tautograph offered radiologists a means of taking films in rapid sequence with a Potter-Bucky grid. This meant that the cardio-pulmonary circulation could now be visualized independently of the circulation time, without having to predetermine the exposure time, without the hazard of repeated examinations, without the assistance of a "crew" of technicians, and with the assurance and constancy of mechanical control. For the first time we had a practical technique for angio-cardiography in children and infants. The roentgen exposure was $\frac{1}{20}$ of one second which

was fast enough to eliminate the movements of respiration. Excellent angiograms were obtained by this method, but we were not yet satisfied. We wanted a faster rate of exposure; equipment of less bulk and weight; a unit more flexible and adaptable to existing radiographic equipment; one with less vibration and noise and capable of almost an unlimited number of exposures. The rapidograph was, of course, the answer to these problems and today it has made cardio-vascular angiography in children a practical and a safer diagnostic procedure.

In this respect we should like to emphasize the great help and cooperation we have received from Dr. Merl J. Carson, Assistant Professor of Pediatrics and Dr. Thomas H. Burford, Associate Professor of Surgery. They contributed largely to the actual technique of the injections. In working so closely together, the whole project has had the benefit of "team" action. The small infants are given a bottle of sugar water to suckle during the preparation and examination. A few cc of novocain are injected into the skin over the left antecubital vein. A small incision is made in the bleb and the largest needle compatible with the diameter of the vein is then inserted. The amount of 70% diodrast or 75% neo-iopex injected depends on the size of the patient as well as on the size of the heart. At a given signal the rapidograph is started and two exposures are made before the chemical is quickly injected (within $1\frac{1}{2}$ seconds). The rapidograph continues taking films throughout the injection and for 8 to 10 seconds thereafter. The

needle is then withdrawn and the skin edges sutured together.

It might be well to review that in 10 seconds of operation, the rapidograph takes 20 roentgenograms on a strip of film $9\frac{1}{2}$ inches wide and 22 feet long. Each exposure is $\frac{1}{20}$ of one second, and for the twenty exposures a total of only one second of x-ray is used. This feature makes it safe to take this number of films and is the great advantage gained over photo-fluorographic techniques which photograph the image on the fluoroscopic screen on small 70 mm. roll film. Our process and photo-fluorography are entirely different and should not be confused.

In our experience cardio-vascular angiography by this method has been very helpful, not only in the confirmation of the clinical diagnosis, but also as a thorough method of visualization of the cardio-pulmonary circulation for additional defects and abnormal physiologic changes. In general cardiovascular angiography has been useful in the recognition of and the distinction between tetralogy of Fallot and Eisenmenger's complex. It has also proved advantageous in the diagnosis of truncus-arteriosis, tricuspid stenosis with a so-called "non-functioning" right ventricle, true transposition of the great vessels, interventricular septal defects, stenosis of the pulmonary conus or infundibulum, double aortic arches, right-sided aortic arch and other anomalies.

A word should be mentioned about aortography as distinguished from cardio-vascular angiography. Aortography is done by injecting the 70% diodrast or 75% neo-iopex retrograde

into a major artery of the neck or shoulder against the direction of the blood flow. It is used primarily for obtaining a clearer visualization of the aorta and its branches. Drs. Burford and Carson developed independently of others the technique of using the left common carotid artery with the needle inserted toward the aorta so that when the chemical is injected, it is forced directly into the aorta. This procedure has been especially helpful in the visualization of coarctations of the aorta for locating the exact level of the constriction, the degree of narrowing and the extent to which the collateral circulation has developed. It has also been valuable in confirming a patent ductus arteriosus as some of the chemical injected into the aorta will pass through the patent ductus into the pulmonary arteries where it is visualized without having passed through the heart. Aortography usually requires the surgical exposure of the left common carotid artery for the direct insertion of the needle.

Perhaps even a greater field of usefulness for the rapidograph lies in its application to cerebral angiography. Here, too, the technique of examination was previously handicapped by the lack of radiographic equipment capable of making a series of roentgenograms in rapid sequence, in this case while a "bolus" of opaque chemical was circulating through the arterial system of the brain. In the past the basic idea was to obtain visualization of the cerebral arterial system by keeping it filled with a continuous injection of the opaque chemical while taking a long

x-ray exposure of two to three seconds duration. A second or occasionally a third film was made immediately following the first in an effort to picture the chemical in the capillaries and later in the venous system. By this same method two films could be made in rapid sequence by shifting the tube between the exposures to obtain stereoscopic views. Frequently this technique was successful, but too often it was not, due to a failure of manual operation in the timing, in the handling of the cassettes and the synchronization of the events. Consequently, repeated injections were commonly required for adequate visualization with a minimal boost in the hazard of the examination.

By applying the rapidograph, a safer, simpler, more accurate, and positive technique has been evolved by "teaming up" with the Department of Neurological Surgery, of which Dr. Henry Schwartz is Professor. In using the rapidograph the human element was eliminated from the radiographic technique, and the only source of failure in the examination now rests with the physician who is making the actual injection of the 30% diodrast into either the right or left common carotid artery.

Both the per-cutaneous technique and the injection directly into the exposed artery are performed at the discretion of the neurological surgeon. Just prior to the injection the rapidograph is set in operation by the technician and at least two "plain" films are made before the signal to injection the chemical is given. The injection here is also done very quickly, within one second, and the roentgen exposures are continued

throughout the injection and for 3 to 4 seconds thereafter. Since the rapidograph provides a continuous series of films taken every half second, it is possible now to inject much smaller quantities of the chemical and record the progress of this single "bolus" through the arterial system, the capillary stage, and the venous system. Large quantities of the chemical are no longer required. This is an advantage in the percutaneous method because if the artery is "missed" and the chemical injected into the soft tissues of the neck only 5 to 7 cc are misplaced, compared to 15 to 30 cc as formerly. With the smaller amounts it is possible to repeat the injection without fear of harmful consequences.

Stereoscopic studies can also be made by taking the first series of films with the x-ray tube shifted $1\frac{1}{2}$ inches to one side of the mid-line and taking the second series after a second injection, with the tube shifted $1\frac{1}{2}$ inches to the opposite side of the mid-line. The two films in each series that demonstrate the best filling of the arteries are then placed in the stereoscopic viewer. Anterior-posterior views are made following a third injection. The total amount of the chemical now used for the three routine injections about equals the amount formerly used for a single injection.

Another advantage offered by the serial roll film in cerebral angiography is that it provides a means of checking a suspicious filling defect in any artery on any one exposure by comparing its appearance on films made $\frac{1}{2}$ second prior and $\frac{1}{2}$ second later than the one in question. In same way the radiolo-

gist has a means of establishing that such a questionable filling defect is constant and thus of definite significance.

Other fields of diagnostic radiology in which the rapidograph is promising are in the visualization of arterial and venous diseases involving the extremities. At present these studies are limited by the relatively small area that can be x-rayed, but as developments in the adaptation of roll film mature, larger rapidographs employing larger films sufficient to include the entire leg or arm will be available. As in cardiovascular angiography, an opaque chemical (30% diodrast or 35% neo-iopex) is injected into the artery or vein in question and serial films are made to demonstrate the distribution of the vessel, the size of the lumen and the location of the occlusion, aneurysm, or arterial-venous shunt.

Preliminary studies are also under way for using the rapidograph as a means of investigating the range of motion of a joint or even of a segment of the spine. Exposures are made as the patient slowly moves the joint from a position in full flexion to full extension. This not only gives film in the extreme positions, but also in the intermediate stages.

An intriguing future use for the rapidograph would be to adapt it to automatic self-operating machines for survey purposes. For example, in conducting surveys of the chest for pulmonary tuberculosis, the rapidograph

could be fitted with a Morgan exposure-time, mounted on an upright stand and equipped with a self-centering and counter-balancing mechanism. The whole unit, together with a shockproof tube, transformer, and control, could be placed in a convenient room. Anyone desiring a chest film could step into a dressing booth, remove his clothing down to the waist, slip on a paper cape, write his name and other pertinent information on an identification card fitted on the front of the rapidograph, place his chain in a slot for this purpose, take a deep breath, and at the end of 5 seconds the x-ray exposure would be turned on automatically and turned off by the Morgan timer to produce a perfect chest film. The patient would then return to the dressing booth, and the next person could step into position. No technician would be required and even the secretary might be omitted. At the end of the day the roll of exposed film would be removed by the dark room technician. Thus several hundred people could be examined daily at their own convenience at a much lower cost, with the assurance that films providing the very best detail were being used to detect disease.

In closing it should be mentioned that the rapidograph represents the first practical utilization of large size x-ray roll film for diagnostic radiographic purposes. As such, it is the forerunner of new and important developments in diagnostic radiology.

Proceedings of Washington University Medical Society

The Borden Undergraduate Research Award for 1949 was presented to Milo Lawrence Heideman, Jr., '49, at the Washington University Medical Society meeting held May 19. The \$500 award was given for his winning paper on "Studies on the Pharmacology of p-Aminoethylbenzenesulfonamide (Sulfamylon,)" which Dr. Heideman presented during the evening program. Other student papers presented at the meeting were: "Investigation of Antidiuretic Principles" by Stanley Rokaw, '49, and "Constancy of Nucleic Acid and Phospholipid Phosphorus with aging in Mouse Liver" by Dale M. Schulz, '49. Abstracts are printed herewith.

Alpha Omega Alpha announced the names of 18 junior and senior students elected to membership in the honorary

fraternity. The names were announced at the May 19 meeting, and juniors elected were: Seymour Advocate, Elmer B. Brown, Jr., William M. Hebert, Robert Rochman, and J. Max Rukes. Those elected from the senior class were: Man Hing Au, Leonard Berg, Warren L. Felton II, Ralph H. Forrester, Ervin Lipschitz, Stanley L. London, Charles P. McGinty, Miss Luigia Norsa, Marvin Rosecan, Dale M. Schulz, Thomas J. Walsh, Laurens P. White, and George S. Woodard. The Nu Sigma Nu Awards of \$25 to the outstanding freshman and sophomore for the school year 1947-48 went to Philip S. Norman and Seymour Advocate, respectively.

Abstracts of the papers presented at the Society meetings on February 8, April 28, and May 19 follow.

Abstracts of Papers Presented on February 8, 1949:

BLADDER RECONSTRUCTION FROM CECUM AND ASCENDING COLON FOLLOWING RESECTION OF PELVIC VISCERA

by

Eugene M. Bricker, M.D., and Ben Eiseman, M.D.

Department of Surgery

In this presentation the authors re-introduced the procedure of ureteral transplantation to the terminal ileum and cecum with construction of a blind cecal pouch to act as a urinary reservoir. This procedure, which was first done in 1908 by Verhoogan, was deemed worthy of resurrection in view of the recent advances in surgery and allied

sciences and in view of the possibility of applying the procedure to the treatment of far advanced carcinoma of the rectum with involvement of the trigone of the bladder. Two illustrative cases were reported. One a man of 68 years, and the second a woman of 48 years, both of whom had complete evisceration of the pelvis for carcinoma arising in

the rectum and rectosigmoid, with transplantation of the ureters into the terminal ileum in the first case and into the cecum in the second. Kidney function remained good. There was apparently no deleterious effect from having the urinary stream diverted into the right colon. There was no interference

with the function of the colostomy which in each case was a left inguinal one. The patients were alive and well without evidence of recurrent tumor two years and one year from the date of the report. The functional result was considered to be good.

AGE CHANGES IN THE SALIVARY GLANDS

Warren Andrew, Ph.D., M.D.

Visiting Professor in Anatomy from George Washington University

The submandibular gland of Wistar Institute rats has been studied in a series of animals ranging from 21 days to 1170 days of age. In old age there is almost no fatty degeneration in this gland in the rat. This is in contrast to the condition in the parotid glands of the same animals, where large masses of parenchyma are destroyed by such a process. Oncocytes are as numerous and as conspicuous in the senile submandibular gland as in the senile pa-

rotid gland. They are essentially large, aberrant cells of the serous aveoli. They show marked nuclear changes. The nucleoli of oncocytes are hypertrophied. Amitosis is common and the daughter nuclei tend to adhere together, forming twin and triplet nuclei. With increasing age, the granular parts of the salivary ducts show more pycnotic and shrunken nuclei, the lumina are obscured, and infiltration by lymphocytes is common.

NUTRITIONAL SURVEYS IN NEWFOUNDLAND

Robert E. Shank, M.D., and Oliver H. Lowry, Ph.D., M.D.

Departments of Preventive Medicine and Public Health, and Pharmacology

Newfoundland has had, for many years, a record of poor nutrition. Beginning in 1944 the Newfoundland government took steps to improve the diet, through enrichment of the flour and margarine, which resulted in a doubling of the average consumption of thiamine, riboflavin, vitamin A, and calcium, and substantially increased the iron and nicotinic acid intake. The government likewise invited a group of Canadian, British and American investigators to

make two nutritional surveys, one in 1944, before the institution of the enrichment program, and again in 1948, after four years under the new program. The isolated nature of the community and the fact that most of the food is important made the situation an ideal one for study. In both surveys there were carried out clinical examinations of over 800 persons and chemical analyses of blood and urine from half that number. The same examiners and

the same chemical procedures were utilized in both surveys. Furthermore, nearly a fourth of the persons were examined both in 1944 and 1948. Thus differences observed would seem to be unusually valid. In a remarkable manner the clinical and laboratory findings agreed that in 1944 there existed at least moderate deficiencies in riboflavin, thiamine, vitamin A and ascorbic acid, and,

perhaps, calcium, and that in 1948 all of these, except ascorbic acid, had decidedly improved. These findings appear to be pertinent to our own enrichment program. (The full report of these surveys is to be found in Aykroyd, W. R., Jolliffe, N., Lowry, O. H., Moore, P. E. Zemecnik, P.C., Canadian M.A.J. 60 1, (1949).

Abstracts of Papers Presented on April 28, 1949:

THE PHYSIOLOGICAL BASIS OF PHYSICAL TREATMENT OF DISORDERS OF THE CORTICOSPINAL TRACT

Sedgwick Mead, M.D.

Physical Medicine

The manifestations of corticospinal tract disease vary considerably with the location of the lesion and the degree of involvement of extrapyramidal systems. With this in mind, the chief defects might be listed as follows: loss of voluntary motor power; increased sensitivity of stretch reflexes; clonus; rigidity—the loss of Sherringtonian reciprocal inhibition and thus, the inability to relax antagonist muscles; increased sensitivity of anti-gravity reflexes; ataxia.

Additionally, secondary factors which may be more disabling in the end are: peri-arthritis (frozen shoulder) and shoulder-hand syndrome: disuse atrophy of muscle, connective tissue, and bone; flexor-pronator contractures of the elbow, wrist, and fingers; foot-drop and external hip rotation. Oversolicitude may produce undue invalidism. If present, auditory aphasia, alexia, agnosias, or apraxias may make re-education nearly impossible.

Rationale of Treatment

Loss of voluntary motor power is seldom total, fortunately. Involvement is more serious in the upper extremity than in the lower, possibly due to the uncrossed corticospinal tract running in the anterior funiculus of the cord which permits the latter to escape in part in a unilateral hemispheric lesion. Several weeks of total paralysis following cerebral thrombosis or embolism may be succeeded by a gratifying return of voluntary power provided proprioceptors and long-circuiting connections are stimulated by passive motions and faradic current. Contractures and severe atrophy are prevented. Reciprocal rhythmic exercises may aid in training alternate control pathways, examples being: swimming and crawling motions on the mat, bed bicycling, pulley exercises. Possibly the rubro-, reticulo-, and vestibulo-spinal tracts can be trained to carry some of these impulses.

Splints and bracing may be essential, for walking must be secured as early as possible. When foot dorsiflexors are paralyzed a short-leg brace with spring device is employed. Braces may later be discarded as muscle power increases with use of progressive resistance exercises.

Increased sensitivity of stretch reflexes is a "calculus" function—the effectiveness of a stretch stimulus is less dependent on its absolute magnitude than on the rate of change of onset of the stimulus. Over-reactions occur when the patient attempts a sudden motion or is startled by a sudden sound or visual image. He learns to avoid positions likely to initiate clonus and also that cold weather increases this problem.

Rigidity is a difficult problem, char-

acterized not only by lead-pipe or cog-wheel resistance to passive motion, but a tendency to contract all the muscles of the extremity instead of the appropriate ones on attempt at a voluntary act. Preventive muscle re-education should be instituted in the early stages of hemiplegia when the patient is apt to be flaccid.

Disabling in the upper extremity, the anti-gravity responses may actually be turned to advantage in the lower extremity. If the patient cannot stand on his feet, his spasticity may do it for him.

Rather than a corticospinal defect, ataxia may signify no more than the imprecision and dysmetria associated with muscle weakness from disuse and invalidism. At least it tends to disappear with training.

ANTIGEN TRACER STUDIES AND HISTOLOGIC OBSERVATIONS IN ANAPHYLACTIC SHOCK IN THE GUINEA PIG

Frank J. Dixon, Jr., M.D.

Department of Pathology

By labelling protein antigens with I^{131} , radioactive isotope of iodine, and using tracer techniques, we were able to demonstrate a concentration of antigen in the bronchial walls during anaphylactic shock. The antigen was localized in the collagenous tissue of the bronchial walls external to the smooth muscle layer. The concentration of antigen was apparently a specific uptake of antigen by sensitized tissue because labelled proteins which were not the specific shock producing antigen were not concentrated in the bronchial wall during shock.

Histologic study of the lungs in ana-

phylactic shock showed two factors to be instrumental in the production of fatal bronchial obstruction. First, there was a transitory contraction of the bronchial smooth muscle which was most apparent two minutes after the shock injection and then gradually disappeared. This muscle contraction was best seen in egg albumen anaphylaxis which terminated fatally in about two minutes. Second, there was congestion of the blood and lymph vessels and edema formation in the collagenous tissue of the bronchial wall, which appeared within a minute after the shock injection and progressed during shock.

In globulin induced anaphylaxis which terminated fatally in from five to eight minutes, there was little or no evidence of muscle contraction, and the conges-

tion and edema of the bronchial wall had become so marked that it appeared to be largely responsible for the bronchial obstruction.

ENHANCING EFFECT OF GROWTH HORMONE ON RENAL FUNCTION

Harvey L. White, M.D.; Peter Heinbecker, M.D.; Doris Rolf, A.B.

Departments of Physiology and Surgery

Daily growth hormone administration (Armour's 3PKR3) for 9 to 12 days doubled the PAH clearance and almost doubled the inulin clearance and PAH Tm in normal dogs and raised the greatly depressed values of hypophysectomized dogs to or above the normal levels. It had but slight effect on these functions in the adrenalectomized dog maintained on DCA pellets. Subsequent batches have been effective in hypophysectomized but not in normal dogs. In view of our earlier demonstrations that

loss of the gonadotropic and adrenotropic hormones is not responsible for the great depressions of these renal functions seen after hypophysectomy, and that the effect of loss of thyrotropic hormone is slight, the principal effect is due to loss of growth hormone or of some substance not yet separated from it. The enhancing effect of growth hormone on renal function may find some therapeutic application if consistently active preparations can be obtained.

THE USE OF RADIOACTIVE IODINE IN THYROID DISEASE

William H. Daughaday, M.D.

Department of Medicine

The experience at Barnes Hospital with the use of radioactive iodine in over 125 patients with hyperthyroidism was reviewed for the Society. Results obtained in the first 75 patients were discussed in detail. These patients were selected because they had recurrent hyperthyroidism, advanced age, or complicating disease. Hyperthyroidism has been controlled in 51 of the 66 patients on whom data were available. Six patients were improved but not, as yet, euthyroid after variable periods of observation. Two patients were subjected to thyroidectomies following initial ra-

dioactive iodine therapy. The surgical procedure was not made more difficult by radioiodine. Twenty-one of the patients exhibited varying degrees of hypothyroidism following radioiodine therapy. From these studies, it was concluded that radioactive iodine has proved itself a valuable aid in the treatment of thyroid disease. The ease and economy of its administration recommend it during these days of mounting medical costs. It effects a truly remarkable decrease in the size of even very large diffuse goiters. It is inferior to thyroidectomy only in the speed of re-

sponse and the higher incidence of post-treatment hypothyroidism. At present, in our opinion, it is the treatment of choice in recurrent hyperthyroidism. Its propensity of causing hypothyroidism makes radioiodine treatment of younger patients less desirable than surgery. Radioiodine is not contraindicated in heart diseases, some of our best results having occurred in such patients. In the treatment of nodular goiters, radioiodine is useful in controlling hyperthyroidism in the presence of old age and severe complicating disease. Patients with large nodular goiters probably do better with surgery. In the treatment of nodular goiters with hyperthy-

roidism, the risk, although not great, of malignancy, should be considered and weighed in the total situation. The possible carcinogenicity of radioiodine has been judged to be slight on the basis of its half-life although another decade or so must pass before a better evaluation can be made.

Preliminary observations on 11 patients with metastatic carcinoma of the thyroid were presented. Of this group, two patients had relatively well-differentiated carcinomas adjudged suitable for radioactive iodine therapy. No conclusions can be drawn at this time of the over-all effectiveness of this form of treatment in carcinoma of the thyroid.

Abstracts of Student Papers Presented on May 19, 1949:

STUDIES ON THE PHARMACOLOGY OF P-AMINOMETHYLBENZENESULFONAMIDE (SULFAMYLON)

M. Lawrence Heideman, Jr., M.D. '49

Previous workers have shown that sulfamylon is not antagonized by para-aminobenzoic acid and exerts some bactericidal effect. Its range of anti-bacterial activity has some differences from that of other sulfonamides.

Marked individual variations in absorption are evident after oral administration of sulfamylon, with absorption very poor in infants, while the subcutaneous route provides a relatively uniform picture of rapid absorption and somewhat higher blood levels. Immediate symptoms of headache and nausea were reported by all patients taking sulfamylon orally; mild dizziness and mental confusion were experienced by three out of eleven. No other toxic re-

actions were observed clinically, and no evidence of renal damage or hematopoietic depression was found.

Sulfamylon is excreted rapidly. High doses are required to attain appreciable blood levels (20 to 50 mg. per 100 ml. after doses of 0.6 gm. per kg.), which fall off rapidly; large amounts of free sulfamylon are detected in the urine within one to two hours after oral administration and disappear within eight hours. Conjugated sulfamylon and para-carboxybenzene-sulfonamide also appear as excretion products in the urine. Sulfamylon causes a pronounced diuresis and production of markedly alkaline urine. The great urinary bicarbonate loss tends to be inhibited by base

need in the body, but may persist during maintenance therapy enough to produce systemic acidosis, at least in patients with renal disease.

Sulfamylon enters the spinal fluid in

concentrations far less than those attained in the blood serum, but attains high levels in ascitic fluid. Concentrations in whole blood are equivalent to those in serum.

CONSTANCY OF NUCLEIC ACID AND PHOSPHOLIPID PHOSPHORUS WITH AGE IN MOUSE LIVER

Dale M. Schulz, M.D. '49

During the development of a tissue there are manifest changes in the synthesis of protein by the cells of that tissue. This is reflected in a general way by increase in size during growth and by atrophy of tissues with age. In recent years there has been accumulating evidence pointing to a close connection between protein synthesis and the nucleic acids. Caspersson has made the observation that intense protein production, as in embryonic tissue, cancer cells, or secret glands, is always associated with an increase in nucleic acid concentration. It was therefore thought desirable to study nucleic acid concentration as a function of age.

The tissue used for this study was mouse liver, the animals being selected at random except that pregnant females were not used. The nucleic acids were estimated in terms of phosphorus. The

pooled livers of from three to five mice were homogenized and treated with various reagents so as to obtain four phosphorus-containing fractions designated as acid-soluble, phospholipid, ribonucleic acid, and desoxyribonucleic acid phosphorus, respectively.

Some twenty-five such sets were run using mice varying in age from three to thirteen months. For purposes of statistical analysis the values obtained for mice under two months of age were compared with the corresponding values for mice ten months old or older. It was found that there was no significant difference in any of the phosphorus-bearing fractions with aging.

This result may indicate that liver does not age in the sense that the individual ages, or it may mean that qualitative changes occur without detectable quantitative shifts.

INVESTIGATION OF ANTIDIURETIC PRINCIPLES

Stanley N. Rokaw, M.D. '49, Bernard A. Bercu, M.D.,
and Edward Massie, M.D.

Department of Medicine

Many reports have recently challenged the conventional explanations of the mechanisms involved in cardiac decompensation. The importance of kidney function and water balance in the

development of congestive failure have excited much interest, and it was felt important therefore, to investigate patients with congestive heart failure for the presence of increased amounts of

antidiuretic substances excreted in their urine.

Urines from normal individuals and from patients with mental illness (used as controls), and the urines from patients with chronic congestive failure and peripheral edema, were studied. Patients with definite kidney diseases or independent liver disease were excluded. The specimens were collected over known-time intervals, acidified, evaporated at room temperature, and then dialyzed against tap water for 6 to 24 hours. Amounts equivalent to fifteen minutes of urine output (2 to 4 c.c.) were used as the test dose, injected intravenously into a normal female dog in water diuresis. A preceding injection of commercial pitressin (0.1 milli unit) was always made for comparison with the antidiuretic response to the test dose. Urines were collected from the dogs by indwelling catheters, into volumetric containers, and output was measured at four minute intervals.

A total of fourteen patients were studied, with diagnoses of arterio-sclerotic heart disease (7), rheumatic heart disease (4), hypertensive heart disease (4), cor pulmonale (2) and one of undetermined etiology. Positive antidiuretic effects (abrupt reduction in urine output after injection of the test substance, followed by return to diuretic output levels) were obtained in eleven cases, while no antidiuretic effect was noted in the urine of three cardiac failure patients. None of the control urines tested showed antidiuretic activity. Investigations indicated the antidiuretic substances present in cardiac-failure urine, were not identical with commer-

cial pitressin. The potency of prepared "positive" fifteen minute urine samples, in terms of milliunits of pitressin effect, assayed at 0.3 to 1.0 milliunits. The source of these substances in the cardiac failure patient is not yet identified.

Eleven Graduated Cum Laude; Annual Prizes Announced

Eleven members of the Class of 1949 were graduated with the degree of Doctor of Medicine cum laude at Commencement Exercises on June 7:

Man Hing Au
Leonard Berg
Ralph H. Forrester
Milo L. Heideman, Jr.
Robert H. Lund
Charles P. McGinty
Stanley N. Rokaw
Marvin Rosecan
Dale M. Schulz
Thomas J. Walsh
Laurens Park White

The annual prizes and awards in the School of Medicine are as follows:

George F. Gill Prize in Anatomy—
Peter P. Rowell

George F. Gill Prize in Pediatrics—
John E. Hult.

Alpha Omega Alpha Book Prize—
Stanley R. Rokaw

Borden Undergraduate Research
Award—Milo L. Heideman, Jr.

Howard A. McCordock Prize in Pa-
thology—John H. Knowles

Sidney Schwab Prize in Psychiatry
—Bertram J. Oppenheimer

Medical Fund Society Prize in Inter-
nal Medicine—Stanley N. Rokaw

Medical Fund Society Prize in Sur-
gery—Man Hing Au.

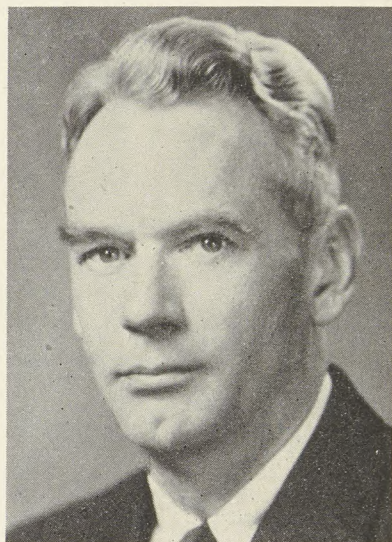
Dr. Sherwood Moore Succeeded by Dr. Hugh Wilson as Radiology Chief

After 48 years spent as student and staff member at Washington University, Dr. Sherwood Moore became professor emeritus of radiology on July 1, at which time he was succeeded by Dr. Hugh M. Wilson. Dr. Wilson, like Dr.

the old Washington University Hospital on Jefferson Avenue, and was the first resident in radiology at Massachusetts General Hospital. In the latter capacity, Dr. Moore relates, he was actually the first intern in x-ray specialization.



Dr. Sherwood Moore, '05



Dr. Hugh M. Wilson, '27

Moore, is an alumnus of the School of Medicine and will be professor of radiology and director of the Mallinckrodt Institute of Radiology.

Dr. Moore has been connected with the School of Medicine continuously since 1901, when he entered as a student, except for a brief one-year period as intern at the St. Louis City Hospital and for three years when he was traveling and studying to prepare for his special field. He was the first resident at

Born in Lynchburg, Va., in 1880, Dr. Moore attended the University of Virginia for one year prior to entering Washington University School of Medicine in 1901. Following his graduation in 1905, he spent one year at City Hospital as intern, then was senior resident in obstetrics at the W. U. hospital for the following year. From 1907 to 1912 he was in the private practice of surgery, and was assistant in surgery at Children's Hospital from 1910 to 1913.

He was resident radiologist at Massachusetts General Hospital in 1916-17.

In 1917, he was appointed assistant in surgery and radiology in the Medical School, and was associate in surgery from 1920 to 1927. He has been professor of radiology since 1927 and director of the Edward Mallinckrodt Institute of Radiology since 1930. During this time, Dr. Moore has been roentgenologist to Barnes, Children's, Maternity, McMillan and Shriner's Hospitals.

He has held military offices in both World War I and II. From 1917 to 1922 he was a lieutenant in the U. S. Naval Reserve Medical Corps. For 20 years, from 1922 to 1942, he was major and, later, lieutenant colonel in the medical corps of the U. S. Army.

Among the honors which have been accorded Dr. Moore are: Gold Medal of the St. Louis Medical Society (received with Dr. Evarts Graham, Dr. Warren Cole, and Dr. Glover Copher) in 1927; honorable mention by the A. M. A. and Canadian Medical Association in 1935; Silver Medal of the American Academy of Orthopedic Surgeons, 1936; honorable mention of the Southern Medical Association, 1937; honorable mention at the Fifth International Congress of Radiology, 1937; Bronze Medal of the Mississippi Valley Medical Society in 1938; First Award of the Radiological Society of North America, 1939; certificates of merit from the American Roentgen Ray Society in 1936 and from the A.M.A. in 1936 and 1939.

Dr. Wilson comes to the School of Medicine from Yale University, where he has been professor of radiology.

Following his graduation from the Medical School here in 1927, Dr. Wilson took his internship at the Royal Victoria Hospital in Montreal, Canada, then returned to Barnes Hospital where he was on the surgical staff under Dr. Evarts A. Graham from 1928 to 1930. He was assistant radiologist to the Mallinckrodt Institute when it opened in 1931 and spent the next three years studying under Dr. Moore, whom he now succeeds. In 1934 he was called to the staff of Yale as assistant professor of radiology and advanced to head of the department there.

Dr. Wilson, who is 47 years old, has published many scientific papers on diagnostic radiology with reference to obstetrics, diseases of the nervous system and of the chest. He was born in Jacksonville, Ill., is married, and has two daughters.

Cancer Research Building to Be Started in Fall

Plans for the new cancer research building to be constructed between the north and south wings of the present Medical School building are in the final stages of preparation, and construction is due to start before very long.

Harris Armstrong, architect for the project, is drawing up final plans for construction work, and it is expected that bids will be let during the early fall.

The plans call for a \$900,000 building, when completed and equipped, which will connect with each of the four floor levels in the present north and south wings. The building will be of modern design.

Preliminary Returns in the Student Dormitory Center Campaign

The campaign for funds from the medical school alumni for the new Student Dormitory Center has gotten off to a good start. The total number of living graduates is 3,352. As this report goes to press, 163 alumni have sent in pledges which total \$26,566.00. Of this amount, \$13,369.15 has already been collected, and the remainder pledged to be paid in 1950 and 1951.

It has been very gratifying to receive several pledges for \$1000.00, and fifteen pledges for \$500.00. It has also been a great satisfaction to note that some of the younger alumni, who are still serving as internes and residents, have sent in pledges. These pledges were necessarily for smaller amounts.

The average amount pledged has been \$161.15. If each one of the 3,352 alumni will make pledges to the fund, and if this average can be maintained,

the total will amount to \$540,174.80. This amount can be supplemented by contributions from other sources, particularly from the parents of students and younger alumni.

I feel confident that the ideal Dormitory Center will become a reality because the alumni are interested, and the land on which it is to be built is already owned by the University.

The following list shows those who have already made contributions or pledges. The names are arranged in two ways. First, by classes, and second, by geographical trade areas, with the chairman for the area listed.

Letters will be sent out periodically in pursuance of the campaign. Those who have not already contributed are urged to do so at their earliest convenience.

Samuel B. Grant, Chairman

Medical Student Dormitory Fund Contributors from Each Class

<i>Class</i>	<i>Number of Living Graduates</i>	<i>Class</i>	<i>Number of Living Graduates</i>
1948.....	90	1943 (Dec.).....	112
1947.....	97	Terrell Covington, Jr., McKinney, Tex.	
Charles G. Clay, Rantoul, Ill.		Mary Jordan, Ridley Park, Pa.	
Burnet W. Peden, St. Louis		1943 (March).....	95
Virginia H. Peden, St. Louis		Raymond M. Charnas, St. Louis	
1946.....	92	Harlan I. Firminger, Bethesda, Md.	
James W. Owen, Jr., Guam, M. I.		Melvin L. Goldman, St. Louis	
Frank Vellios, Guam, M. I.		Eichi Masunaga, Hawaii	
Leonard J. Wiedershine, Ft. Warren, Wyo.		Ernest S. Rogers, San Francisco, Calif.	
1945.....	97	Carvel T. Shaw, Hermann, Mo.	
John T. Johnstone, Jr., St. Louis		Ira W. Leibner, Brooklyn, N. Y.	
Roscoe Maxwell, Punta Gorda, Fla.		1942.....	93
Eugene E. Taylor, Mocksville, N. C.		Herman Rice, Temple, Texas	
1944.....	99	1941.....	93
Rowe F. Bisbee, Ada, Okla.		Peter O. Fleming, Topeka, Kan.	
		Anne T. Goetsch, Berkeley, Calif.	

<i>Class</i>	<i>Number of Living Graduates</i>	<i>Class</i>	<i>Number of Living Graduates</i>
Geo. Bruce Lemmon, Springfield, Mo. Harold E. McCann, E. St. Louis, Ill. C. A. Nielsen, Seattle, Wash. Joseph W. Noah, St. Louis Carol H. Rehm, Los Angeles, Calif.	90	1933.....	88
1940.....	90	James W. Bagby, St. Louis C. A. Good, Rochester, Minn. Carl G. Harford, St. Louis W. W. Herman, Cleveland, Ohio Joseph C. Jaudon, St. Louis Lyman K. Richardson, New Orleans, La. Richard Y. Sakimoto, Honolulu, T. H. Lawrence M. Wilson, Olympia, Wash.	
Donald S. Bottom, Alton, Ill. Russell J. Crider, St. Charles, Mo. Robert E. Koch, St. Louis Gordon F. Moore, Alton, Ill. Willard D. Rowland, Portland, Ore. Seymour Brown, St. Louis	96	1932.....	85
1939.....	96	Sim F. Beam, St. Louis Louis T. Byars, St. Louis William Ehrlich, Newark, N. J. Leo Gottlieb, St. Louis Carl V. Moore, St. Louis Sydney S. Pearl, Elizabeth, N. J. C. O'Neil Rich, Salt Lake City, Utah Wendell G. Scott, St. Louis Barrett L. Taussig, St. Louis Sam R. Wallis, Kauai, T. H. Helman C. Wasserman, St. Louis	
Alfred K. Baur, St. Louis Heinz E. Cron, San Francisco, Calif. Edward H. Reinhard, St. Louis Minton D. Ritter, Margate City, N. Y.	93	1931.....	73
1938.....	93	Mary Louise Newman, Jacksonville, Ill. Robert F. Monroe, Louisville, Ky. Delevan Calkins, St. Louis	
Anthony Piraino, Oberlin, Ohio Philip Rosenblatt, New York, N. Y.	93	1930.....	74
1937.....	93	Herbert H. Gass, St. Louis I. D. Newmark, Chester, Ill.	
Samuel Brady, Gary, Ind. Martin A. Compton, Richmond, Va. Charles M. Polan, Huntington, W. Va. Henry N. Reid, Rome, N. Y. Lloyd Rosenbaum, Anderson, Ind. William H. Gray, Yakima, Wash.	96	1929.....	72
1936.....	96	Louis Kovitz, Kansas City, Mo. Frank B. Queen, Portland, Ore. Jay Marvin Salzman, Springfield, Ill.	
F. R. Crouch, Farmington, Mo. Norman W. Drey, St. Louis Stephen Ellis, Coffeyville, Kan. Nathan R. Kahn, Brooklyn, N. Y. Frank McDowell, St. Louis James D. Morrison, Billings, Mont. R. A. Nussbaum, St. Louis	89	1928.....	68
1935.....	89	A. N. Arneson, St. Louis Justin J. Cordonnier, St. Louis H. R. Hildreth, St. Louis J. T. Jean, St. Louis R. D. Kepner, Honolulu, T. H. L. A. Malone, Terre Haute, Ind. John F. Patton, St. Louis A. Victor Reese, St. Louis Verne Ross, Stockton, Calif. W. A. Ruch, Memphis, Tenn. S. D. Soule, St. Louis Vincent Williams, Kansas City, Mo.	
I. J. Flance, St. Louis A. H. Hutto, St. Louis Bruce Kenamore, St. Louis Edward Massie, St. Louis Ben H. Senturia, St. Louis A. J. Steiner, St. Louis	88	1927.....	72
1934.....	88	A. C. Fortney, Fargo, N. D. Alfred G. Henrich, Los Angeles, Calif. W. R. Merrell, Brigham City, Utah Kazuo Miyamoto, Honolulu, Hawaii Eugene O. Parsons, Kansas City, Mo. Willard C. Schwartz, Manhattan, Kan.	
Helen M. Aff, St. Louis James M. Baker, Columbia, Mo. Eugene M. Bricker, St. Louis David Friedman, Granite City, Ill. Stanley Hampton, St. Louis Louis G. Jekel, Phoenix, Ariz. Dorothy J. Jones, St. Louis Morris D. Marcus, St. Louis Edna Schrick, Holland, Mich.			

<i>Class</i>	<i>Number of Living Graduates</i>	<i>Class</i>	<i>Number of Living Graduates</i>
Frances H. Stewart, St. Louis		1914.....	8
Louis L. Tureen, St. Louis		1913.....	21
W. B. Wilcoxon, Bowling Green, Mo.		Omar Sevin, St. Louis	
1926.....	74	1912.....	30
William B. Kountz, St. Louis		Edwin C. Ernst, St. Louis	
H. M. Chandler, Waipahu, T. H.		1911.....	23
Max Deutch, St. Louis		Charles H. Hecker, Palo Alto, Calif.	
1925.....	69	1910.....	41
Robert J. Crossen, St. Louis		Frederic Hagler, Springfield, Mass.	
H. M. Denny, Union, Mo.		1909.....	31
James J. Donohue, E. St. Louis, Ill.		1908.....	33
Richard K. Kimmel, St. Louis		1907.....	29
Melvin A. Roblee, St. Louis		1906.....	35
Gershom J. Thompson, Rochester, Minn.		S. P. Martin, East Prairie, Mo.	
1924.....	69	William H. Smith, Colfax, Calif.	
Roy F. Baskett, Texarkana, Texas		1905.....	12
Elizabeth E. Koppenaar, Elmhurst, Ill.		Walter Fischel, St. Louis	
O. Earl Whitsell, St. Joseph, Mo.		1904.....	35
J. William Beckmann, New York, N. Y.		N. M. Freund, St. Louis	
1923.....	51	1903.....	22
Oliver Abel, Jr., St. Louis		1902.....	23
James Barrett Brown, St. Louis		1901.....	21
William G. Becke, St. Louis		Walter C. G. Kirchner, St. Louis	
Charles Teel, Bellingham, Wash.		1900.....	2
J. W. Thompson, St. Louis		1899.....	44
Clair O. Vingom, Madison, Wisc.		R. O. Raymond, Flagstaff, Ariz.	
1922.....	44	Selden Spencer, St. Louis	
F. E. Sultzman, Hannibal, Mo.		1898.....	41
1921.....	43	J. G. W. Fischer, Alma, Mo.	
Oscar C. Zink, St. Louis		1897.....	34
1920.....	39	Theodore Greiner, St. Louis	
Warren H. Cole, Chicago, Ill.		1896.....	30
Alfred Goldman, St. Louis		1895.....	28
Samuel B. Grant, St. Louis		1894.....	15
Frederick E. Jostes, St. Louis		1893.....	17
L. J. Owen, Lincoln, Neb.		1892.....	4
Harvey L. White, St. Louis		1891.....	21
Herman M. Meyer, St. Louis		1890.....	7
1919.....	45	1889.....	14
Carl O. Kohlbry, Duluth, Minn.		1888.....	15
A. B. Raffl, Syracuse, N. Y.		1887.....	7
Duff S. Allen, St. Louis		1886.....	6
Otto S. Krebs, St. Louis		1885.....	8
1918.....	26	1884.....	9
J. F. Pessel, Trenton, N. J.		1883.....	12
Glover H. Copher, St. Louis		1882.....	2
1917.....	25	1881.....	4
1916.....	13	James A. Dickson, St. Louis	
Ray T. Woolsey, Salt Lake City, Utah		1880.....	2
Earl C. Sage, Omaha, Neb.		1879.....	5
1915.....	22	GIFTS FROM PARENTS OF FORMER AND PRESENT STUDENTS	
D. K. Rose, St. Louis		Dr. Joseph C. Peden, Sr.	
		Dr. Lawrence T. Post	

Contributors According to Trade Areas

Names in *italics* denote area chairmen.

<i>Trading Area Center</i>	<i>No. of Graduates in Trading Area</i>	<i>Trading Area Center</i>	<i>No. of Graduates in Trading Area</i>
Albany (N. Y.)	3	Des Moines (Ia.)	30
Albuquerque (N. Mex.)	5	<i>R. J. Tidrick</i> , Iowa City, Ia.	
Amarillo (Tex.)	5	Detroit (Mich.)	33
<i>Orra Hand</i> , Lubbock, Tex.		<i>Fred J. Hodges</i> , Ann Arbor, Mich.	
Atlanta (Ga.)	9	<i>William A. Hudson</i> , Detroit	
<i>William G. Hamm</i> , Atlanta, Ga.		Duluth (Minn.)	3
Baltimore, (Md.)	14	<i>C. O. Kohlbry</i> , Duluth	
<i>William G. Reese</i> , Perry Point, Md.		Carl O. Kohlbry, Duluth, Minn.	
Birmingham (Ala.)	32	El Paso (Tex.)	5
<i>Wesley C. Corson</i> , Tuscaloosa, Ala.		<i>G. A. Slusser</i> , Silver City, N. M.	
Bismarck (N. D.)	1	Evansville (Ind.)	22
Boston (Mass.)	26	<i>Willard T. Barnhart</i> , Evansville	
<i>Walter B. Hoover</i> , Boston, Mass.		<i>Frank C. Weber</i> , Olney, Ill.	
Frederick Hagler, Springfield, Mass.		Fargo (N. D.)	7
Buffalo (N. Y.)	10	<i>Laurence G. Pray</i> , Fargo	
<i>William L. Bradford</i> , Rochester, N. Y.		A. C. Fortney, Fargo, N. D.	
Butte (Mont.)	4	Grand Rapids (Mich.)	10
Charlotte (N. Car.)	21	<i>Paul S. Barker</i> , Ann Arbor, Mich.	
Eugene E. Taylor, Mocksville, N. C.		<i>William F. Wenner</i> , Kalamazoo, Mich.	
Chicago (Ill.)	94	Edna Schrick, Holland, Mich.	
<i>Minas Joannides</i> , Chicago		Great Falls (Mont.)	8
<i>Carl H. Matthey</i> , Davenport, Ia.		James D. Morrison, Billings, Mont.	
<i>Walter S. Priest</i> , Chicago		<i>David T. Berg</i> , Helena, Mont.	
<i>H. S. Rumerich</i> , Glen Ellyn, Ill.		Houston (Tex.)	18
<i>Herman H. Wellmerling</i> , Bloomington, Ill.		<i>Russell J. Blattner</i> , Houston	
<i>Marie H. Wittler</i> , Elmhurst, Ill.		<i>Clarence P. Jasperson</i> , Corpus Christi	
Samuel Brady, Gary, Ind.		Indianapolis (Ind.)	18
Charles G. Clay, Rantoul, Ill.		<i>T. B. Noble</i> , Indianapolis	
Warren H. Cole, Chicago, Ill.		L. A. Malone, Terre Haute, Ind.	
Elizabeth E. Koppenaar, Elmhurst, Ill.		Lloyd Rosenbaum, Anderson, Ind.	
Cincinnati (O.)	16	Jacksonville (Fla.)	2
<i>Lewis G. Herrmann</i> , Cincinnati		Kansas City (Mo.)	190
Charles M. Polan, Huntington, W. Va.		<i>J. B. Carlisle</i> , Sedalia, Mo.	
Cleveland (O.)	22	<i>W. B. Chapman</i> , Joplin, Mo.	
<i>Michael E. Geraci</i> , Cleveland		<i>Donald M. Dowell</i> , Chillicothe, Mo.	
W. W. Herman, Cleveland, O.		<i>B. L. Elliott</i> , Kansas City, Mo.	
Anthony Piraino, Oberlin, O.		<i>Stephen S. Ellis</i> , Coffeyville, Kan.	
Columbus (O.)	11	<i>Joseph L. Fisher</i> , St. Joseph, Mo.	
<i>C. C. Sherburne</i> , Columbus		<i>Clifford L. Gilles</i> , Kansas City, Mo.	
Dallas (Tex.)	47	<i>Henry Snyderman</i> , Wadsworth, Kan.	
<i>Samuel H. Kahn</i> , Dallas		Peter O. Fleming, Topeka, Kan.	
<i>Albert E. Meisenbach, Jr.</i> , Dallas		Stephen Ellis, Coffeyville, Kan.	
Herman-Rice, Temple, Tex.		Eugene O. Parsons, Kansas City, Mo.	
Terrell Covington, Jr., McKinney, Texas		Willard C. Schwartz, Manhattan, Kan.	
Denver (Colo.)	58	O. Earl Whitsell, St. Joseph, Mo.	
<i>Col. James H. Forsee</i> , Denver		Vincent Williams, Kansas City, Mo.	
<i>Howard H. Heuston</i> , Boulder, Colo.		Louis Kovitz, Kansas City, Mo.	
<i>Harvey S. Rusk</i> , Pueblo, Colo.		<i>J. G. W. Fischer</i> , Alma, Mo.	
Leonard J. Wiedershine, Cheyenne, Wyo.		Knoxville (Tenn.)	4

<i>Trading Area Center</i>	<i>No. of Graduates in Trading Area</i>	<i>Trading Area Center</i>	<i>No. of Graduates in Trading Area</i>
Little Rock (Ark.)	22	Sydney S. Pearl, Elizabeth, N. J. Philip Rosenblatt, New York, N. Y.	
<i>Jerome S. Levy</i> , Little Rock		Oklahoma City (Okla.)	22
<i>Roy F. Baskett</i> , Texarkana, Tex.		<i>George H. Garrison</i> , Oklahoma City	
Los Angeles (Calif.)	126	<i>Raymond L. Murdoch</i> , Oklahoma City	
<i>Herbert Anderson</i> , Los Angeles		<i>Rowe F. Bisbee</i> , Ada, Okla.	
<i>Phillip H. Bassett</i> , Corona Del Mar, Calif.		Omaha (Neb.)	15
<i>Edward A. Blondin</i> , San Diego, Calif.		<i>Miles E. Foster, Jr.</i> , Omaha	
<i>G. E. Christensen</i> , Los Angeles		<i>L. J. Owen</i> , Lincoln, Neb.	
<i>Lawrence K. Gundrum</i> , Los Angeles		<i>L. J. Owen</i> , Lincoln, Neb.	
<i>Elmer N. Liljedahl</i> , Los Angeles		<i>Earl C. Sage</i> , Omaha, Neb.	
<i>Elaine K. Lince</i> , Pasadena, Calif.		Philadelphia (Pa.)	20
<i>Alfred G. Henrich</i> , Los Angeles, Calif.		<i>Lucius R. Wilson</i> , Philadelphia	
<i>Carol H. Rehm</i> , Los Angeles, Calif.		<i>Mary Jordan</i> , Ridley Park, Pa.	
Louisville (Ky.)	4	Phoenix (Ariz.)	14
<i>Robert F. Monroe</i> , Louisville, Ky.		<i>Ben P. Frissell</i> , Phoenix	
Memphis (Tenn.)	15	<i>Royal W. Rudolph</i> , Tucson, Ariz.	
<i>Clinton K. Higgins</i> , Memphis		<i>Louis G. Jekel</i> , Phoenix, Ariz.	
<i>W. A. Ruch</i> , Memphis, Tenn.		<i>R. O. Raymond</i> , Flagstaff, Ariz.	
Miami (Fla.)	5	Pittsburgh (Pa.)	10
<i>Samuel J. Roberts</i> , Miami		<i>Russell C. Bond</i> , Wheeling, W. Va.	
Milwaukee (Wis.)	35	Portland (Me.)	1
<i>L. O. Helmes</i> , Oshkosh, Wis.		Portland (Ore.)	30
<i>Volney B. Hyslop</i> , Madison, Wis.		<i>Frank B. Queen</i> , Portland	
<i>Clair O. Vingom</i> , Madison, Wis.		<i>Willard D. Rowland</i> , Portland, Ore.	
Minneapolis-St. Paul (Minn.)	26	<i>Frank B. Queen</i> , Portland, Ore.	
<i>James L. Benepe</i> , St. Paul		Richmond (Va.)	16
<i>Clarence G. Ochsner</i> , Wabasha, Minn.		<i>Everett C. Drash</i> , University, Va.	
<i>Edwin F. Robb</i> , Minneapolis		<i>Martin A. Compton</i> , Richmond, Va.	
<i>Archie D. Skemp</i> , La Crosse, Wis.		Salt Lake City (Utah)	51
<i>C. A. Good</i> , Rochester, Minn.		<i>R. P. Roantree</i> , Elko, Nev.	
<i>Gershon J. Thompson</i> , Rochester, Minn.		<i>O. Sundwall</i> , Murray, Utah	
Nashville (Tenn.)	8	<i>Ray T. Woolsey</i> , Salt Lake City	
<i>Llyod C. Miller</i> , Nashville		<i>W. R. Merrell</i> , Brigham City, Utah	
New Orleans (La.)	20	<i>C. O'Neal Rich</i> , Salt Lake City, Utah	
<i>Alton E. W. Ochsner</i>		<i>Ray T. Woolsey</i> , Salt Lake City, Utah	
<i>Lyman Richardson</i> , New Orleans, La.		San Antonio (Tex.)	17
New York City	94	<i>Walter G. Stuck</i> , San Antonio	
<i>J. William Beckmann</i> , New York City		San Francisco (Calif.)	86
<i>Lester J. Evans</i> , Jackson Heights, N. Y.		<i>B. F. Dearing</i> , San Francisco	
<i>Joseph A. Fiorito</i> , New Haven, Conn.		<i>D. H. Trowbridge, Jr.</i> , Fresno, Calif.	
<i>Samuel Martin</i> , New York City		<i>Heinz E. Cron</i> , San Francisco	
<i>Walter R. Peterson</i> , Trenton, N. J.		<i>Anne T. Goetsch</i> , Berkeley, Calif.	
<i>Philip Rosenblatt</i> , New York City		<i>Charles H. Hecker</i> , Palo Alto, Calif.	
<i>Frank S. White</i> , Teaneck, N. J.		<i>Ernest S. Rogers</i> , San Francisco	
<i>J. William Beckmann</i> , New York, N. Y.		<i>Verne Ross</i> , Stockton, Calif.	
<i>William Ehrlich</i> , Newark, N. J.		<i>William H. Smith</i> , Colfax, Calif.	
<i>I. W. Leibner</i> , Brooklyn, N. Y.		Savannah (Ga.)	4
<i>Nathan R. Kahn</i> , Brooklyn, N. Y.		Seattle (Wash.)	43
<i>J. F. Pessel</i> , Trenton, N. J.		<i>Byron F. Francis</i> , Seattle	
<i>Minton D. Ritter</i> , Margate City, N. J.		<i>Vernon O. Lundmark</i> , Enumclaw, Wash.	

<i>Trading Area Center</i>	<i>No. of Graduates in Trading Area</i>	<i>Trading Area Center</i>	<i>No. of Graduates in Trading Area</i>
C. A. Nielsen, Seattle, Wash.		Wendell G. Scott	
Charles Teel, Bellingham, Wash.		John Seddon	
Lawrence M. Wilson, Olympia, Wash.		Philip Shahan	
William H. Gray, Yakima, Wash.		Robert M. Smith	
Shreveport (La.)	3	Horace W. Soper	
Sioux City (Ia.)	10	Carl Peter Birk, Decatur, Ill.	
Bernard S. Clark, Spearfish, N. D.		Eldon C. Bohrer, West Plains, Mo.	
Spokane (Wash.)	24	Alva Trueblood, Jr.	
Austin, C. Taylor, Spokane		Ray D. Williams	
Syracuse (N. Y.)	5	Frederic E. Woodruff	
John E. Wattenberg, Cortland, N. Y.		George J. Wulff	
Arthur B. Raffl, Syracuse, N. Y.		Oscar C. Zink	
Henry N. Reid, Rome, N. Y.		James M. Baker, Columbia, Mo.	
St. Louis (Mo.)	970	F. Biggs, Jr., Neelyville, Mo.	
Oliver Abel, Jr.		Urban J. Busiek, Springfield, Mo.	
Louis Aitken		Henry B. Delicate, Edwardsville, Ill.	
Duff S. Allen		James J. Donahue, E. St. Louis, Ill.	
Millard Arbuckle		George Drennan, Jacksonville, Ill.	
Walter Baumgarten, Jr.		Ben Fox, Carbondale, Ill.	
Grace Bergner		Edgar H. Keys, Quincy, Ill.	
C. Read Boles		W. F. Rose, Dupo, Ill.	
Eugene M. Bricker		E. C. Schmidtke, Columbia, Mo.	
Robert Brookes		William E. Stone, Boonville, Mo.	
T. K. Brown		Francis E. Sultzman, Hannibal, Mo.	
Stanley S. Burns		Oliver Abel, Jr., St. Louis	
Delevan Calkins		Helen M. Aff, St. Louis	
Marshall B. Conrad		A. N. Arneson, St. Louis	
Glover Copher		James W. Bagby, St. Louis	
James B. Costen		James M. Baker, Columbia, Mo.	
Robert J. Crossen		Alfred K. Baur, St. Louis	
Frank L. Davis		William G. Becke, St. Louis	
Charles Duden		Sim F. Beam, St. Louis	
Gladden Elliott		Donald S. Bottom, Alton, Ill.	
Walter Fischel		Eugene M. Bricker, St. Louis	
William Gaunt		Raymond M. Charnas, St. Louis	
Samuel B. Grant		Justin J. Cordonnier, St. Louis	
R. B. H. Gradwohl		Russell J. Crider, St. Charles, Mo.	
Theodore Greiner		F. R. Crouch, Farmington, Mo.	
Guerdan Hardy		Robert J. Crossen, St. Louis	
Stanley Harrison		H. M. Denny, Union, Mo.	
John Horner		James A. Dickson, St. Louis	
Scott Heuer		James J. Donohue, E. St. Louis, Ill.	
Bruce Kenamore		Max Deutch, St. Louis	
Martin F. Kouri		Norman W. Drey, St. Louis	
Everett Lerwick		Walter Fischel, St. Louis	
Guy Magness		I. J. F lance, St. Louis	
Frank P. McNalley		N. M. Freund, St. Louis	
Joseph M. Noah		David Friedman, Granite City, Ill.	
David R. Oliver		Herbert H. Gass, St. Louis	
David L. Penney		Alfred Goldman, St. Louis	
G. D. Royston		Melvin L. Goldman, St. Louis	
Otto H. Schwarz		Leo Gottlieb, St. Louis	
		Samuel B. Grant, St. Louis	

<i>Trading Area Center</i>	<i>No. of Graduates in Trading Area</i>	<i>Trading Area Center</i>	<i>No. of Graduates in Trading Area</i>
Theodore Greiner, St. Louis		Edwin C. Ernst, St. Louis	
Carl G. Harford, St. Louis		A. H. Hutto, St. Louis	
Stanley Hampton, St. Louis		Richard K. Kimmel, St. Louis	
H. R. Hildreth, St. Louis		Walter C. G. Kirchner, St. Louis	
J. T. Jean, St. Louis		S. P. Martin, East Prairie, Mo.	
John Johnstone, Jr., St. Louis		Frank McDowell, St. Louis	
Frederick E. Jostes, St. Louis		Melvin A. Roblee, St. Louis	
Joseph C. Jaudon, St. Louis		Tampa (Fla.)	8
Bruce Kenamore, St. Louis		<i>Frances C. Wilson</i> , Tampa	
Robert E. Koch, St. Louis		Roscoe Maxwell, Punta Gorda, Fla.	
William B. Kountz, St. Louis		Toledo (O.)	4
G. Bruce Lemmon, Springfield, Mo.		<i>Edward L. Burns</i> , Toledo	
Edward Massie, St. Louis		Tulsa (Okla.)	39
Harold E. McCann, E. St. Louis, Ill.		<i>W. A. Showman</i> , Tulsa	
Gordon F. Moore, Alton, Ill.		Washington, D. C.	30
Carl V. Moore, St. Louis		<i>Gordon S. Letterman</i>	
I. D. Newmark, Chester, Ill.		<i>Col. Paul I. Robinson</i>	
Mary Louise Newman, Jacksonville, Ill.		Harlan I. Firminger, Bethesda, Md.	
R. A. Nussbaum, St. Louis		Wichita (Kan.)	34
John F. Patton, St. Louis		<i>Wilbur G. Gillette</i> , Wichita	
Burnet W. Peden, St. Louis		Outside United States	34
Virginia H. Peden, St. Louis		H. M. Chandler, Waipahu, T. H.	
A. Victor Reese, St. Louis		R. D. Kepner, Honolulu, T. H.	
Edward H. Reinhard, St. Louis		Eichi Masunaga, Hawaii	
Wendell G. Scott, St. Louis		Richard Y. Sakimoto, Honolulu, T. H.	
Ben H. Senturia, St. Louis		Kazuo Miyamoto, Honolulu, T. H.	
Jay Marvin Salzman, Springfield, Ill.		James W. Owen, Jr., Guam, M. I.	
Carvel T. Shaw, Hermann, Mo.		Frank Vellios, Guam, M. I.	
Selden Spencer, St. Louis		Sam R. Wallis, Kauai, T. H.	
F. E. Sultzman, Hannibal, Mo.			
Frances H. Stewart, St. Louis			
J. W. Thompson, St. Louis			
Barrett L. Taussig, St. Louis			
Louis L. Tureen, St. Louis			
Helman C. Wasserman, St. Louis			
Harvey L. White, St. Louis			
W. B. Wilcoxon, Bowling Green, Mo.			
Oscar C. Zink, St. Louis			
Dorothy J. Jones, St. Louis			
Morris D. Marcus, St. Louis			
Clover H. Copher, St. Louis			
Joseph W. Noah, St. Louis			
Herman M. Meyer, St. Louis			
D. K. Rose, St. Louis			
Seymour Brown, St. Louis			
Duff S. Allen, St. Louis			
Delevan Calkins, St. Louis			
Otto S. Krebs, St. Louis			
Omar Sevin, St. Louis			
James Barrett Brown, St. Louis			
Louis T. Byars, St. Louis			

Postgraduate Courses Offered for Winter

A one-week course in clinical allergy, planned specifically for the general practitioner, will be given from November 7 to 11 by the Division of Postgraduate Studies at the Medical School. A short course from December 1 to 3 will explain the newer aspects and developments of medical technology to laboratory technicians.

Complete information on these two courses may be obtained by writing to the Division of Postgraduate Studies in care of the School of Medicine.

FACULTY CHANGES AND APPOINTMENTS

The following changes and appointments to the faculty of the School of Medicine became effective on July 1 in the various departments:

Anatomy

John C. Finerty promoted to associate professor; Albert I. Lansing promoted to associate professor; Edward L. Kuff promoted to instructor; Morris Alex appointed research assistant; Mr. Donald L. Opdyke appointed research fellow.

Bacteriology and Immunology

Samuel J. Ajl appointed assistant professor; Frank L. Adler appointed assistant (effective September 1).

Biological Chemistry

Maurice E. Krahl promoted to associate professor.

Medicine

Warren P. Elmer, status changed to associate professor emeritus of clinical medicine; Walter Fischel promoted to associate professor and retired with title of associate professor emeritus of clinical medicine.

Gustave J. Dammin promoted to associate professor of medicine and pathology; Carl G. Harford, Edward H. Reinhard and John R. Smith promoted to associate professors; Samuel C. Bukantz promoted to assistant professor; Arthur C. Brooks and Bruce Kenamore promoted to assistant professors of clinical medicine.

Robert J. Glaser, Robert Paine promoted to instructors in medicine; Benjamin H. Charles, I. J. Flance, Joseph W. Noah, Ernest T. Rouse, Milton Smith, Robert M. Smith, Franz Steinberg, J. Harrison Wedig promoted to instructors in clinical medicine.

Helen E. Clark, William A. Clay, Joe Bill Hall, Norman P. Knowlton, Frank B. Norbury, John K. Spitznagel, David W. Talmage, Clifford Tillman appointed assistants in medicine; Jack Barrow, John W. Berry, Albert B. Eisenstein, Frank F. Martin, Hugh B. Waters appointed clinical fellows in general medicine; Arthur L. Gropper appointed fellow in hypertension; Bernard S. Lipman appointed fellow in clinical cardiology; Virgil Loeb, Jr., John B. Shapleigh II appointed fellows in clinical hematology; Seymour Reichlin appointed fellow in clinical metabolism.

Neuropsychiatry

Margaret C.-L. Gildea and Sydney B. Maughs promoted to assistant professors of clinical psychiatry; Joseph Gitt promoted to assistant professor of clinical neurology; Frank R. L. Egloff, Arthur S. Greditzer, Wanda Lamb, Joseph M. Natterson, Patricia L. O'Neal appointed assistants; Eli Robins appointed U.S. P.H.S. fellow in psychiatry and in pharmacology (effective September 1); Shirley J. Shaffer appointed fellow in psychiatry; Robert R. Lam appointed fellow in neurology.

Obstetrics and Gynecology

William H. Masters promoted to assistant professor; Ralph B. Woolf promoted to instructor; John L. Cockrell, Frank B. Long, Wallace R. Stacey appointed assistants; Bryce Bondurant, MacDonald Bonebrake, Donald W. Robinson appointed fellows.

Ophthalmology

Harold Beasley appointed assistant in clinical ophthalmology; Justine Sleight appointed assistant.

Otolaryngology

Isaac D. Kelley promoted to associate professor of clinical otolaryngology; William F. Andrew, Jose A. Bello, Cecil S. Franks, Robert W. Hazen, George T. Hodges, Charles C. Jacobs, Watson B. Larkin, Joseph J. Littell, Joseph W. West appointed assistants; Chiang Tung-Ming appointed fellow.

Pathology

Franz Leidler, Thomas L. Young promoted to instructors; Frank L. Beckel, appointed instructor; James C. Hawkins, Menard Ihnen, James C. Roberts, Dale M. Schulz, William Snoddy appointed assistants; Raymond F. Hain appointed fellow; Louis T. Litzow appointed fellow in surgical pathology.

Pediatrics

Adrien S. Bleyer, status changed to associate professor emeritus of clinical pediatrics.

Joseph A. Bauer, Maurice J. Lonsway promoted to instructors in clinical pediatrics; Dorothy Case appointed in-

structor in pediatrics and in child psychiatry and assistant director of the Child Guidance Clinic; John Holland appointed dentist in pediatrics; C. Read Boles, Frank Wissmath appointed assistant in clinical pediatrics; Rosellen Cohnberg, Marvin Cornblath, William Daeschner, Oliver F. Deen, Jr., Robert Garner, Helen Hofsummer, James McNeil, Sterling Suddarth appointed assistants.

Preventive Medicine and Public Health

Herbert R. Domke appointed assistant professor of public health; Albert I. Mendeloff appointed assistant professor of preventive medicine and of medicine and physician to students at the Medical Center.

Pharmacology

Morris Friedkin appointed instructor in pharmacology (effective October 1); Jack L. Strominger appointed American College of Physicians Research Fellow in Pharmacology.

Radiology

Sherwood Moore, status changed to professor emeritus of radiology; Hugh M. Wilson, appointed professor of radiology and director of the Mallinckrodt Institute of Radiology; William B. Seaman appointed instructor; Wesley Fee, Thomas Keely, A. Jack Stacy appointed assistants in radiology.

Surgery

Leo. A. Sachar promoted to instructor in clinical surgery; William E. Hunt,

Darrell Munro, Harrison H. Shoulders, Hugh E. Stephenson, Jr., William B. Wall, Jr., appointed assistants; Harvey R. Bernard, Edward J. Bishop, M. Richard Carten, William F. Collins, Fleming B. Harper, Bart F. Wooldridge appointed fellows in general surgery; Hal B. Jennings appointed fellow in plastic surgery; Thomas G. Otto appointed fellow in orthopedic surgery; James L. Schricker, Jr., appointed fellow in neurosurgery; Frederick H. Taylor appointed fellow in thoracic surgery.

Miscellaneous

Adolph H. Conrad, Jr., promoted to

instructor in clinical dermatology; Arnold H. Williams promoted to instructor in physiology in medicine; Miss Beatrice Schulz appointed instructor in physical therapy; Mr. Jesse B. Lasater appointed lecturer in vital statistics; Mr. Elmer P. Wheeler appointed lecturer in industrial hygiene; Miss Marguerite Cannon appointed assistant in psychiatric social work; Lilli Hofstatter appointed research assistant in gerontology; Crofford Vermillion appointed assistant in hospital administration; E. Praetorius appointed fellow in gerontology; Donald Stewart appointed fellow in chest diseases.

DEPARTMENTAL NEWS

Auxiliary Medical Services

Among those receiving degrees on June 7 from Washington University were 11 students in occupational therapy and 11 in hospital administration. Miss Sue P. Hurt, director of Occupational Therapy, reported that 13 students completed their academic work and went into clinical training in July. They will be candidates for degrees in June, 1950. Dr. Frank R. Bradley '28, professor of hospital administration, announced that 12 students in his department completed their first year of academic training and went into internships. Dr. Sedgwick Mead, assistant professor of physical medicine, reported that eight students in physical therapy will finish their clinical training in October. Four of these will be candidates for B.S. degrees next year and the remaining four will receive certificates.

Bacteriology

Dr. Alfred D. Hershey, associate professor of bacteriology and immunology, attended a conference sponsored by the National Academy of Science at Shelter Island for the discussion of current developments and trends in studies of the gene. He attended meetings of the Society of American Bacteriologists in Cincinnati, May 17-20, and participated in a round table discussion on nucleic acids. His topic was "Relation of Nucleic Acids to Bacterial Genetics."

Medicine

Dr. Joseph C. Edwards presented a paper on the "Evaluation of Anterior Pituitary Extracts in the Treatment of Pituitary Dwarfism" at a meeting of the Association for the Study of Internal Secretions in Atlantic City June 3. During the first week in June, he attended

meetings of the American Heart Association and its Scientific Council, and the American Diabetes Association.

Dr. Richard S. Weiss '09 was elected vice-president of the American Dermatological Association during a meeting of the group in Hot Springs, Va., late in May.

Neuropsychiatry

At the meeting of the Midwestern Psychological Association in Chicago, during April, four members of the Division of Medical Psychology were in attendance. They were Dr. Robert I. Watson, Dr. Saul Rosenzweig, Dr. Ivan Mensh, and Mrs. Betty Caldwell. In collaboration with Dr. Philip H. Du Bois of the Department of Psychology at the University, Dr. Watson gave a paper on the selection of patrolmen for the St. Louis Police Department. He and Dr. Rosenzweig served as chairmen at section meetings concerned with clinical problems. Dr. Ivan Mensh gave a paper on psychological similarities in folie a deux.

Dr. Edwin F. Gildea, professor of psychiatry; Dr. George Saslow, associate professor of psychiatry; Dr. Sydney B. Maughs, instructor in clinical psychiatry; and Dr. Frank O. Shobe, fellow in psychiatry, attended the annual meeting of the American Psychiatric Association in Montreal, Canada, the week of May 23.

Ophthalmology

Dr. Bennett Y. Alvis, associate professor of clinical ophthalmology, was guest of honor at a meeting of the Indiana Academy of Ophthalmology and

Otolaryngology at Bloomington, Ind., on May 4 and 5. He spoke on treatment of external diseases of the eyes and took part in a round table discussion with Dr. O. E. Van Alyea on the relationship between disorders of the eyes and the nasal sinuses.

Dr. Richard G. Scobee, assistant professor, was one of the guest speakers at a symposium on the muscles of the eye at the University of Iowa during the week of May 23.

Dr. Lawrence T. Post, professor of clinical ophthalmology, and Dr. Richard Scobee attended the annual meeting of the American Ophthalmological Society in Hot Springs, Va., June 2 to 5.

Otolaryngology

Twenty-four students completed the eight-month postgraduate course in the Department of Otolaryngology on May 20.

Pathology

Dr. Robert A. Moore, Dean and professor of pathology, attended meetings of the National Board of Medical Examiners in Atlantic City on June 14, and the Advisory Committee on Cancer Control of the U. S. Public Health Service in Washington, D. C., immediately afterwards.

Pediatrics

The Idaho State Medical Association, meeting at Sun Valley from June 20 to 23, had as one of its guest speakers Dr. Alexis F. Hartmann '21, professor of pediatrics. He spoke on the fundamentals of electrolyte and water and carbohydrate metabolism and their appli-

education in the prevention and treatment of acidosis and alkalosis and in the recognition and treatment of hypoglycemia and diabetes mellitus.

Pharmacology

Dr. and Mrs. F. E. Hunter left June 15 for a European visit during which Dr. Hunter will stop at scientific laboratories in France, Switzerland, Belgium, Holland, Denmark, Sweden, Norway, and England. He will attend the International Congress of Biochemistry which meets at Cambridge, England, from August 19 to 25.

Preventive Medicine

Dr. George M. Saunders, assistant professor of preventive medicine, discussed bacteriology, public health, parasitology, and entomology during a Science Career Day sponsored by the Missouri and St. Louis Junior Academies of Science in St. Louis during April.

Radiology

Dr. Martin D. Kamen, chemist to the Mallinckrodt Institute of Radiology, has been appointed a member of the National Research Council Committee on Radiology and a member of the subcommittee planning an international symposium on the basic aspects of interaction of radiation with biological systems.

The A. M. A. Silver Medal was awarded to Dr. Wendell G. Scott '32, Dr. Merl J. Carson of the Department of Pediatrics, Dr. Thomas H. Burford of the Department of Surgery, and Dr. Sherwood Moore '05, for the exhibit of the Rapidograph.

Surgery

Dr. Justin J. Cordonnier '28, was awarded first prize for his exhibit in Clinical Investigation in the Scientific Exhibit Section of the American Urologic Association meeting in Los Angeles in May.

The American College of Chest Physicians presented its gold medal award to Dr. Evarts A. Graham, Bixby Professor of Surgery, on June 4 during a meeting of the group in Atlantic City.

Dr. James Barrett Brown '23, professor of clinical surgery, lectured at the University of Oklahoma May 12 on carcinoma of the mouth and jaws, and at Northwestern University on June 6 on the management of tumors of the mouth, face, and jaws.

Dr. John F. Patton '28, assistant professor of clinical genito-urinary surgery, was elected to membership in the American Association of Genito-Urinary Surgeons, which limits its number to 75, at the meeting in White Sulphur Springs, W. Va.

Dr. Robert W. Bartlett, assistant professor of clinical surgery, was elected to membership in the American Goiter Association at the annual meeting held in Madison, Wis., May 26 to 28.

Dr. Robert Elman, professor of clinical surgery, discussed a paper on acute pancreatitis at the A.M.A. meeting in Atlantic City in June, and immediately following that attended a meeting of the National Professional Advisory Committee in Washington, D. C. Dr. Elman gave the Max Ballin Lecture in Detroit on May 4, speaking on starvation in general practice.

Publications of the Faculty

April - June, 1949

- Alexander, H. L., Grunow, O. H. W. & Smith, J. R. Rheumatic heart disease with respiratory failure. Clinico-pathologic conference. *Am. J. Med.* 6: 781-789. June, 1949.
- Andrew, W. Age changes in the salivary glands of Wistar institute rats with particular reference to submandibular glands. *J. Gerontol.* 4: 95-103. April, 1949.
- Breakey, M. R. & Davis H. Comparisons of thresholds for speech: word and sentence tests, receiver vs. field, and monaural vs. binaural listening. *Laryngoscope* 59: 236-250. March, 1949.
- Briseno-Castrejon, B. & Finerty, J. C. An azocarmine stain for differential cell analysis of the rat anterior hypophysis. *Stain technol.* 24: 103-107. April, 1949.
- Brown, J. B. Repair of radiation burns. *Proc. Inst. Med. Chicago* 17: 330-331. May 15, 1949.
- Brown, J. B., Fryer, M. P. & McDowell, F. Internal wire-pin immobilization of jaw fractures. *Plastic and reconstruct. surg.* 4: 30-35. January, 1949.
- Brown, J. B., McDowell, F. & Fryer, M. P. Surgical treatment of radiation burns. *Surg. Gyn. Obst.* 88: 609-622. May, 1949.
- Burford, T. H. Surgery of congenital cardiovascular lesions (Abstr.) *Weekly Bull. St. Louis Med. Soc.* 43: 460-461. May 27, 1949.
- Carson, M. J. Diagnostics and clinical asthenics (Abstract). *Weekly Bull. St. Louis Med. Soc.* 43: 457. May 27, 1949.
- Chieffl, M. & Kirk, E. Chronaxie studies in thiamine-deficient old individuals. *J. Gerontol.* 4: 127-131. April, 1949.
- Cordonnier, J. J. Ureterosigmoid anastomosis. *Surg. Gyn. & Obstetrics* 88: 441-446. April, 1949.
- Costello, C. & McDonald, J. The role of a new analgesic in surgery. *J. Mo. State Med. Assn.* 46: 333-337. May, 1949.
- Cowdry, E. V. Epidermal carcinogenesis. *Acta unio internat. contra cancerum.* 6: 3-8, 1948.
- Davis, H. The Forbes "School" of neurophysiology at Harvard. *Electroencephalography and clin. neurophysiol.* 1: 139-140. May, 1949.
- Delarue, N. C. & Graham, E. A. Alveolar cell carcinoma of the lung (pulmonary adenomatosis, Jagzietke?) A multicentric tumor of epithelial origin. *J. thorac. surg.* 18: 237-251. April, 1949.
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Alumni News

1895

On April 5, 1949, the St. Louis Medical Society awarded its Certificate of Merit and Gold Medal to **Robert E. Schlueter** "in recognition of his distinguished service to medicine, his scholarly contributions to medical history, to this Society and to its Library." Dr. Schlueter, who was born in St. Louis on June 9, 1872, was graduated cum laude from the Missouri Medical College and won the Charles O. Curtman prize in chemistry at that time. After graduation he taught in physiology and pharmacy at his Alma Mater, and three years later was appointed instructor in surgery at Washington University, a position which he held until 1916. Since 1923 he has been associate professor of surgery at St. Louis University School of Medicine.

In 1909 and 1910, Dr. Schlueter spent his time in postgraduate study under the great men of that time in the medical centers of Europe. Upon his return to St. Louis, he became one of the leading surgeons, with appointments on the staffs of several hospitals in the city. He emerged from World War I as a major, and since 1944 has been consultant to the Army Medical Library in Washington.

Dr. Schlueter has received many honors from local, state, and national medical societies. He was president of the St. Louis Medical Society in 1911, of the Missouri State Medical Association in 1918, and of the St. Louis Surgical Society in 1941. He has represented the Missouri State Association in the A.M.A. House of

Delegates at ten conventions, and has been re-elected to represent it in 1949, 1950, and 1951. He is a diplomate of the American Board of Surgery, Founders' Group, and holds membership in the American College of Surgeons and many other professional and scientific groups.

Dr. Schlueter is held in high esteem by historians for his many contributions to medical history, and for his contribution to the development of the library of the St. Louis Medical Society. The Society appointed him honorary librarian for life recently.

Dr. J. William Thompson '23, president of the St. Louis Medical Society, presented the medal and certificate to Dr. Schlueter. Honoring him on the occasion were Dr. Philip A. Shaffer, distinguished service professor of biological chemistry in the School of Medicine; Dr. Chauncey D. Leake, vice-president in charge of medical affairs at the University of Texas; and **Dr. R. Emmet Kane '99**, St. Louis physician and former president of the Medical Society.

1901

R. E. Holben wrote a recent note to the Quarterly telling of his retirement from the staff of the Jacksonville (Ill.) State Hospital when he reached the retirement age of 70. But Dr. Holben was not ready to retire, so he has stepped across the state border into Iowa where he is senior house physician at the Mount Pleasant State Hospital in Mount Pleasant.

The April issue of the Quarterly erro-

neously reported that **John R. Lionberger** was in South Bend, Ind. Dr. Lionberger is living in St. Louis at 5260 Westminster Ave., and his son, John R. Lionberger, Jr., who graduated from the School of Medicine in 1938, is practicing in South Bend.

1903

F. N. Gordon now lives at 432 N. Willow Ave., in Fayetteville, Ark.

1909

William H. Thaler has moved from St. Louis to Long Beach, Calif., where he is living at 464 Cowles Street.

1917

Wilbur K. Brown visited the Alumni Office in June, with **Frank P. McNalley** serving as his guide during a visit to St. Louis. Dr. Brown practiced in East St. Louis until 1921 and after a year's training in eye, ear, nose and throat specialty at New York Postgraduate Medical School, moved to San Diego. He practiced in San Diego until a year ago when he retired, but still lives there at 3795 Highland Avenue. Dr. Brown has three sons, age 26, 24, and 22, all of whom served in the recent war. He is especially proud of one son who received the Silver Star Medal for valor on the Siegfried Line as a staff sergeant on Patton's line. Dr. Brown was happy to be able to contradict a report that he had passed on, which Dr. McNalley had heard somewhere.

1919

Edward H. Hashinger has new offices in the Plaza Time Building at 411 Alameda Rd. in Kansas City 2, Mo.

1923

Harold F. Corson recently moved from Richmond, Va., to 604 Monticello Drive, Jefferson Village Apartments, Falls Church, Va.

1930

Herbert H. Gass, medical missionary from Baitalpur-Chandkuri, C. P., India, has been in St. Louis for the past several

months on furlough and has been studying recent developments in medicine. During his 17 years as a medical missionary in India, he has made many contributions to the treatment of leprosy and received recognition from the Indian Government for meritorious service in this field. Dr. Gass was born in India, the son of missionaries of the Evangelical and Reformed Church, and plans to return shortly.

1931

Don C. Robertson can be reached at 1202 S. Kuhl in Orlando, Fla.

1933

Richard B. Fulks wrote a letter to tell of his change of address to the State Bank Building in California, Mo. He wrote as follows: "For the alumni records—I have returned to my home town for general practice, having opened my office here on June 6. I have spent a number of years in Kentucky in general practice and in connection with the Kentucky State Department of Health, as health officer, later as Director of the Division of County Health Work, and for a brief period as Acting State Health Commissioner.

"During the period of my service with the Kentucky State Health Department, I spent one year at Columbia University in postgraduate study leading to the degree of Master of Public Health. I am happy to be back in Missouri, and I am looking forward to resuming contact with the School and to seeing friends and associates of my school years."

1935

Henry J. Lane moved recently to 1516 Edgewood Drive in Palo Alto, Calif.

1936

Arthur C. Darrow's home address is 14249 Tyler Road, San Fernando, Calif.

O. Elliott Ursin, who is now a colonel, is with the Surgeon's Office, Headquarters First Army at Governor's Island in New York City.

Robert Dunn is at the U. S. Marine Hospital in Baltimore, Md.

1937

Lt. Col. Martin A. Compton has moved to Richmond, Va., where he is with the R. O. T. C. unit of the Medical College of Virginia.

Edward H. Lyman is living at 5960 De Giverville Ave. in St. Louis.

The address of **Edwin L. McCall** is 9012 Manchester Rd., in St. Louis County, Mo.

Charles E. Martin is also in St. Louis and has his office at 3911 Lee Ave.

Edward A. Harris wrote a recent letter to bring his record up to date. His office is at 1117 South 20th St., in Birmingham, Ala., and his home is at 1348 44th Street West. Dr. Harris is married and has an 11-year-old son, Edward Alun, Jr. The following is a portion of his letter: "I am practicing pediatrics and am a licensee of the American Board of Pediatrics, a fellow of the American Academy of Pediatrics, assistant professor of pediatrics at the Medical College of Alabama, former chief of pediatrics at Employees' Hospital in Fairfield, Ala., immediate past president of the staff of Children's Hospital in Birmingham, and hold active membership on the staffs of Jefferson-Hillman Hospital, Baptist Hospitals, and South Highland Infirmary. I am also a member of the courtesy staff at Carraway Methodist Hospital, Birmingham, and Employees' Hospital, Fairfield."

1938

William Stanbro is at George Washington University Hospital in Washington, D. C.

1940

Joe S. Summers, Jr., recently moved from St. Paul, Minn., to Jefferson City, Mo., where he has offices in the Central Trust Building.

Kendall D. Gregory has moved from St. Louis to 426 Belleview, in Alton, Ill.

Henry T. Friedman has announced the recent opening of his offices at 416 North Bedford Drive in Beverly Hills, Calif., and

at 12103 Ventura Place in Studio City, Calif. His practice is in allergy.

Robert Anschuetz is in private practice in Alton, Ill., with offices at 412 Bluff St.

1941

Gordon Letterman, recently on the surgical staff at Barnes Hospital, is now in Washington, D. C., where he can be reached at 2019 R Street, N. W.

1942

The Forty-Five Hundred West Pine Clinics Psychiatric Unit in St. Louis announced the recent addition of **Frank O. Shobe** to the staff.

1943

Torrence A. Makley, Jr., is at the Eye Clinic of the University Hospital in Columbus, Ohio. His home address is 915 E. 20th Ave.

Ernest T. Rouse announces the opening of his office at Suite 1011 in the Beaumont Medical Building in St. Louis with practice limited to internal medicine.

1944

David S. Citron is with the U. S. Marine Hospital in Boston, Mass.

Bernard Bercu is at the McKinney Veterans Administration Hospital in Dallas, Texas.

1945

Samuel B. Guze is on the staff of the Veterans Administration Hospital in Newington, Conn.

1946

Frank Vellios is a first lieutenant in the Army Medical Corps, stationed at the 22nd General Hospital on Guam in the Mariana Islands.

1947

Robert Tanner recently moved from St. Louis to 1922 North Circle Drive in Jefferson City, Mo.

1948

John T. Gentry's present address is 4509 Washington Ave., in St. Louis, but after Sept. 30, he will be in the Office

of Professional Training of the New York State Department of Health in Albany, N. Y.

Juro Shintani has moved from St. Louis

to Santa Maria, Calif., where his address is Route 1, Box 82-C.

Duane Taylor is in Cairo, Ill., where he can be reached at 418 Union Ave.

In Memoriam

Deaths not reported previously in the Medical Alumni Quarterly:

1886

George H. Eversole of Caledonia, Mo., died October 4, 1948.

1888

John L. Higbie died November 12, 1948, in Ohio.

Nathan P. Thompson died in St. Louis on October 31, 1948.

1891

Donnell M. Pearson of Louisiana, Mo., died there on October 12, 1948.

1893

Joseph J. Meredith died June 27, 1949, in Cleveland, Ohio, where he had lived for the past three years. He was 84 years old and had practiced medicine in St. Louis for 53 years before his retirement in 1946. He was honored by the St. Louis Medical Society for 50 years of service in 1943.

Minor W. Pitts of Lubing, Texas, died March 20, 1949.

1895

Robert J. Curdy of Kansas City, Mo., died December 15, 1948.

1896

Charles Quincy McGinnis died three years ago on June 23, 1946, at White Memorial Hospital in Huntington Park, Calif., after a long illness due to a heart ailment. The Alumni Office recently re-

ceived with appreciation a letter and contribution from Mrs. McGinnis.

1898

Hiram E. Silverstone of Kansas City, Mo., died there on October 19, 1948.

Ralph V. Smith died in Britain, Oklahoma, his home, on November 27, 1948.

1899

Pinckney B. Carrigan of Hope, Ark., died there on February 22, 1949.

1900

Richard Campbell died November 24, 1948, in Illinois.

1903

William J. Doyle, who had offices in the Metropolitan Building in St. Louis, died November 22, 1948.

Charles N. Guhman of St. Louis died here June 5, 1949, aged 75. He was a fellow in the A.M.A. and an honor member of the St. Louis Medical Society.

1904

Chiles E. Keithly of Milo, Mo., died there November 12, 1948.

1909

Frank H. Dillon died in Illinois on November 6, 1948.

1910

Carl H. Wachenfeld of St. Louis died on October 18, 1948.

1911

James Lewald of Laurel, Md., died February 3, 1949.

WASHINGTON UNIVERSITY

Arthur H. Compton, Ph.D., Sc.D., LL.D., *Bridge Chancellor*

Charles Belknap, B.S., *Vice Chancellor*

Edward K. Graham, Ph.D., *Dean of Faculties*

Thomas Edward Blackwell, Ph.B., M.S., J.D.,

Director of Business Administration

The College of Liberal Arts

Thomas S. Hall, Ph.D., *Dean*

The School of Engineering

Lawrence E. Stout, Ph.D., Ch.E., *Dean*

The School of Architecture

Joseph D. Murphy, *Dean*

The School of Business and Public Administration

Leslie J. Buchan, Ph.D., *Dean*

The George Warren Brown School of Social Work

Benjamin E. Youngdahl, A.M., *Dean*

The Henry Shaw School of Botany

Henry Nathaniel Andrews, Jr., Ph.D., *Acting Dean*

The Graduate School of Arts and Sciences

Carl Tolman, Ph.D., *Dean*

The School of Law

Wayne L. Townsend, A.B., LL.B., J.S.D., *Dean*

The School of Medicine

Robert A. Moore, M.D., Ph.D., *Dean*

The School of Dentistry

Otto W. Brandhorst, D.D.S., *Dean*

The School of Nursing

Louise Knapp, R.N., B.S., A.M., *Director*

The School of Fine Arts

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University College

Willis H. Reals, Ph.D., *Dean*

The Summer School

Frank L. Wright, A.M., Ed.D., *Director*

The Henry Edwin Sever Institute of Technology

Lawrence E. Stout, Ph.D., Ch.E., *Director*