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## CONTENTS

- **DEPARTMENT OF ANATOMY. PART II. INVESTIGATION** by Robert J. Terry .......................... 1
- **FORM AND SUBSTANCES IN MEDICAL EDUCATION** by Robert A. Moore .................. 10
- **SOME FUNDAMENTAL IMPLICATIONS IN THE TREATMENT OF INTESTINAL OBSTRUCTION** by C. G. Johnston ........... 24
- **RECENT CONTRIBUTIONS IN CHEMOTHERAPY** by Paul O. Hageman ...................... 31
- **BASE HOSPITAL NO. 21 — 1916-1919** by Borden S. Veeder ............................... 44
- **WASHINGTON UNIVERSITY SPONSORS ARMY RESERVE HOSPITAL** by Lee D. Cady ........ 48
- **DEPARTMENTAL CONFERENCES** ................................................................. 51
- **NEWS OF THE SCHOOL** .............................................................................. 59
- **MEDICAL LIBRARY** ....................................................................................... 61
- **ALUMNI NEWS** .............................................................................................. 65
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CONTENTS

THE DEPARTMENT OF OTOLARYNGOLOGY—SOME NOTES ON ITS HISTORY & DEVELOPMENT by L. W. Dean, Sr. and Arthur W. Proetz — 71

CANCER SURGERY by Eugene Bricker — 76

THE CORRECTION OF PROTEIN DEFICIENCIES IN SURGICAL PATIENTS by Robert Elman — 81

THE OVARIAN HORMONES AND THEIR CLINICAL USES by Willard Allen — 89

THE BACKGROUND OF GREEK MEDICINE by Thos. S. Duncan — 99

QUITMAN UNDERWOOD NEWELL—1886-1940 — 109

TO MARK THE GRAVE OF DR. JOSEPH NASH McDOWELL, FOUNDER OF THE MISSOURI MEDICAL COLLEGE — 112

CIVIL WAR NOTE — 114

DEPARTMENTAL CONFERENCES — 116

NEWS OF THE SCHOOL — 125

MEDICAL LIBRARY — 127

ALUMNI NEWS — 129

STUDENT NEWS — 133
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CONTENTS

THE DEPARTMENT OF MEDICINE by David P. Barr - - 137

THE RETICULO-ENDOTHELIAL SYSTEM: ITS PHYSIOLOGY AND PATHOLOGY by Chas. A. Doane - - - - - - 151

THE ELECTRON MICROSCOPE by Gordon H. Scott - - - - 165

THE NEW SAINT LOUIS CITY HOSPITAL by Avery P. Rowlette - - - - - - - - - - - - - - - - - - - - - - 172

GENERAL HOSPITAL NO. 21 AND THE ANNUAL MILITARY BALL by L. C. Boemer - - - - - - - - - - - - 176

REPORT OF THE COMMITTEE TO MARK THE GRAVE OF DR. JOSEPH NASH MCDOWELL - - - - - - - - - - - - - 178

DEPARTMENT CONFERENCES - - - - - - - - - - - - - - - - - - - - - - - - - 180

NEWS OF THE SCHOOL - - - - - - - - - - - - - - - - - - - - - - - - - - 193

MEDICAL LIBRARY - - - - - - - - - - - - - - - - - - - - - - - - - - - - 197

ALUMNI NEWS - - - - - - - - - - - - - - - - - - - - - - - - - - - - - 200

STUDENT NEWS - - - - - - - - - - - - - - - - - - - - - - - - - - - - 204
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CONTENTS

Research in the Department of Pathology, Washington University School of Medicine, 1910-1940
by Robert A. Moore - 209

Prophylaxis of the Common Cold by Theo. E. Walsh 218

Hypertension by Frank Glenn 224

General Hospital No. 21, R. A. I. 231

On Marking the Grave of Dr. Joseph Nash McDowell 232

News of the School 233

Alumni Association 239

Departmental Conferences 240

Letters 250

Alumni News 255
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An alcove in the dissecting laboratory
In the issue of the Quarterly for last July I presented and discussed the method of teaching gross anatomy which had been planned in the Department and has been practiced and developed over a long period. In this number of our Alumni journal the opportunity has been given to set forth a résumé of the investigation carried on since 1914, participated in by members of the staff, students and visitors to the laboratory.

It will be apparent in reading this article, that the investigation in the Department covers a broad field and includes many special problems. This is the result of an attitude toward the researcher to permit and encourage the undertaking and pursuit of any proposed problem for which the laboratory could provide facilities necessary, whatever their nature, and that the investigator was qualified to carry on. Before the division of the Department in 1924, separating gross and microscopic anatomy, research proceeded in histology and embryology as well as in gross anatomy, and other fields of morphology. Since 1924 and after the reunion of the anatomical disciplines in one Department in 1928, our own field of research has been chiefly gross human anatomy and physical anthropology, but, whereas these two subjects dominate, it will be seen that other interests appear: these are in most cases the continuations of problems undertaken long in the past and whose promise of new things lures one on. Research in microscopic anatomy has flourished under the direction of Professor Ranson and Professor Cowdry in the period since 1924.
Histology and Embryology. Julia Lindsay Adams, while a medical student, was the first to describe the early developmental stages of the supracondylloid process in human embryos. An original interpretation of the process of ovogenesis was pointed out by Edgar Allen. Important contributions to knowledge of the comparative embryology of the hypophysis, the development of the glands of von Ebner, the liver of Amblystoma are examples of some of the researches of Edwin A. Baumgartner. Raymond A. Dart of the University of Sydney, Australia, while holding a Rockefeller Fellowship pursued investigations in neurology and mammalian paleontology. Several papers on the comparative embryology of the cranium came from studies of Walcott Denison and R. J. Terry; and there is unpublished work on the chondrocranium by Duff Allen. Fundamental histological studies were published by the late Victor E. Emmel on cell clusters in the aorta and cellular elements in the coelom. Ila Scott wrote her master’s thesis on her investigation of the orientation of the semicircular canals in fetuses. Forest Staley investigated the gastric glands of Alligator. A valuable paper on the development of the hymen was the result of an extensive research by Frederick J. Taus-sig. Beatrice Whiteside completed her doctor’s thesis, begun in Zurich, on the development of the endolymphatic duct, and Dorothy Wolff published her doctor’s thesis on the anatomy of the ear in late fetuses. There was notable interest shown by a number of medical students encouraged by Charles Danforth in wax reconstructions of series of developmental stages of organs that have remained in the departmental collections for further study.

Heredity and Genetics. Charles H. Danforth’s interest in these subjects produced some of the early papers on the study of twins that has since become so active and fruitful a field of research. Congenital cataract and other eye defects that tend to be hereditary, brachydactylism, polydactylism, genetic selection in germ cells are some of the subjects of Danforth’s investigation. His book on hair records other studies in heredity (baldness, hypertrichosis). Several medical students under his stimulating influence collaborated in studies of heredity and in experiments in the field of genetics. Henry Edmonds has investigated the hereditary tendency of variations of
branches of the aortic arch in rabbits. George Klinkerfuss, while a student, published a family history of polymastia. Mildred Trotter and C. H. Danforth have investigated the incidence and heredity of facial hypertrichosis. More recently George Williams has published a study on hereditary aspects of arterial hypertension.

*Comparative Anatomy.* “The Anatomy of Polyodon” is the subject of Danforth’s doctoral thesis, including a description of a rare early stage of this ganoid fish of the Mississippi. Henry A. Harris of University College, London, while holding a Rockefeller Fellowship, investigated the endocranial form of gorilla skulls. From George A. Seib, pursuing research on the venous system, came a sound paper on the azygos veins of the laboratory ape, Pithecus. R. J. Terry published on the chondrocranium of the cat; on parallelism in a mammalian series; on the course of the facial nerve.

*Physiological anatomy.* Contributions to knowledge on hair growth in the guinea pig in relation to pregnancy (doctoral thesis) have been made by Helen L. Dawson. Growth of long bones was studied by H. A. Harris, partly on evidence of disease. Leith H. Slocumb and R. J. Terry measured the resistance to tilting of the sacrum afforded by the sacrotuberous ligament. The specific gravity of the blood of the right and left sides of the heart was determined by Terry and Seib. The former has demonstrated the presence of fluid in the air spaces of the lung of frog and turtle, and evidence of it in the cat. Observations on the alveoli of the lung in a living cat have been made by Terry. Life cycles of hair were determined by Mildred Trotter (doctoral thesis) who established new facts concerning the hair follicle in pregnancy. Experiments to determine the specific gravity of human bones have been made by Trotter and Seib.

*Experimental morphology and endocrinology.* Victor Emmel’s *in vitro* experiments on mammalian erythrocyte formation were begun before our move to the new laboratory. The work of Joseph Larimore in repeating Uhlenhuth’s experiments on thyroid feeding and Meyer Wiener’s first trials in corneal transplantation were carried out in the Locust Street Building. The fundamental studies of Edgar Allen on the oestrous cycle and the discovery of the follicular hormone were
the beginnings of a brilliant career and the initiation of many lines of significant research. Under Allen's leadership several medical students collaborated with him in his researches. Bess Lloyd completed a survey of the incidence of goitre in St. Louis. Stuart Mudd studied the blood supply of the human hypophysis by reconstructions from serial sections (master's thesis). Many experiments were made on the hypothesis set up by Terry (1905) that inverse symmetry in a living organism was an expression of stereochemical influence in the molecular structure of protoplasm; two papers published: on the effects of dextro- and laevo-hyoscyamine on the pupil (Terry-Wiener); content of nucleic acid in various tissues (Whitseite). Trotter's experimental investigations into factors concerned in the resistance of hair growth to certain stimulants and on determining the hair slope (with Helen Dawson), have thrown much light on the status of these old questions and has helped to clear away false conceptions that have prevailed. The beginning functioning of the suprarenal medulla in pig embryos, gauged by the chromaffin reaction was observed by the late Morie F. Weymann. Observations on the regeneration of the gustatory tract were published by Beatrice Whiteside, who also made interesting studies on the mid-line relations of nerves.

Applied anatomy and pathology. The late Nathaniel Allison studied congenital dislocation of the hip and published the anatomy of a case. Experiments on the cadaver made by Harry S. Crossen have shown the site of pressure on the brachial plexus in anaesthesia paralysis. Cecil Charles made surveys of public schools and reformatories to compare intelligence quotients in the two groups. Under the direction of Mildred Trotter, Jane Erganian and Bernice Albert (students) have studied bilateral aneurysms of the iliac arteries and reported a case. Studies of ectopic testis, phocomelia, monstrous variation of heart and veins have been reported by H. A. Harris and Caroline Whitney. E. L. Keyes has studied a series of ruptured tendons of the supraspinatus muscle in cadavers, and revealed a correlation between age and incidence; senile shoulders, erosions of articular surfaces of the knee-joint are other subjects he has investigated and published from observations on dissecting room cadavers. Seib
MEDICAL ALUMNI QUARTERLY

has made an accurate determination of the incidence of patent foramen ovale cordis. He also found the incidence of the foramen of Civinni (coinciding with the incidence of failures to reach the Gasserian ganglion via the foramen ovale). Observations and experiments over a long period made by Leith Slocumb indicate a correlation between anomalous positions of the superior mesenteric artery in crossing the duodenum, and gastric dilatation and duodenal ulcer. The important discoveries with respect to treatment of headaches via the sphenopalatine ganglion were made by the late Greenfield Sluder in studies covering several years on a large series of decalcified sectioned heads. The interesting phenomenon of ringed hair has been investigated by Lee D. Cady and M. Trotter.

Variation. Many cases of variation presenting features of unusual morphologic or practical significance have been observed, studied and reported. This subject treated statistically is presented below under Collective Investigation. Further information on the incidence and innervation of the sternalis muscle was given by Ralph N. Barlow. Presence of cervical ribs connected with the axis were observed and reported by J. B. Brown and P. K. Webb. K. S. Chouke has published a study of variation of the coracobraehialis muscle. Further observations on familial cleidocranial dysostosis were published by Terry. W. W. Graves has pursued his interesting investigations of the scapula at different times over many years in our laboratory. Jesse Hetherington has brought out the incidence of the variant kerato-cricoid muscle. William Hudson, and later G. D. Williams have reported cases of absence of the right recurrent laryngeal nerve and its significance embryologically and clinically. More data have been collected by Raymond Lanier on the nature of atlas assimilation. Leo Lloyd, while a student, analyzed the sorts of supernumerary renal arteries and calculated their incidence in a series. William Ossenfort, during his medical studies, published a paper on variation of the atlas. Septal apertures of the humerus, an old subject of inquiry, was attacked by M. Trotter on our collection of documented skeletons and some clear cut evidence was brought out. A study of asymmetry of vertebral articular processes was published by the late Caroline Whitney.
Physical Anthropology. The Department of Anatomy initiated research and graduate study in this special field of study of human structure in Washington University and has accumulated a large documented collection of skeletons and other materials for research. Publications on the following investigations have appeared: incidence of the supracondyloid process in several races, insane and criminal series (a number of papers by Cady and Francis, Irene Pieper (master's thesis), Sun, Terry); nasal cavity of the negro (Charles); distribution of hair on the digits, absence of palmaris longus muscle (Danforth; J. W. Thompson, C. H. Danforth, J. Batts); presacral vertebrae in whites and negroes (doctor's thesis, Lanier); level of termination of spinal cord (J. H. Needles); hypothophysal fossa (Burchard Pruett); palmaris brevis muscle (B. Schneider); negro clavicle; acromial end of clavicle in Indians (Terry); facial hair in whites and negroes; form, size and color of head hair in American whites; hair of Arabs; classification of hair color; vertebral column in ancient Egyptians; vertebral column in whites and negroes (Trotter); hair of French Canadians (Trotter, Dawson); incidence of tuberculosis in negroes of Macon, Georgia; the constitution of Brazilian whites and negroes (in progress) (Williams). Other investigations in physical anthropology are cited in the following section, Collective Investigation.

Collective Investigation. This is the method of mass attack upon the problem. It was adopted after deliberation as a plan that would yield the largest return of desirable data in a period limited by availability of funds granted by the Rockefeller Foundation. All the students in the laboratory, from 1930 to 1937 inclusive, were brought into cooperation with the staff to carry on the labor of collecting data. It was a wholesome enterprise for the students because of the experience involved in both making and systematically recording observations. Both operations were checked by an instructor, each member of the staff having a group of problems for which he assumed the responsibility of collecting and verifying the observations called for. The problem decided upon was the determination of the range of variability of anatomical structures of the American Negro. Some progress has been made in this problem applied to Europeans, not much with other
stocks. Our material is documented rather fully and the identity of the individual is never lost from the moment he is measured and photographed until his skeleton is stored and catalogued. The choice of subjects to be investigated, that is, the criteria of variability range, was limited by the time factor (the schedule of dissection could not be interrupted too much) and by the student’s skill and interest. Problems too difficult or too time consuming would discourage, the efforts would be careless and results useless. It followed, therefore, that although data were secured for all systems of the body, the number was not equally distributed; there were obtained, for example, more observations on vessels than on viscera because it was found easier to formulate a critical question that a student could deal with in arterial patterns than find one with critical points in the intestine or bladder.

The records of laboratory observations made on series varying from 40 to 300 cadavers, classified and filed number 163 topics of investigation. They are available for study to qualified investigators. The following subjects have been studied thus far by instructors, and by students in collaboration with instructors, and papers published. These papers contain data on the anatomy of American whites and negroes, collected during a seven year period from known documented material, and are suitable for statistical treatment.

Incidence of sternalis muscle (R. N. Barlow, Williams); terminations of the circumflex veins of the thigh (R. D. Baird, J. S. Cope); lumbar spaces (E. H. Burford, Seib); origin of the deep brachial artery (Charles, L. Penn, H. F. Holden, R. A. Miller, E. B. Alvis); menisci of the knee-joint; superficial veins of the arm (Charles); circumflex veins of the thigh (T. L. Finley, R. D. Baird, J. S. Cope, Charles); branches of the aortic arch (H. M. Aff, M. Schmeckebier, H. W. Edmonds, E. G. Graul, Williams); renal artery (Leo Lloyd, Terry); azygos system of veins; psoas minor muscle; pectoralis minor muscle (Seib); sciatic nerve and piriformis muscle; synostosis of manubrium; septal apertures of the humerus; accessory sacro-iliac articulations; anatomical variations in the sacro-iliac region (Trotter); types of the middle meningeal artery (D. Rothman, Trotter); calf muscles (Williams, G. E. Grim, J. J. Wimp, T. F. Whayne); circumflex arteries of the thigh
method. apparatus. in the course of the past twenty-five years methods of investigation and techniques have been improved, new ones invented, new apparatus devised and put into advantageous use. among many of these auxiliaries to research, may be mentioned the following, accounts of which have been published: approach to heart and lungs via superior mediastinum (Terry, Seib); entrance into pulmonary alveoli by means of capillary glass tubes; observation of lung in living animal by means of a thoracic window; a new type of dissecting table; terra cotta exhibition jars (Terry); method and apparatus for measuring and photographing the cadaver (Terry, Seib); colorimeter for measuring skin color (Williams).

collections established for investigation. the laboratory is indebted chiefly to the late professor Victor E. Emmel, professor Charles H. Danforth and Dr. Edwin Baumgartner, whose efforts devoted to scientific progress, resulted in a research collection of comparative embryological material. the desire to have such a collection in Washington University was inspired by my experience with the Minot collection in the Harvard Medical School. our collection includes 670 series of slides representative of selected types of fishes, amphibia, reptiles, birds and mammals. since the year 1924-25 records have been made and filed for all cadavers received, containing data essential for research purposes. these records have gradually extended in scope with the expanding technique of the embalming room: weight, anthropological observations and measurements, photographs, death masks, hair and skin sam-
pies. Other data are much desired, but there is no provision to extend this documentation, indeed, retrenchment became necessary three years ago. There are at this time 1260 fascicles of cadaver records which include measurements. On the completion of dissection all bodies have been skeletonized and the skeletons finally catalogued and stored. At the present time there are 1510 documented skeletons of American whites and negroes, available for research in anatomy, physical anthropology and pathology. Mention should be made of the growing collection of x-ray films, being developed for purposes of teaching and investigation by Dr. Trotter. Through exchange of publications with laboratories in this country and abroad the Department possesses a library of reprints on anatomy, physical anthropology and allied subjects, numbering 5314 titles, catalogued and filed. In preparing the plans for our collections and in putting them into effect, I have had the invaluable advice and loyal cooperation of my staff. The clerical and technical work involved is extensive and demanding of care and judgment at every step; this work, essential to our investigations, has been carried on most commendably by the secretary of the department and the technicians.

The work reviewed here is that which has been brought to some sort of conclusion, chiefly by publication; in a few instances by completed manuscript. It is a part only, but the larger part, of the research carried on during the past twenty-five years. Many studies have been undertaken that never came to publication into which a great deal of effort has gone both on the part of the students and the members of the staff. This is inevitable in every laboratory. Regarding these, some consolation can be taken in the fact that many such failures to complete the work are not sheer waste of time and effort, for the experience always teaches something of value, to be used in other undertakings.

These sketches of the Department of Anatomy are built upon the two chief functions of a university department, teaching and research. There is of course in this, as in all departments, a background, so to picture it, of other functions, necessary though generally not interesting to the teacher and investigator, which must be discharged in order that the main purposes will live and grow in usefulness.
Form and Substances in Medical Education

ROBERT A. MOORE

In the material world, you are all familiar with form and substance. The chair upon which you are sitting has a definite form with a seat, back, arms and legs. The substance is wood and iron. The outline form of this building is a rectangle. It is divided by walls, ceilings and floors into hallways and rooms. The substance of the building is brick, cement, wood, plaster and iron. These examples are concerned with concrete objects. An abstract object, such as education, is equally divisible into form and substance. Aside from the buildings and physical equipment which need not concern us now, form in education is concerned with the curriculum, methods of learning and required and elective courses. In other words, form constitutes all of the tangible and intangible opportunities which are placed before the student in his pursuit of knowledge. Substance, on the other hand, is the mass of information, both factual and theoretical, which is brought to the attention of the student. Please note that I have not used the word "teach" in a definition of either the form or the substance of medical education. A child is taught, an adult is given an opportunity to learn. On first thought, this may not seem important to you, but in the final analysis it represents, or to be more realistic, should represent, the difference between undergraduate education and graduate education. The study of medicine should take the form of graduate education. You are all adults. You have all taken three, four or five years of college. You have all found that knowledge cannot be acquired only by exposure, but that thought, contemplation and reading are necessary to place a fact in its logical place with other facts.

For many years, but more especially during the past summer, your faculty has given thought to the form of medical education in the Washington University School of Medicine.

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† Presented at the opening of the School of Medicine for the year 1940-41, September 25, 1940.
Some people would have you believe that form is not important, that given a building and professors, graduate students and medical students will work out their own destiny, that the order of subject matter, the arrangement of the curriculum and the allotment of hours to departments is of no consequence, that the only important part of education is substance. I should like to present to you another viewpoint, a viewpoint that form is as equally important as substance, and that one cannot be separated from the other.

What are some of the elements which go to make up the form of medical education? An important principle is concerned with the method of learning: whether one listens to lectures, or recites, or reads, or makes personal observations and experimentations. In other words, we are here concerned with methods by which knowledge is acquired, and I use the word acquired rather than the usual term conveyed for the same reason that I have distinguished between teach and learn.

Medical education in the United States originated in the preceptor system, passed through the college phase and in the early part of this century emerged into the present university stage. In the transition from the preceptor to the college phase, the so-called preclinical sciences took their place in the medical curriculum. These sciences, really nothing but specialties of the broad science of biology, adopted the methods of instruction which had been developed in the 19th century by Huxley, Martin and others. This pedagogy briefly was that the student shall in so far as possible make his own observations and not depend upon the textbook or the lecture. Unfortunately, the teachings of the great clinicians of Paris and Edinburgh had been lost in the intervening sixty years and the advantages of self-observation in clinical teaching were tossed aside for lectures and clinics.

In 1880, a young Canadian, William Osler, decided to throw in his lot with the emerging American Schools of Medicine, first at Pennsylvania and later at Hopkins. Osler went about preaching the doctrine of "bed-side" teaching; to quote his own words, "It makes of the hospital a college in which, as clinical clerks and surgical dressers, the students slowly learn for themselves, under skilled direction, the phenomena of dis-
ease. It is the true method, because it is the natural one, the only one by which a physician grows in clinical wisdom after he begins practice for himself."

As Osler's ideas spread over America, Washington University was one of the few, which as early as 1910, had at its head a man who had the vision to see the truth of this new approach to medical education. Mr. Brookings with his boundless energy, carried this school through the transition from the college to the university. He, directly or indirectly, provided the now Washington University School of Medicine with laboratories, hospital affiliations and full-time professors, that combination which was and is necessary to place clinical teaching on a firm basis.

But why do I tell you of these ideas and events of 30 and 40 years ago? I tell them to you largely because they are still true today. The principle of clerkship teaching has been tried and tested as a sound pedagogical principle. In a consideration of the curriculum during the past summer, your faculty have thought it desirable to extend the system more fully to the third year. The new schedule, effective this fall, calls for 270 fewer didactic hours in the third year, or one-fourth of the scheduled work. The time thus freed has been made available in full-time block clerkships.

You may be surprised at the secondary changes which became necessary, because of the abandonment of didactic clinical instruction. If medicine is to be taught at the bedside, your faculty are obliged to see that there are sufficient beds so that the student may study a variety of disease and disease types. Despite what I believe to be a sincere appreciation of the value of a teaching hospital, on the part of the Trustees and Superintendent of the Barnes Hospital, it manifestly is no longer possible to confine our clinical instruction to this one hospital. As medicine has changed, so have hospitals changed. The private hospital has become more and more interested in the specialties and the type of patient frequently has incipient disease rather than the advanced disease which is desirable and valuable to students. We must go to the tax-supported institution to enlarge and to extend the scope of observable disease. You will therefore find yourselves assigned as clinical clerks at the St. Louis City Hospital and at the
Homer Phillips Hospital. The administrators and staff of these hospitals are anxious to assist you in your study of medicine.

Another secondary change is probably of more than passing interest to you. In the third and fourth year, school starts at 8:00 o'clock in the morning. The reason for this is apparent. A clerkship at a hospital to be effective must start not later than ten in the morning and continue for the remainder of the day. Despite the statement made earlier this evening that clinical instruction should be at the bed-side and not in the class room, there is a certain minimum of didactic teaching which cannot be eliminated. The only compromise then between the above expressed ideas of a profitable uninterrupted clerkship and a minimum of didactic exercise is to start work earlier. I am sure that after mature thought you will agree that the broad advantages gained tremendously outweigh the loss of an hour's sleep.

With the emphasis on clerkships in both the third and fourth years, some rearrangement of the relative allotments of time became necessary. It is evident that medicine and surgery should be taught in both years. But this acknowledgment immediately leads us to another more perplexing problem. Shall the instruction in medicine and surgery be carried out first in the out-patient clinics or in the wards of the hospital. A sound pedagogical principle is that the beginnings of a subject shall be learned in that place where the most precise, the most exact and the most thorough work can be done. Without doubt, this place is the hospital. This fall, the third year class will therefore start hospital clerkships in both medicine and surgery. Clerkships in obstetrics and gynecology will also be given in both years, hospital clerkships in the third year and clinic clerkships and deliveries in the fourth year. All of the clinical instruction in neurology and psychiatry will be given in the third year and the clerkships in pediatrics will be given only in the fourth year. Because some of these assignments represent a material change from last year, the coming year will be a transition period when all of the above may not be exactly true.

A second element of the form of medical education is the avoidance of provincialism in both time and space. By pro-
vincialism in time, I mean blind adherence to the written and spoken word of today. It follows that those who abhor provincialism in time are interested in the future progress of medicine. I do not propose that you become “doubting Thomases,” but I would urge upon all of you the thesis as stated by Karsner that “Truth as we find it is not absolute, and may not be the same tomorrow as it was yesterday or is today. Truth is revealed by the demonstration of facts, which represent observations dependent on methods. Human imagination and ingenuity evolve new and improved methods and, as circumstances alter, truth may alter with them.” By provincialism in space, I mean absolute faith in the thought, philosophy and teachings of the staff of the Washington University School of Medicine. Not only students, but also professors, who are really only advanced students, must be humble, must point with pride to the work of men in other medical schools of this country and I particularly wish to add, to the men in other countries, no matter what personal feelings you may have because of world conditions. Medicine knows no national nor international boundaries.

How can your faculty assist you in the avoidance of provincialism in time and space. First, there is a fine library of current and bound medical journals and a cooperative staff of librarians. With their assistance you can consult the writings of others, the record of original research or the accumulated philosophy of the masters. May I urge you to turn your attention more and more to the reading of original articles and less and less to the standard textbooks. Be inquiring, consult the original sources of information yourself, do not accept the word of a reviewer for all things. Second, your faculty has made provision for a full elective quarter in the fourth year. Elective time is meant to give you an opportunity to probe more thoroughly into some subject which is of particular interest to you. It is, in general, not designed to sample all of the fields of medicine. I, therefore, urge you to elect one or at the most two subjects during this eight weeks period. All of the departments of the school have cooperated in the creation of elective opportunities and you will find over 60 full-time places for 24 students, thus giving each of you the chance to pursue the subject of your choice. The existence of
an elective quarter bears on provincialism in both time and space. The relation to timal provincialism has to do with research by students. Those who have supported the idea of research by students have been criticized, even abused, on the basis of what I believe to be a misunderstanding. Even the most enthusiastic proponents of this pedagogical principle, (and I plead guilty as a vigorous supporter) acknowledge that most medical students are not interested in research, that many medical students do not have the background or knowledge to carry out research and that most investigations undertaken by students never see the light of a scientific meeting or of a journal. But, none of these accepted facts dispute the basic thesis that research by students is not a question of the development and crystallization of an original idea, but rather is an attempt to convey to the student the research method. What matters it, if the particular study undertaken is not completed in two months or if the completed study is not worthy of publication? The important point is that the student has learned a new approach, a new way of thinking, a new form of study, he has learned the research method.

This discussion of research leads us into another field about which I should like to say a few words: clinical research. Too often when the laity and even doctors think of research they call to mind, a laboratory with test tubes, flasks and beakers, complex apparatus, mice and rats and rabbits and a peculiar individual who, they believe, has abstracted himself from the world like a hermit. We must acknowledge that this concept is certainly incorrect as an all inclusive picture. There must be added a picture of a hospital ward was patients and more especially young doctors who are trained in the research method. It is not necessary to abstract from the patient a sample of blood or urine or a piece of tissue to do medical research. A single patient or a series of patients may be studied by the objective and subjective methods of pure clinical medicine with as great advantage to the progress of medicine as if laboratory methods were used.

Only a small percentage of you will, after graduation, enter the field of pure research or even full-time university medicine. Most of you expect to practice clinical medicine either in an office or in a hospital or in both. Your opportunity to con-
tribute to the science of medicine is unlimited if you are familiar with the research-method. I sincerely hope that a not inconsiderable number of you during the elective quarter and at other times as well, will associate yourself with some member of the faculty who is active in research, basic or clinical. Try to assimilate his or her philosophy and methodology and study how this way of thinking might be applied to the clinical problems which interest you.

The elective quarter bears on spacial provincialism in giving a few of you an opportunity to study in other schools and hospitals. Let us say that Mr. John Smith wishes to spend his elective quarter in pathology, but he prefers to study at Western Reserve University, at Cornell University or at Harvard University, or to state it more broadly, at any class "A" medical school in the United States or Canada, rather than at Washington University. A committee of the faculty known as the Committee on Electives has been appointed. Mr. Smith makes application to this committee for leave to elect a quarter of pathology at Harvard. The committee examines his record and attempts to answer the question: Has Mr. Smith demonstrated by his previous record that he will derive benefit from this extramural period of study? If the answer is affirmative and if he be acceptable to the selected institution the request will be granted.

One extramural opportunity deserves special mention. The Cancer Commission of the State of Missouri, which maintains the Ellis Fischel Hospital at Columbia, has places for two senior medical students as externes. Applications should be made directly to the Commission and if you are accepted by the Hospital, the Committee on Electives will approve of your absence from St. Louis for the eight week period.

A third essential in the form of medical education is concerned with correlation. From early days medical faculties have struggled with this problem. The four years of study should be an integrated whole, but how are we to integrate the metabolism of proteins (chemistry), the function of the kidney (physiology), the anatomical changes of chronic nephritis (pathology) and the clinical signs and symptoms of a patient with Bright's disease (medicine) or any number of other similar subjects.
One solution, frequently used, is to admit to the third and fourth year curricula, correlation or refresher courses in chemistry, physiology and pharmacology. You point to the X University where such a course has been a success. But on careful analysis, you will find that the course has been a success not because of the soundness of the pedagogical principle, but because of the personality of the professor who conducted the lectures or clinics. He is one of those rare teachers with the supremely logical mind, the mind which can simultaneously grasp all of the facts of the basic sciences and place them and use them at the bedside. Unfortunately most human minds are not capable of this breadth of comprehension, but are capable and can develop correlation in a few fields. How then, can we capitalize on this latent ability of our own faculty without at the same time freezing so many hours in the curriculum for chemical, physiological or pharmacological correlation.

Your faculty believe that a satisfactory solution is given by the special lecture. In the new curriculum Wednesday at 5:00 is designated as a Special Lecture. Members of the faculty and invited guests from other institutions, who because of special ability or aptitude, will present discussions of topics of interest to all students. In general, the lectures will be arranged in a series. For example, the first four will be devoted to radiant energy and the cyclotron. The first lecture on next Wednesday, October 2, will be given by Dr. Robert Thornton, Physicist in charge of our own cyclotron, on the basic principle of the cyclotron and how it works. The second series is planned to cover the steroid hormones, that is, the androgens, estrogens and the adrenal cortical hormone in both their biological and clinical aspects. I am sure that you will find these lectures profitable. The Committee on the Special Lectures of which Dr. Willard Allen is Chairman, will be glad to receive your suggestions for topics and speakers.

A fourth element in the form of education is usually considered a disagreeable subject, one which all students detest: examinations. Let me be completely frank about the development, form and purposes of examinations and in return ask for your belief in my absolute sincerity. Unfortunately, in the modern development of educational principles and in the emergence of so-called progressive education, the use of the
examination has not kept in line with other newer ideas and methods. Examinations are uniform from the kindergarten to the graduate school. The "school marm" of the one-room country school house still rules generations after her day. By action and by word she inculcated the idea that an examination was a horrible experience and something to be feared. Although these time-honored traditions may be true for the grammar school (which parenthetically I doubt) there is no excuse for the continuance of the idea into the college and medical school. The examination should be and can be a form of instruction. The evaluation of the answers must be looked upon as of secondary importance. The primary point is that the student has an opportunity to review and to crystallize his or her knowledge and, from the experience, to learn new facts and new ways of thinking.

If we, at least for the moment, accept this thesis concerning the purposes of an examination, it follows that we must give thought to the form and type of the examination. The classical five questions to return to the professor, parrot-fashion, the bare facts heard in a lecture or read in a textbook must be abandoned. This accepted examination of the past does not even test knowledge if we look upon knowledge as the ability to think and not simply an encyclopedia storehouse of facts.

But, we must not tear down the old without proposing something better to take its place. It is the opinion of your faculty that the answer to these problems is given in two words: objective and comprehensive. Before you shudder too much, particularly at the thought of comprehensive examinations, let me define and explain them. A comprehensive examination is not, as it is usually practiced, planned to test at one time, separately, your knowledge of each subject such as anatomy, physiology, biochemistry, bacteriology and pathology. Rather it is an examination in which the facts and theories of each academic discipline are woven into a comprehensive whole. It deals with single questions which to answer, the student must have knowledge of all of the regimes of one year or several years. The comprehensive examination serves only a small part of its purpose if we at the same time retain the old type of question. The objective type of question completes
the conversion of the country school house into the graduate school. The objective question is not even a question, but rather submits to you certain facts and asks you to correlate them, to deduce other facts from them or to relate them to a general theory. In other words, speaking colloquially, it asks you to use not only "gray matter" but also "white matter."

At this point in the discussion, many of you fear the worst, that every student will be required to take one or more comprehensive objective examinations, that life from now on will be full of examinations and that your faculty have followed the leader in the trend of pedagogy. I assure you that your faculty are at least, trying to think originally and to develop new principles. We have reasoned that the student rated high by all departments has already demonstrated his or her ability to think, to crystallize, to correlate and to deduce. Why should we ask them to demonstrate again this same ability in a comprehensive examination. Thus, we shall ask only those of you who stand in the lower one-fifth of your class in forty percent or more of your work to take a comprehensive examination over the year's work. Even then, the matter is subject to judgment by the promotions committee. The exact wording of the rule is as follows:

All students who stand in the lower one-fifth of the class in forty percent or more of the scheduled hours shall have a condition for the year. This condition may be removed; first, by the committee on the basis of the student's record, or second, by a satisfactory showing in a comprehensive examination given at the beginning of the next academic year.

Let us suppose that the committee feels that the cause of a student's low record is acute or subacute and not chronic, that a temporary emotional experience or a transient inability to acclimatize himself is responsible for the poor showing, the condition is removed on his record. In fact, the rule specifically states: "The committee shall consider not only scholarship, but also economic and other personal factors."

Finally in the discussion of examinations, a word directed at the third year class only. Earlier this evening I proposed that medical education should be considered and should follow the form of graduate education. It is a sound and well estab-
lished principle in the conferring of the doctorate degree, that
the candidate's knowledge be sampled and tested at some time
before he or she enters the final year of study. For that rea-
son, each of you in the third year class will be asked to take
an examination in November and in May. This is really not
as bad as it sounds. Each examination occupies only a half-
day and probably not over two hours. The questions will be
of the objective type and you need only relate the given facts.
The evaluation of your answers are not a matter of immediate
permanent record, but are known only to the promotion com-
mittee for the third year and are used by them together with
all other available data to make the decision that you shall be
admitted to the final year of study and become a doctor of
medicine.

For several minutes past, examinations have been consid-
ered and discussed, but not once has the word "grade" been
used. The omission was not oversight, but means that as a
matter of record, grades in this medical school have been abol-
ished. In the place of grades, we propose to use "rank in the
class." Thus, the report from each department will state that
a given student ranks first, twenty-sixth or seventy-third in a
class of ninety-six. In addition, certain ranks will be marked
"with honors" and unfortunately a few, and I hope a decreas-
ing few, must be recorded, "fail." The ranks with honors
need not be awarded to those with the best scholastic record,
but industry, interest and attitude may well be considered.
Similarly "fail" is not automatically given to a lower part or
percentage of the class, but is reluctantly recorded on the con-
sidered judgment of the department.

There are many advantages of the rank in the class system
over the classical absolute grade, but I have time this evening
to elaborate on only two: the more rational range of numbers
and the uniformity of evaluation in the different departments.
With grades, the range is theoretically 0 to 100, but practic-
ally, it is 70 to 90 and when various grades are averaged, an
attempt is made further to subdivide the grades with two
decimals so that as one student expressed it "I object to being
divided into ten-thousand small cubicles." With rank in the
class, the range is 1 to the total number in the class, a more
limited and rational classification.
The second point is of greater importance, uniformity of grading in all departments. With absolute grades the average of the class in one department may be 85 and in another department 78. With rank in the class, the average is always the same, for example in a class of 90, 45 is the average.

So much for the form of medical education. There are many other points which we might discuss, but with all of the essentials of form and with all of the substance of medicine, there is still one vital thing lacking: spirit. Spirit as form is composite and made up of many parts. Two of these occur to me to be worthy of comment, first your attitude toward your faculty and their attitude toward you, and second, your attitude to the world about you, particularly in the year 1940, when half of the world is aflame and the other half is smoldering.

In every group of students there are a few who feel that a faculty are an unnecessary evil, that professors are placed in a University to hinder students, to be a source of irritation and harassment to them. Even more unfortunately there are a few professors, such as one I knew, who publicly stated, "The University would be a nice place to work if it were not for students." There is no place for either of these individuals in the University School of Medicine.

In the medieval ages Universities were, and today they should be, the collection together in one physical location, of a group of minds, eager and anxious to learn. Some of the minds have already travelled a part of the path of knowledge and for convenience we call them, professors. Others of the minds are just starting the climb and we call them, students. The goal of both is the same; first, acquisition of a reasonable share of the present knowledge and second, the further extension of this knowledge. Professors and students then should be mutually beneficial to each other. Professors to assist on the twist and turns and difficult climbs, to instill that stern mental discipline that you must acquire if you are to gain a clear insight in your search for truth. Students to bring the unhindered viewpoint and to keep the professor moving onward and upward. In all sincerity there is nothing more stimulating than a free discussion with a group of inquiring students.

As the second component of spirit, what attitude shall we
of the younger generation take toward present world conditions? Leaving aside politics and propaganda and fanfare, there can be little doubt that we as individuals are headed toward trouble. Trouble in the sense of personal sacrifice and the temporary shelving of our own ambitions. Some or all of us may be called upon to serve our country in either a professional or military capacity. We must render that service quickly, freely and to the best of our ability. But, much more important is the question, What shall we do in the interim, how shall we occupy ourselves in the coming months or year?

You have all seen what happens to a people gripped by hysteria. Of what use is education if it does not supply that intellectual discipline which allows a person to view the facts calmly and in the full light of day. Regardless of the events of the coming weeks or months, this country and its people will need doctors of medicine, doctors trained in all of the modern forms of therapy, doctors well versed in the field of public health, doctors with clear minds not clouded by doubts and fears. You can best serve your country by focusing your attention on the immediate “job” at hand, the completion of your medical education, thus preparing yourself for the far greater “job” ahead.

Perhaps you can, as I have, draw confidence from the words of Wilson G. Smillie, spoken one year ago on an occasion similar to this. “You have been destined to live in one of the important epochs of the world’s history. From day to day events transpire that will affect whole nations for centuries to come. The most powerful forces of the world are locked in a deadly embrace in this struggle for world dominance. Whole peoples will be destroyed, national traditions, hopes and aspirations will be blasted. Kingdoms will fall, old social and political philosophies will die and new ones will be born. A world catastrophe is pending. You may be called upon to take an active part in this maelstrom of human agony; some of you may be destroyed by its terrible force.”

“And yet, when the final page of history is written, when the historian of the year 3000, with the perspective of a thousand years to guide his hand and to give him insight into the great, the basic, the essential forces that have affected the destiny of mankind—that historian will not consider that the
world wars of the Twentieth Century were the critical and most important events of that day."

"Though the roar of cannon and the crash of bombs drown out my voice as I say it, I assure you that the most important event of the period in which you live is not world war. Instead, as I look over the shoulder of the historians of the future, of the year 3000, as he writes, I see the words: 'The greatest event of the Twentieth Century was the discovery by mankind of the true origin and nature of disease, its causes and its prevention, together with the application of this knowledge in the promotion of the health and happiness of the people, in the prevention of premature death, and in the alleviation of suffering and pain. From the beginning of time, the peoples of the world had lived in superstition and in ignorance of the causes, the mode of spread, and the methods of prevention of illness. They had no conception of the orderly, basic laws that controlled the growth and development and the disintegration of the human body. Within one short century the veil was torn away and the world entered a new phase of knowledge and understanding of the laws that govern human existence on this earth. This was the great contribution of that century'."

Let us then take these new wings of educational form and attach them to the old spirit, that same spirit which animated a small group of faculty and students when these buildings were opened a quarter of a century ago. With that spirit we can hold our heads high and look with confidence to the next 25 years of the Washington University School of Medicine.
Some Fundamental Implications in the Treatment of Intestinal Obstruction

C. G. Johnston, '26*

The problem of acute intestinal obstruction has been a vital one. The mortality from this condition is excessively high, the sequence of events leading to a fatal outcome has not been clearly understood, nor the method of treatment uniformly satisfactory.

Advances in knowledge and understanding of other conditions are usually reflected in decreased mortality rates. This has not been noticeable, except, possibly, during the last decade, in the case of acute intestinal obstruction. Schramm reported a mortality from acute intestinal obstruction of 73 percent before 1873. During the following ten years in a series of cases the mortality was 58 percent. That more modern surveys of the subject have not afforded a more optimistic viewpoint is attested by the statement of C. Jeff Miller who estimated in 1929 that the mortality from intestinal obstruction was approximately 61 percent. The statistics of these authors reflect pessimism when viewed as a progressive series. One series which points out the lack of influence of persistent attempts to understand this condition is that of McIver who reviewed three series of cases over three separate ten-year periods in the Massachusetts General Hospital. The mortality from 1898-1907 was 60 percent, from 1908-17, 41 percent, and from 1918-1927, 44 percent.

Several difficulties arise in the analysis of large numbers of cases from the literature. The most obvious is that the various series are not always comparable. Acute intestinal obstruction is not a single clinical entity but is actually a collection of conditions which have certain common factors. The most obvious of these factors are the inability of the gut to propel its content untrammeled throughout its entire length, and the development of distention of the intestine. Variations

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in etiological factors, position, integrity of blood supply, general condition of the patient before onset, and the length of time between onset and beginning of treatment, are factors which influence the mortality rate, regardless of the effects of treatment.

Etiological factors in the initiation of mechanical obstruction of the bowel have long been well understood. Clear descriptions of causation are to be found in the works of Treves in 1884, and Brinton in 1867. Approximately half of all the cases of intestinal obstruction are caused by protrusion of the intestine through external hernial orifices. This has been well borne out by many published statistics. Inguinal and femoral herniae are the most common offenders in this regard; according to Vick, who studied a large series (6892 cases), approximately 88 percent of all obstructions from herniae were due to incarcerations of gut in these regions. The mortality associated with obstruction due to hernia is low as compared to that due to most other causes, even though the incidence of strangulation is likely to be high. The obvious reason for this lower mortality is that the diagnosis is made early and a standard procedure, early operation, is not usually unduly delayed. In addition, the operation is likely to be simpler since the lesion is not difficult to find. Therefore, in reported series which exclude cases caused by external hernia, the total mortality from intestinal obstruction is expected to be higher than in series in which these cases are included.

Next to external hernia, the most common etiological factor is adhesions and, of these, adhesions resulting from previous surgical procedures form the largest group in this category. Mclver has indicated that in the group found early in the postoperative period the mortality is higher than in those cases occurring late after operation. This, despite the fact that these cases usually become obstructed before they have left the hospital and are, therefore, not to be classed as seeking aid late in the disease. These two conditions, external hernia and adhesions, account for approximately three-fourths of all cases of intestinal obstruction.

Obstructions which are likely to be associated with interference with the mesenteric blood supply are as a rule more serious in nature since, in addition to the possibility of necro-
sis and perforation of the intestine, there is a greater tendency to early signs of toxemia and shock.

The high mortality in most published series is no intimation that decided effort has not been made to understand the cause of death in acute intestinal obstruction. A vast array of clinical and laboratory investigation has been expended upon this problem. Three main theses have been advanced to explain the cause of death in this condition.

The oldest theory concerning the cause of death in intestinal obstruction is that a potent toxin is formed. That toxic substances are found late in intestinal obstruction, and especially in the case of strangulation obstruction, has been well proven, and nature and source of the toxin has caused much controversy. Dehydration with salt loss has been proposed as an explanation for the cause of death in obstruction, and while these are important factors, it is well known that even well hydrated patients die because of an unrelieved obstruction of the intestine. The concept that shock is actually the causative factor in death from this condition was suggested by Braun and Borutta in 1908 and has been occasionally referred to by others since. That this latter concept does not cover the entire picture for most cases of obstruction is obvious to those who have studied this condition. The multiplicity of viewpoints presented with regard to the cause of death in intestinal obstruction is but another indication of the protean nature of this condition.

Basically there are two factors which are practically always present; the inability of the gut to move the intestinal content throughout its course, and the early appearance of distention. The first of these has been obvious, and the best form of therapy in a patient who can stand the procedure is removal of the obstruction. The other basic factor which has been well recognized and has been one of the most obvious clinical signs is distention. Distention as a factor in the train of events which lead to a fatal outcome has not received attention commensurate with its importance until the last decade. Burget and his associates, Herrin and Meek, and Taylor, Weld, and Harrison have presented experimental proof which indicates that if an obstructed loop is kept decompressed no untoward symptoms result, and that a chain of events simu-
lating intestinal obstruction resulted when the intestine was distended, even when no obstruction was present. This latter observation is frequently made in clinical patients with adynamic ileus.

Wangensteen and his associates\textsuperscript{11} have done much to focus attention upon distention as a factor of great importance in intestinal obstruction. The initiation of the use of suction drainage in the treatment of intestinal obstruction has been ascribed to these workers; actually it has been sporadically suggested for many years. Of greater importance is the enunciation of a principle which may have seemed obvious, but apparently was not so, which Wangensteen presented regarding the importance of the control of distention. Suction drainage by use of gastric or duodenal tubes is but one method for accomplishing relief of distention of the small bowel. Unfortunately the method rather than the principle has been considered as fundamentally important, and we find many who condemn or praise the method without consideration of the basic principles involved. In association with a recent reiteration of these principles, Wangensteen\textsuperscript{12} has reported mortality statistics of cases treated by suction drainage which attest to the efficacy of the method; but it is to be noted that the cases so treated were a group, the most of which were suitable for this type of treatment, and other cases were submitted to various operative procedures.

In 1938 Abbott and Johnston\textsuperscript{13} reported the use of intestinal intubation in the treatment of simple intestinal obstruction by the use of a tube developed by Miller and Abbott. The rationale of its use was based on the proposition that the distended intestine could be decompressed better with suction applied directly above the point of obstruction than was possible at higher levels. This in effect is tantamount to an enterostomy without the necessity of an operative procedure. In addition to drainage from a vantage point it permits the feeding of the patient. Further studies with this method have indicated its usefulness, not only with regard to the treatment of intestinal obstruction, but also for localization of the obstructing lesion, and for the preparation of the patient for operation. Sufficient experience has been gained with the use of intestinal intubation in the treatment of simple intestinal
obstruction and adynamic ileus to illustrate its efficacy. In several clinics where it has been used extensively but judiciously, there has resulted a marked lowering of the mortality rate from intestinal obstruction. For the past two and a half years the mortality from small intestinal obstruction at the Detroit Receiving Hospital, including all cases of intestinal obstruction whether the obstruction contributed to the death or not, except those due to strangulated hernia, is approximately 23.9 percent. The mortality from simple acute obstruction treated by intubation was 9 percent.

For proper use of suction drainage it is necessary to recognize its place in the broad problem of the therapy of intestinal obstruction, based on an understanding of the pathology and physiology involved. The problem of treatment of this condition must be based on principles involved without regard to strict adherence to any method. The well-known saying that "the sun should never set on an unoperated case of intestinal obstruction" is as erroneous and as productive of poor results as such general dicta are likely to be if followed strictly. Wangensteen has pointed out that there is a mortality of treatment as well as of disease, a fact which is too often ignored. Treatment carried out on the basis of dicta or fixed routine, without regard to pathology and physiological principles involved, and without the consideration of obstruction of the bowel as a diversified problem, must lead to many unnecessary fatalities.

Regardless of the possibilities for the reduction in mortality from intestinal obstruction by careful consideration and use of suitable methods of treatment, it is not likely that the mortality from this condition will be lowered to a respectable figure until the importance of early diagnosis is universally recognized. Within a few hours after the onset of obstruction, when distention is likely to be slight, operation is attended by low mortality. When distention is marked, dehydration present, and changes in blood chloride and urea are marked, the difficulty of treatment is greatly increased. It is well to point out that in addition to the recognition of the early symptoms of intestinal obstruction the Roentgen ray offers early diagnostic aid. The use of contrast media is not necessary but actually contraindicated early in the disease. In fact X-ray without
contrast media offers the only laboratory finding of any advantage early, and should be utilized in all suspected cases. While the upright film may reveal fluid levels and indicate the presence of obstruction, the supine film will in many instances indicate the level of the obstruction. When the diagnosis of obstruction is established early, before marked distention and dehydration are present, operation ought not to be delayed.

Early diagnosis and treatment, so important in simple obstruction, become imperative in those cases where there is interference with the mesenteric blood supply, not only because of the possibility of releasing the occlusion of the vessel early, thereby preventing necrosis of bowel, but for the prevention of the development of the severe toxemia which is so rapidly fatal. The differentiation between simple and strangulated obstruction is not easy in the early stages. The diagnosis of strangulation is based on the severity of the onset, the rapidity of progression of symptoms, evidence of a localized gas-filled loop, and symptoms out of proportion to the amount of distention present. Increasing pulse rate, falling blood pressure, and presence of localized tenderness are likely to be found late and should always suggest strangulation. Gatch has suggested that it is possible to treat such patients without operation until the strangulated loop becomes well walled off, as is practiced in cases of appendiceal abscess, but we have not felt that it is wise to defer operation in cases of suspected strangulation, except for preparation by blood transfusion, intravenous saline, and the insertion of a gastric tube.

Consideration of the importance of distention as the initiating factor in the sequence of events following simple obstruction of the bowel does not imply any particular form of therapy. Relief of distention can be brought about by operation or by removal of the distending content from within the bowel by means of intubation. Which of these methods is to be used depends upon the problems presented by the patient and not by custom. There have undoubtedly been instances where an attempt has been made to apply suction drainage for treatment of intestinal obstruction without regard to the problem presented by the patient and it is to be expected that such attempts will be disheartening. The concept that suction drainage is a specific regimen for intestinal obstruction is but
little less dangerous than the concept that early operation is indicated in all forms of intestinal obstruction. It ought to be emphasized that it is only by early diagnosis, a consideration of the underlying principles involved, the conscientious appraisal of the patient, and the utilization of the best available forms of treatment that the unnecessarily high mortality from intestinal obstruction will be effectively lowered.

BIBLIOGRAPHY

Recent Contributions in Chemotherapy

PAUL O. HAGEMAN, '34*

During the past year the steady flow of papers on sulfonamide therapy has continued. Such a rapid accumulation of data necessitates an occasional critical analysis of the recent contributions. Many papers add statistically to those previously published without essentially changing the picture, while others present results that should serve to modify older concepts. It is the purpose of this article to present significant and recent additions to our knowledge of sulfanilamide and sulfapyridine and then to summarize the information available regarding the new sulfonamide derivative, sulfathiazol. Although at the present time sulfathiazol is neither commercially available nor accepted by the Council of Pharmacy and Chemistry of the American Medical Association, it has considerable promise of being an important member in our ever increasing therapeutic armamentarium. Likewise, the published data on this drug is relatively meager especially in its clinical application. But, no doubt, by the time of publication, additional clinical reports will have appeared and the use of this chemical will have become considerably more widespread.

Mode of Action

Inquiry into the mechanism of the bacteriostatic effects of sulfonamides has continued and several recent thoughts and theories seem worthy of mention.

Many discussions have dealt with the oxidation products of sulfanilamide, the thought being that an oxidation product is the effective bacteriostatic agent rather than sulfanilamide itself. Fox pointed out that reduced oxygen tension, i.e. relative anaerobiosis, interferes, whereas increased oxygen tension enhances the effects of sulfanilamide. Similarly large inocula of organisms (which reduce the oxygen potential) and reducing agents inhibit the bacteriostatic properties. Fox also states that an oxidized sulfanilamide, i.e. the 4-hydroxylamino-benzene-sulfonamide, exerts immediate bacteriostatic effects in vitro, thus eliminating the usual "lag phase" seen with sulfanilamide. Clinically the occurrence of methemoglobinemia

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and the presence of oxidized sulfanilamide in the urine are additional reasons which led Fox to conclude that oxidation of the drug does occur and constitutes the most logical explanation of its action. Harris & Michel\textsuperscript{2} concur with Fox and also point out that the degree of methemoglobinemia is in proportion to the sulfanilamide concentration. Bratton, White & Marshall\textsuperscript{3} have studied p-hydroxylamino-benzene-sulfonamide and find that the drug is rapidly converted to sulfanilamide when injected intravenously in dogs. When tested in vitro the hydroxy compound was found to be ten times as effective as sulfanilamide itself. Two other observations are of interest: Fox & Cline\textsuperscript{4} converted hemoglobin to methemoglobin in vitro by using oxidation products of sulfanilamide and Harris\textsuperscript{5} converted hemoglobin to methemoglobin by adding slices of surviving tissues to sulfanilamide and whole blood.

Following a line of reasoning set down by Fildes\textsuperscript{6} that antibacterial substances may act by interfering with essential metabolic processes of the cell, several English workers made similar contributions almost simultaneously. Stamp\textsuperscript{7} extracted a sulfanilamide inhibiting substance from the hemolytic streptococcus itself and Green\textsuperscript{8} likewise found a similar substance in Brucella abortus. Employing a modification of Stamp’s technique, Woods\textsuperscript{9} extracted an inhibitor from fresh baker’s yeast. Chemically the material resembled p-amino benzoic-acid and as was predicted this chemical likewise inhibited the action of sulfanilamide. Structurally this drug is very closely related to sulfanilamide. The amount of the p-amino-benzoic-acid necessary to inhibit sulfanilamide varies as the concentration of the latter.

This work led Selbie\textsuperscript{10} to test the effect of these inhibitors “in vivo.” Experimental hemolytic streptococcus infections in mice were unaffected by sulfanilamide in the presence of para-amino-benzoic-acid.

In the light of these contributions, our understanding of the mode of action of sulfonamides has progressed. It appears that p-amino-benzoic-acid is essential for the growth of certain micro-organisms. Utilization of this essential metabolite, which is normally synthesized by the bacterial cell, is inhibited by sulfanilamide. The “lag phase” is that period during which
growth and metabolism of the cell proceed normally because of previously utilized or formed p-amino-benzoic-acid. Strains resistant to sulfanilamide may be unusually good synthesizers of this essential element. These British investigators are to be commended for their noteworthy additions to this fast moving subject. Confirmation of their results has already been reported in this country.

For those who have noted variation in the response of patients with pneumonia treated with sulfapyridine, ample explanation is found in the works of Long & Bliss and Schmidt & Hilles. These investigators noted that strains of pneumococci differ appreciably in their susceptibility to sulfapyridine. It also became apparent that “in vitro” and “in vivo” susceptibility were not necessarily parallel. In general, strains of a single type of pneumococcus showed less variation than that demonstrable with different types. In the light of such information, it becomes obvious that the effect of available sulfonamides can hardly be predicted in any single instance. It would be extremely valuable and useful to have a simple rapid test developed which could be applied to individual cases enabling one to determine the efficiency of the drug being employed.

The exact relation between chemotherapeutic and immunological responses has been further explored. It is rather well established that sulfonamides neither neutralize toxins nor stimulate leucocytosis. Wood & Long observed that antibodies often appeared three or four days after defervescence in sulfapyridine treated pneumonia. They emphasize that cessation of chemotherapy before antibodies develop probably accounts for the frequent relapses seen. In addition they point out that the chemical is a bacteriostatic agent, and that actual sterilization of the involved lung requires phagocytosis which is dependent on the development of immunity. “In vitro” studies of Spring, Lowell & Finland demonstrate the differences in the chemical and immunological effects. Pneumococcus serum exerts its effect immediately, while sulfapyridine has a definite “lag phase” and the combination of the two is more effective than either alone. The same investigators found comparable data in their clinical studies and noted that the antibody response was unaltered by sulfapyridine. Kneeland
& Mulliken also observed the delayed appearance of antibodies after sulfapyridine "recoveries." These results lead one to conclude that serum with sulfapyridine is the ideal and complete mode of treatment.

The effect of temperature on the effectiveness of sulfanilamide was studied by White, who found that lower concentrations were required at higher temperatures to produce the same results. As a matter of fact, one hundred times more sulfanilamide is necessary to produce the same results at 98.6°F as compared to 102.2°F. Employing a similar technique, Neter found that strains of Streptococcus fecalis (Enterococcus hemolytic and non-hemolytic, Lancefield group D) responded to sulfanilamide at 43°C. Heretofore, this group of organisms had resisted the bacteriostatic efforts of sulfonamides. Statistics of this sort suggest a rational basis for combined fever and chemotherapy.

Toxicity

The entire subject of comparative toxicities of sulfanilamide and sulfapyridine has recently been reviewed in a well controlled series of adequate size reported by Brown, Thornton & Wilson. These authors feel in general that sulfapyridine is the more toxic and that severity of complications is in direct proportion to the blood concentration.

Nausea and vomiting occur very frequently with sulfapyridine and often interfere with the maintenance of an adequate blood concentration of the drug. The administration of sulfapyridine with alkalies or in various media (soup, tea, applesauce) or even parenterally does not eliminate these troublesome and unpleasant symptoms. Blake and his associates have observed vomiting in gastrectomized dogs receiving sulfapyridine. In addition, sulfapyridine was applied directly to the vomiting center without eliciting this reflex. The symptom appears then to be reflex and not central in origin with the afferent arc arising outside the stomach itself. Hope for the abolition of this unpleasant side-effect will rest in the discovery of the afferent arc of the reflex.

Recently an increasing amount of attention has been directed to kidney complications of sulfonamide therapy. The chief difficulty has arisen in the use of sulfapyridine, where
the acetylated form of the drug crystallizes out of the urine thus causing obstruction to urinary flow. Masses of crystals act as a kidney stone and the usual symptoms of pain and hematuria result. Deposits of these crystals are apt to form with high blood sulfapyridine concentrations and especially with a small urinary output. It is generally advised that the urinary output should be in excess of 1,000 c.c. per day during sulfapyridine therapy. Immediate withdrawal of the drug and forcing of fluids is indicated when either pain or hematuria are noted. Plummer & McLellan\textsuperscript{21} reported two fatal cases, one of which had pyelographic evidence of the crystalline depots. An excellent demonstration of the lesion and complete discussion of the problem has been presented by Stryker.\textsuperscript{22} Irrigation of the kidney pelves and ureters gave satisfactory results in cases reported by Carroll, Shea & Pike\textsuperscript{23} and Scurry & Wittenborg,\textsuperscript{24} but this procedure is not necessary in the less severe cases. An interesting study of Smadel & Swift\textsuperscript{25} indicated that sulfanilamide had no deleterious effect on nephrotoxic nephritis in rats. In the absence of nitrogen retention, the drug was excreted normally.

Another serious toxic effect of sulfonamides concerns hemoglobin metabolism. Two types of anemia have been observed following sulfonamide therapy: one severe and sudden, the other mild and more gradual in onset. Deposits of hemosiderin\textsuperscript{26} were seen in the spleens of mice given sulfanilamide suggesting a hemolytic basis for the anemia. Later clinical observations on the severe sudden anemias revealed a definite hemolytic reaction as evidenced by jaundice, and even hemoglobinuria. Watson & Spink\textsuperscript{27} found evidences of increased hemoglobin metabolism with ordinary doses of sulfanilamide and sulfapyridine. Their conclusion was based on an increase in urobilinogen in the feces and a rise in the number of circulating reticulocytes. The occasional severe hemolytic anemia represents an extreme degree of this reaction.

Similar observations were made by Erf & MacLeod\textsuperscript{28} who noted that eight of twenty-six patients had increased urobilinogen excretion and of these, three developed hemolytic anemia. Ravid & Chesner\textsuperscript{29} reported an extremely severe case of hemolytic anemia associated with nephrotic uremia due to hemoglobin crystals in the kidney tubules.
Liver function is also disturbed by sulfanilamide and by sulfapyridine to a lesser degree. Watson & Spink\textsuperscript{27} observed urobilinogenuria and occasionally jaundice with a positive direct Vanden Bergh reaction. Undoubtedly subclinical hepatic disturbances have occurred far more frequently than has heretofore been appreciated.

**Clinical Applications**

Technical difficulties in the parenteral administration of sulfapyridine have been solved by two groups of workers in two distinctly different fashions. Haviland & Blake\textsuperscript{30} studied the solubility of sulfapyridine at different temperatures for varying lengths of time in normal saline, 5 percent glucose and the combined solution of 5 percent glucose in normal saline. Sufficient sulfapyridine could be dissolved so that patients could be treated solely by parenteral routes without giving unreasonable amounts of fluid. For instance, 2 Gm. could be dissolved in 1,500 c.c. of saline or in 1,000 c.c. of 5 percent glucose or 1,000 c.c. of 5 percent glucose in saline. A liter of the solution to be used (e.g. 5 percent glucose in normal saline) is brought to a boil, taken off the flame, then 2 Gm. of powdered sulfapyridine is added and the flask is then shaken for two minutes. The solution is allowed to cool to 25° C. and is kept at this temperature until the drug is completely dissolved. Using these solutions, 6 Gm. could be given with a total parenteral fluid volume of 3,000 c.c. Satisfactory blood levels were maintained with this method and there were no signs of local irritation from the fluids.

The solution to the problem presented by Taplin, Jacox & Howland\textsuperscript{31} dealt with subcutaneous administration of sodium sulfapyridine. All previous reports advised using this salt in 5 percent solution in distilled water for intravenous injection and warned very particularly that the solution was very irritating to the subcutaneous tissues because of its high alkalinity. By using dilute solutions of the sodium salt (0.3 - 0.7 percent in normal saline), these workers were able to administer 3 - 7 Gm. of the drug in a 1,000 c.c. hypodermoclysis. No local irritation resulted from the use of this solution in fifty patients. It was also noted that blood concentrations were more steadily maintained than with intravenous sodium sul-
fapyridine therapy. The technique of preparation is relatively simple. Normal saline is brought to a boil and removed from the flame, sodium sulfapyridine is then added and the solution is ready for use as soon as it cools to body temperature.

During the past year a new sulfapyridine preparation, combining glucose with a high concentration of the drug, has been studied and very interesting data revealed. Taylor and Associates32, 33, 34 found that high blood concentrations are observed following parenteral injection. The drug is excreted rapidly without any reabsorption in the kidney tubules. The glucose-sulfapyridine does not diffuse as well as the parent substance and is found only in extra-cellular fluids and not in the red blood cells. The drug is not bacteriostatic “in vitro” and neither is blood following its subcutaneous or intravenous administration. On the other hand, if glucose-sulfapyridine is taken by mouth it apparently is split to plain sulfapyridine or its sodium salt and acts accordingly. Hence, after oral administration, blood takes on bacteriostatic properties. The importance of these observations for the intelligent use of this product is obvious.

Although the clinical indications and limitations of sulfanilamide are fairly well established there are two recent papers which warrant special attention. The chemotherapy of meningitis has been thoroughly reviewed by Sappington & Favorite,35 who added twenty-two of their own cases to two hundred and five collected from the literature. Several types of meningitis have been sufficiently studied to warrant statistical analysis, namely, those due to the hemolytic streptococcus and the meningococcus. In the former infection sulfanilamide has lowered mortality from 95 percent to 20 percent and in the latter the serum treated mortality of 16 percent has been lowered to 13 percent. Because sulfanilamide diffuses into spinal fluid satisfactorily, these workers advocate a minimal amount of spinal punctures and intraspinal therapy. Withdrawal of fluid should be done only for relief of pressure symptoms or for observation on the course of the disease.

Since neoprontosil seems helpful in the treatment of chronic ulcerative colitis, the work of Brown, Herrell & Bargen36 is worthy of note. Twenty-nine patients were given 4.0 - 5.5 Gm.
per day for two to nineteen months and blood concentrations (as sulfanilamide) averaged 2.4 mg. percent. Forty-four and eight-tenths percent of the patients had "excellent" results from the treatment and a similar percentage did fairly well. Another series of nineteen patients receiving serum or vaccine in addition to neoprontosil did as well but no better than those receiving neoprontosil alone. In view of the therapeutic problem presented by this condition, the use of neoprontosil would seem justified especially since its toxicity is negligible.

Significant therapeutic data accumulated during the past year regarding sulfapyridine deals with additional series and experience in the treatment of pneumonia (See Table I). Without any question a mortality of 8.2 percent in pneumococcus pneumonia is a therapeutic triumph and one which could only be approached with serum therapy.

**Table I**

Pneumococcus Pneumonia Treated with Sulfapyridine

<table>
<thead>
<tr>
<th>CASES</th>
<th>MORTALITY PERCENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pepper Flippin, Schwartz &amp; Lockwood[37]...400</td>
<td>7</td>
</tr>
<tr>
<td>Smith &amp; Needles[38]..................................50</td>
<td>8</td>
</tr>
<tr>
<td>Don &amp; Luxton[39]..................................234</td>
<td>6.7</td>
</tr>
<tr>
<td>Whittemore, Royster &amp; Riedel[40]............92</td>
<td>7.6</td>
</tr>
<tr>
<td>Schwartz, Flippin &amp; Turnbull[41]............233</td>
<td>9</td>
</tr>
<tr>
<td>Bullowa, Osgood, Bukantz &amp; Brownlee[42]....324</td>
<td>8.1</td>
</tr>
<tr>
<td>Abernethy, Dowling &amp; Hartman[43]............135</td>
<td>11.1</td>
</tr>
</tbody>
</table>

Total 1468 Average 8.2

Results obtained with serum treated cases either alone or in combination with sulfapyridine have been presented by several authors. Schwartz and his associates[41] report a mortality of 10 percent in a series of fifty patients treated with serum alone. In Type I pneumococcus pneumonia the mortality of controls was 37 percent, serum treated cases 11.1 percent, and sulfapyridine cases 3.3 percent. In sulfapyridine treated Type I pneumonia Abernethy[43] had no deaths (twenty-three cases) and Pepper[37] reported a mortality of 5.8 percent. Bullowa et al.[42] found a mortality of 17.3 percent among serum treated cases and 11.2 percent in cases treated with serum and sulfapyridine. Both of these figures are in excess of that found with sulfapyridine alone. Among the thirty-seven cases...
of Type I and II pneumonia treated with serum and sulfapyridine, Don and associates had three deaths or a mortality of 8.1 percent. Dowling and Abernethy had a mortality of 16.7 percent in ninety-six serum treated cases as compared to 11 percent in their sulfapyridine series of one hundred and thirty-six cases. In their series bacteremia carried the same mortality with serum or sulfapyridine. They felt that the drug was superior to serum in patients over forty years of age and also in the presence of multilobar involvement.

Table II

Procedures in the Optimum Care of Pneumococcus Pneumonia

In the following order:
1. Obtain sputum typing and blood culture.
2. Do complete blood count and urinalysis.
3. Start sulfapyridine.
4. Give serum to cases with poor prognosis as soon as the type is determined.
5. Give serum to all cases when there is no definite improvement after 24 to 36 hours of sulfapyridine therapy.
6. Repeat blood and urine examinations daily.
7. Determine level of free sulfapyridine in the blood every 2 days.

The recommended method of handling a case of pneumococcus pneumonia has been outlined by Finland (See Table II). Accurate bacteriological data is essential for accurate prognosis and consideration of serum therapy. Blood counts and urinalyses at frequent intervals enable one to detect toxic reactions in their incipiency. Since serum and sulfapyridine work in entirely different manners, the combined method of treatment should be employed when there is either a poor prognosis (elderly patients or multilobar involvement) or a lack of response to chemotherapy.

Sulfathiazol

Of the large number of new sulfonamide compounds, sulfathiazol (2(para-amino-benzene-sulfonamide)thiazole) seems to show the most promise. An increasing amount of attention has been focused on its efficiency in the treatment of pneumococcic infections and more particularly on its relative lack of toxic effects. At present the recorded data are meager but many reports are being prepared for publication. An analysis
of the available literature should serve as a basis for a more critical review of future material.

A number of papers deal with the comparative value of sulfathiazol and sulfapyridine in the control of various types of experimental infections. McKee et al.\(^4\) and Barlow & Homburger\(^4\) agreed that the thiazol derivative was superior to sulfapyridine and sulfanilamide in the control of pneumococcus and hemolytic streptococcus infections in mice. "In vitro" results of Lawrence\(^8\) paralleled the above data. An original publication by Long\(^9\) indicated that sulfapyridine was more effective than sulfathiazol in the control of mouse infections. Opposite conclusions were obtained later in Long's laboratory,\(^10\) probably because the method of administration of the drug had been changed. In the former study, the drug was given orally in acacia suspensions and blood concentrations were probably not as evenly maintained as in the second group of experiments where the diet contained 1 percent of the drug.

Thus far as each sulfonamide has appeared, a beneficial effect on staphylococcal infection has been hopefully expected, but as yet successfully chemotherapy of this infection has not been found. Results\(^30, 51, 52, 53\) indicating that sulfathiazol is the most promising drug thus far tested have appeared from several sources.

The one clinical report of sufficient magnitude to be significant has been published by Flippin, Schwartz & Rose.\(^54\) The results obtained in the treatment of one hundred cases of pneumococcic pneumonia treated with sulfathiazol are compared to a similar series treated with sulfapyridine. The corrected mortality in the former group was 7.4 percent as compared to 11.4 percent in the latter. While 37.5 percent of bacteremia cases treated with sulfapyridine proved fatal only 10 percent of those treated with sulfathiazol succumbed. These workers advocated an initial dose of 3 Gm. to be followed in four hours by another 3 Gm. and then 1 Gm. at four hour intervals thereafter. Blood concentrations averaged 5 mg. percent. Additional but statistically less significant clinical results are to be found elsewhere.\(^55, 56, 57\)

One of the chief advantages of sulfathiazol over sulfapyridine is the lower incidence of unpleasant side effects. Van Dyke\(^58\) found sulfathiazol to be 65 percent as toxic as sul-
fapyridine in experimental animals. The drug is absorbed and excreted faster and is less acetylated in the body, hence Van Dyke predicted that there would be little or no tendency to form kidney stones. The above data was confirmed by Reinhold, Flippin & Schwartz, who also studied the metabolism of sulfathiazol in normal man. At times acetylation equalled that seen with sulfapyridine, and 90-97 percent of the drug could be recovered in the urine. Accurate studies of kidney function indicated a temporary impairment and occasional hematuria and albuminuria was observed. Pepper & Horack studied a fatal case with concretions of acetylated sulfthiazol in the substance of the kidney itself. The inaccessibility of these deposits make them more harmful than the usual pelvic or ureteral concretions of acetylated sulfapyridine. Judging by statistics on 183 patients nausea and vomiting occur only one-third as frequently with sulfathiazol and these symptoms seldom interfere with its administration. Hematuria occurs perhaps one-half as frequently as with sulfapyridine.

Summary

Recent additions to our knowledge of the mode of action, toxicity and clinical applications of the sulfonamide compounds has been presented.

The present status of sulfathiazol has been discussed.

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THE WASHINGTON UNIVERSITY

Base Hospital No. 21 — 1916 - 1919

BORDEN S. VEEDER

In the period between April 1914 when the World War started, and April 1917 when the United States entered on the side of the Allies, many people thought we would be drawn into the war and recognized our unpreparedness. Among these were a group of physicians, one of whom was Dr. Fred T. Murphy, Professor of Surgery at Washington University at that time. Some, like Dr. Nathaniel Allison, had served temporarily during this period on the Staff of the American Hospital in Paris, or with the hospital staffs organized in Boston and Chicago for service with the British Army in France.

An effort was made by this group to have the Army Medical Corps organize hospitals based on existing civil institutions, but President Wilson would not permit army expansion under the theory that military expansion might lead the United States into war. To get around this block the plan was evolved, with full cooperation of the Surgeon General's Office, of the American Red Cross organizing 50 Hospitals for emergency purposes. Washington University Medical School was one of the institutions designated, and assigned to organize Red Cross Base Hospital #21.

Dr. Murphy asked Dr. Nathaniel Allison, head of orthopedic surgery, and the writer to join with him in organizing the hospital. Under the original Red Cross plan Dr. Murphy became Director, Dr. Allison, Assistant Director, and Dr. Veeder, Quartermaster. With this nucleus members of the faculty were added to occupy positions similar to their duties in the medical school hospitals. Dr. Clopton became Chief of the surgical service and Dr. Walter Fischel, Chief of the medical, Dr. Lawrence Post, ophthalmologist, Dr. Schwab, neurologist, Dr. Proetz, otolaryngologist, Dr. Opie, pathologist, Dr. Ernst, roentgenologist, and so on. Miss Julia Stimson, head of the Training School, was appointed Chief Nurse and organized a staff of Red Cross nurses from the St. Louis hospitals. The Unit at this time was purely a Red Cross civilian affair and had no army connection. The Members of the medical and nursing staff were not in the Army Reserve Corps, had no
army rank, and were not subject to call for military service. The sound idea back of it was that a group of physicians accustomed to working together in civil life would in an emergency be able to set up and staff a hospital which could function with maximum efficiency. A sum of $60,000 was raised through the local Red Cross Chapter and during the winter of 1916-1917 equipment for a 500 bed hospital was purchased and put in storage—beds, linen, drugs, sterilizers, X-ray and dental equipment, etc.

Suddenly the picture changed. The week following our entrance into the war on April 7, 1917, a British Military mission was sent to Washington. Their first request, the day they landed, was for personnel to staff six military hospitals in France, and 1000 unattached army doctors for service with the British Army in the field. Our own Army Medical Corps consisted of only a few hundred regulars scattered through many army posts, and there was no such Reserve Corps as has existed in the last twenty years. It was quite impossible for the regular Army to meet this request. Six telegrams were therefore sent to the Directors of Red Cross Base Hospitals on April 21st asking if they were ready for and would accept immediate foreign service. After a hurried consultation our reply, as the others, went back—"yes." Every doctor on the staff volunteered despite the lack of information as to where, or for how long we were to go. On April 27 orders were received to mobilize. Then the troubles began. Shortly word came that it was necessary for the Unit to go as an Army organization with the medical officers and nurses commissioned in the army, and the civilian personnel enlisted as soldiers. In less than three weeks everything was ready and twenty-odd members of the faculty were self-consciously walking about in poorly fitting uniforms, with Lieutenant's and Captain's bars on their shoulders, arms sore from typhoid inoculation, and with a sudden realization they were in "for duration."

On May 17 the Unit left for New York and sailed "destination unknown," on May 19 on the S.S. St. Paul. The Unit sailed with Base Hospital 10 from the Pennsylvania Hospital in Philadelphia and was preceded a day or so by the Lakeside Unit from Cleveland. These with the Harvard, Chicago and New York hospital Units which followed in a day or so
formed the first contingent of the A. E. F. which ultimately amounted to over 2,000,000 men. The Unit landed in Liverpool on May 28, and on June 9 crossed from Southampton to Le Havre. On the 12th of June, less than a month after leaving St. Louis, Unit #21 took over British General Hospital #12 at Rouen and started to work.

The hospital, which from this time on was known as “#12 (St. Louis, U. S. A.) General Hospital B. E. F.,” had been established by the British on the Champ de Courses at Rouen in 1914, and was one of the fourteen B. E. F. hospitals in the Rouen area. It was a tent hospital with a normal capacity of 1350 beds and an emergency expansion to 1500. It soon became obvious that the American staff, organized for 500 beds, was insufficient and hence a reinforcement group was sent by the medical school which reached Rouen in the fall. Naturally the sudden departure of so many from the teaching staff created many problems in the medical school, and those who remained behind willingly accepted heavy loads and additional duties in order that the school unit be maintained in the field.

As time passed it was found that the Unit was top heavy in medical ability for the work it was called upon to do in the hospital at Rouen. A number of surgical teams were formed who served at casualty clearing stations near the front, and some were called to important duties with the rapidly developing A. E. F. Dr. Murphy became head of the medical and surgical service of the Red Cross in France and was succeeded in command by Dr. Veeder. Dr. Allison was transferred to take charge of the front line orthopedic work. Dr. Opie was made head of a commission for the study of trench fever. Dr. Schwab became director of the special hospital organized for the treatment of war neuroses. Dr. Chesney was made epidemiologist to the Third Army. In April 1918 Miss Stimson was made Chief Nurse of the A. E. F. In July 1918 Mobile Hospital #4 was organized from Base Hospital #21 personnel with Dr. Clopton in command, and served with the A. E. F. in the late summer and fall of that year. Among the enlisted personnel who left St. Louis in 1917 was a group of about 10 senior medical students. After completing an obstetrical service at one of the civilian hospitals in Rouen they were graduated by the Medical School and received their com-
missions as medical officers. These served as replacements for the men taken away and thus throughout its entire service the staff was based on Washington University Medical School.

The Unit remained in Rouen until Feb. 11, 1919, when it started slowly making its way home. On April 7 it sailed from Brest and reached New York Easter Sunday, April 20. After a week at Camp Merrit it left for Camp Funsten with a day in St. Louis enroute and was demobilized May 3, 1919—twenty-three and one-half months after mobilization, of which twenty-three were spent in foreign service.

Many stories have been told of Unit #21. The history was published in a pamphlet by the Red Cross and may be found in the Medical School library. More interesting are the stories which appear in "The Rouen Post," a monthly magazine started in 1936 by Rouen Post #242 of the American Legion, a post with a membership made up of those who served with Unit #21 in France.

From its first conception, throughout the months of preparation, and during the final period when it spent nearly two years on active service, the spirit that dominated Unit #21 was one of service. There were many dreary discouraging times, the natural result of the precipitate tearing out of a group from their normal grooves in life and depositing them in a situation that called for rapid readjustment in work and ways of living. Unit #21 survived it better than most. It is not generally known that Unit #21 was selected to represent the hospitals in a planned "Victory Parade" in Washington in 1919, in which one unit of every type of army organization in the A. E. F. was to take part, a plan given up as a result of the difficulty of bringing back these selected units at the same time.

The time has come when a new Unit #21 is being formed at the medical school—a generation twenty years younger is taking over the name and traditions of old Unit #21. Should conditions develop which will call them to active service, those of the "Old Guard" know they will carry on with the same ideals of service which will make them truly representative of the Washington University School of Medicine, and pledge them their help and aid in every possible way. They might even teach them to drink to the health of "Cardinal Puff."
Washington University Sponsors
Army Reserve Hospital

LEE D. CADY

During the First World War, Washington University Medical School sponsored Base Hospital No. 21, first as a Red Cross organization, and then as a U. S. Army unit. It served with credit to the University and to the Army while it was stationed at Rouen, France. After the War, the War Department changed the designation of such hospital organizations. Through the efforts of Dean Nathaniel Allison, U. S. Army Reserve, General Hospital No. 21 was allotted to Washington University under the command of (then) Lieutenant-Colonel M. B. Clopton with (then) 1st Lieutenant Lee D. Cady as Executive Officer.

For the most part during the '20's and '30's, the Reserve Officer personnel of General Hospital No. 21 was Washington University Faculty or alumni officers. However, in time the sponsorship idea became rather tenuous in Corps Area Headquarters and many others became members of the hospital unit.

In May and June of this year, the Office of the Surgeon General of the Army announced the War Department's revival of hospital unit sponsorship by University Medical Schools. This plan recognizes that many professional positions in military hospitals can be filled by well-trained doctors of medicine or doctors of dentistry with very little special military training. For example, the Chief of Laboratory, Roentgenology, Surgery, or Medical services and their assistants may be able to perform their professional and technical duties without knowing the School of the Soldier, Field Service Regulations, or how to make out a pay voucher. Furthermore, if the medical officers are accustomed to working with each other, the relatively disorganized period of mobilization and early unit training can be materially shortened. True, certain key officers, the Headquarters group, such as the Commanding Officer, the Executive Officer, Chaplain, Adjutant, personnel
Adjutant, Commander of the Medical Detachment, the Registrar, the Quartermaster, the Medical Supply officer, the Mess Officer, and the peace time Director all need special training for their positions to function properly. All except the first two named and the Director need not be medically trained officers at all.

While the above considerations are true about medical personnel in the Medical Reserve Hospitals, these same officers with their specialist's professional training cannot be expected to fulfill the expectations demanded of Medical detachment officers with combat troops or officers in Medical Regiments. Such officers require additional military administrative and tactical training. Thus, the sponsored medical units of the Medical Department of the Army is a device for using medically trained officer personnel with the minimum loss of time and expense to the Government in a national emergency. These medical officers may enjoy the grade, pay, authority, and functions of military appointments, commensurate with their civilian professional attainments, so long as they are selected by the Faculty and approved by the Office of the Surgeon General. They may not transfer from one unit to another except by virtue of certain peculiarities of regulations which may not often be operative. For example, a civilian physician or a Captain, Medical Reserve Corps, may be appointed as Major in a sponsored unit, and perform the duties of Major in that unit. Whenever he may no longer be recommended by the Faculty, or resigns from the Faculty or from the Sponsored Unit, he reverts to his former civilian or Reserve officer status, as the case may be.

At the time this new ruling went into effect, and General Hospital No. 21 was again sponsored by the Washington University Medical School, several faculty members were officers of the unit. The medical school requested the vacation of all other assignments, and the appointment and assignment of other Faculty Reserve officers to fill positions in the organization. No campaign of recruitment was necessary to accomplish this purpose, for all places were filled, except one, without inviting applications. It is expected that the Adjutant General of the Army will grant the appointments necessary, except for those who may fail by reason of unforeseen physical
disqualifications. The following Faculty members are already members, or have requested the assignments set opposite their names below. The names listed within the subgroups are not necessarily in the order of rank.

General Hospital No. 21

Preliminary Functions and Assignments to Professional Services

Acting Director: Lt. Col. Lee D. Cady.


Roentgenology: Capt. Thomas Russell.


A General Hospital has a normal complement of 42 officers, 120 nurses, and 400 enlisted men. The normal bed capacity is 1,000, but capable of expanding to 2,000.

As might be suspected for this large an organization, General Hospitals are expected for the greater part of their services to be more or less immobile, permanent establishments.

L. D. C.
DEPARTMENTAL CONFERENCES

Pathology

CARCINOMA OF THE EXTRAHEPATIC DUCTS

History No. 33574. A 60 year old white widow was admitted to the Barnes Hospital for the second time on July 4, 1940. Her chief complaints were pain in the right upper quadrant of the abdomen for two months, progressive jaundice, loss of appetite and weakness for one month and a dull constant pain in the epigastrium for one week. On the previous admission to the hospital in March, 1932, she had an operation for prolapse of the uterus and uterine myomata. She had had diabetes for 13 years, but this was easily controlled by diet and small amounts of insulin. Her mother died at the age of 63 of diabetes and two brothers and one sister had died of diabetes at the ages of 61, 54 and 65.

Physical examination revealed deep jaundice with scratch marks over the entire body. Over the right apex, the percussion note was slightly dull and the breath sounds were slightly more quiet than elsewhere. There was no rigidity of the abdominal muscles and no pain was elicited on palpation. The liver extended 4 centimeters below the costal margin. At the edge of the liver there was a hard smooth round mass which moved with respiration. The urine contained bile and sugar, but was otherwise normal. There was no occult blood in the stool which was clay-colored. The icteric index was 85. The fasting blood sugar was 131. The prothrombin time was increased. For a period of two weeks the patient was given supportive therapy and parenteral vitamin K. The prothrombin time returned to normal. X-ray examinations of the chest and abdomen and gastro-intestinal tract were indeterminate except for a partial obstruction of the second part of the duodenum. The tentative diagnosis was carcinoma obstructing the common bile duct probably arising in the pancreas. An exploratory laparotomy was advised. During the course of operation, the patient’s conditions became poor and she died suddenly.
THE WASHINGTON UNIVERSITY

Postmortem No. 8770. At the junction of the cystic common and hepatic ducts there was a tumor mass 1.5 centimeters in diameter which completely occluded these ducts. The common duct below this point was not dilated. There were metastases to the peritoneum, to the ovaries and to the right kidney. The liver showed the typical appearance of obstructive biliary cirrhosis. The wall of the gall bladder was thickened and the lumen contained numerous small stones. The pancreas showed moderate interstitial fibrosis without anatomical changes in the cells of the islets.

Discussion. This case well illustrates the typical carcinoma of the extrahepatic bile duct exclusive of those at the ampulla. The neoplastic growth is usually located at the junction of the three ducts and may bring about advanced jaundice and early death even when the tumor is small in size. The association with cholelithiasis is not as striking as in the cases of carcinoma of the gall bladder. Metastases are usually not widespread, but the finding of the peritoneal metastases such as in this case is not unusual. The gross and histological finding of the interstitial fibrosis of the pancreas in diabetes is frequent. The family history of diabetes in this patient is of more than passing interest. A considerable number of diabetic individuals give such a history as this.

ACUTE HEMORRHAGIC NECROSIS OF THE PANCREAS

History No. 83296. A 50 year old white man was admitted to the Barnes Hospital July 10, 1940 complaining of cramping abdominal pain, jaundice, nausea and vomiting for the past three weeks.

Two years ago, the patient had, for twenty-four hours, severe pain in the right upper quadrant of the abdomen, but there was no vomiting and no jaundice. There was a similar attack in July, 1939, which was more severe and more prolonged. A cholecystogram at that time showed a non-functioning gall bladder, but no stones. During the past year he had five similar attacks.

The present attack started three weeks ago with pain in the right upper quadrant of the abdomen, jaundice and vomiting. This was associated with diarrhea and was followed by a dull ache in the left flank which had become more severe.
He was told six years ago that he had diabetes which had been controlled with diet. He had received no insulin.

The father died of diabetes and one brother has diabetes. One sister suffers from disease of the gall bladder and his wife has tertiary syphilis.

Physical examination revealed a 50 year old obese white man who was acutely ill. His temperature is 38.5°, pulse 100, respirations 28 and blood pressure 132/78. There was slight jaundice and diffuse tenderness over the abdomen greatest on the left where most examiners felt an indefinite mass.

The white blood cells numbered 26,000. The urine contained sugar and acetone. The blood sugar was 472 mg. percent. The admitting diagnoses were varied and included cholecystitis with rupture, carcinoma of the stomach, cholelithiasis, acute pancreatitis, malaria and carbuncle of the left kidney. After observation for six days it was felt that exploration of the left kidney was a justifiable procedure and a large quantity of foul smelling pus was drained from this region. The cavity extended well above and below the left kidney. B. coli was cultured from the pus. Although the patient improved for a few days, it was apparent that more adequate drainage was necessary. Accordingly, the wound was opened and the abscess cavity followed retroperitoneally into the pelvis. After the operation a generalized edema developed and a determination of blood proteins revealed 4.1 mgm percent. The edema subsided after two transfusions. On July 30, the patient suddenly complained of severe pain in the right half of the abdomen with spasm of the muscles. On the following day the peritoneal cavity was opened and about three liters of bile-stained fluid was removed. In view of the patient’s condition no attempts at further exploration were made. The temperature rose on the evening following operation and the patient expired during the night.

Postmortem No. 8781. In the ampulla of Vater, obstructing the common orifice of the bile duct and the pancreatic duct, there was a small biliary calculus. The pancreas was completely sequestrated and surrounded by a large cavity filled with dark red or black semi-fluid material. There were small foci of fat necrosis throughout the abdomen. There was thrombosis of the portal and splenic veins. There were 1000
cc. of bile-tinged fluid in the peritoneal cavity with a perforation of the fundus of the gall bladder. There were numerous faceted stones within the lumen of the gall bladder. The lungs showed a bronchopneumonia of the lower lobes. There was only slight arteriosclerosis of the aorta and larger blood vessels.

Discussion. This is a typical case of acute hemorrhagic necrosis of the pancreas, such as was originally described by Opie in his book on Diseases of the Pancreas. It has been postulated that obstruction of the common orifice of the bile duct and the pancreatic duct allows the bile to enter the pancreatic duct and set in progress the chain of events which lead to hemorrhagic necrosis. The long duration of illness allowed the necrotic process to spread and form the unusually large cavity.

As in the previous case there was a family history of diabetes. The extensive destruction of the pancreas does not allow a determination of the histological changes associated with the diabetes. It is perhaps significant that in both of these cases, one a diabetic for 13 years and the other a diabetic for 6 years showed only very slight arteriosclerosis of the large blood vessels.

MALIGNANT NEPHROSCLEROSIS

History No. 78959. A 68 year old white man was first admitted to the Barnes Hospital on November 30, 1939, and until the terminal admission on October 5, 1940, he had six additional admissions to the hospital. The initial complaint was shortness of breath for two months and loss of 11 pounds in weight during a six months' period. The family history was unrevealing except that one sister had diabetes. The present illness began four years ago when he felt weak and became easily fatigued. Medication by several local physicians had given him little relief.

Physical examination revealed an emaciated dyspneic white man with a pale dry skin. There were a few rales in the left base. The blood pressure was 190/90. The heart was enlarged to the left with a systolic murmur heard best over the apex. The rhythm was regular.

The red blood cells numbered 2,200,000 and the hemoglobin
was 56%. The Kahn test was negative. The non-protein nitrogen of the blood was 21 mgm. percent. The urine contained 2 plus albumin and a few white blood cells. The anemia did not respond to liver, but transfusions were of considerable benefit. The diagnoses at that time were anemia, hypertension, hypertensive heart disease and generalized arteriosclerosis.

On five subsequent admissions the patient was given transfusions and he entered for the last time on October 5, 1940. He complained of persistent vomiting, drowsiness and weakness. There were extensive purpuric spots over the skin and a tremor of the hands. There were a few moist rales in the lungs. The blood pressure was 210/90. The red blood cell count was 3,400,000 and the non-protein nitrogen of the blood was 208 mgm. percent. The carbon dioxide combining power of the blood was 30 volumes percent. He did not respond to therapy and expired three days later.

Postmortem No. 8791. The kidneys were small and firm and weighed 110 grams each. The capsules stripped with difficulty revealing a pale red granular surface in which there were numerous small petechiae. The cortex measured only 2 to 3 millimeters in thickness (7 to 8 millimeters is normal). The markings of the kidneys were indistinct and there were small petechiae in the renal pelvis. The heart weighed 500 grams and was dilated. There were numerous petechiae and ecchymosis throughout the gastro-intestinal tract, in the pericardium and in the bladder. There was only slight arteriosclerosis in the aorta and coronary arteries. There was bronchopneumonia of the lower lobes of both lungs.

Discussion: This case is a typical example of malignant nephrosclerosis. The degree of anemia is somewhat unusual, but studies of the bone marrow by Dr. Carl Moore failed to establish a diagnosis of primary anemia. Throughout all of the organs, there was thickening of the small arterioles. The petechiae in the kidneys and the increased firmness of the organs are characteristic of malignant nephrosclerosis. The petechiae represent small hemorrhages in Bowman’s space and tubules as the result of necrosis of the afferent arterioles of the glomeruli.
TUBERCULOUS PYELONEPHRITIS AND HYPERTENSION

History No. 80025. A 38 year old white woman was first admitted to the Barnes Hospital on January 31, 1940 because of dyspnea. In 1934, she was told that her systolic blood pressure was 170 and in the intervening six years she had occasional headaches with vomiting.

At the age of 15 her right kidney was removed because of tuberculosis and for some years she was bothered with cystitis but had had no urinary symptoms for many years and kidney function tests were said to be normal.

Physical examination revealed a well developed and well nourished white woman. There were patches of vitiligo over the body. There was no edema. The heart was enlarged to the left with a systolic murmur at the left sternal border. The second aortic sound was loud and ringing. The blood pressure was 235/150.

A PSP test showed 35% in two hours. The non-protein nitrogen of the blood was 36 mgm. percent. The urine contained 3 plus albumin. She was discharged from the hospital three weeks later unimproved.

The final admission was on April 9, 1940 at which time the physical findings were essentially as given above. The blood pressure was 240/155. The non-protein nitrogen of the blood was 71 mgm. percent which gradually rose to 120 mgm. percent. During the course of two months in the hospital there was persistent vomiting. There was development of edema of the legs and enlargement of the liver. During the last few days there were coma, muscular twitchings and anuria.

Postmortem No. 8723. The left kidney weighed 140 grams and the capsule was thickened. The cortical surface was rough, irregular and studded with small grayish yellow tubercles. On cut section there were numerous similar tubercles throughout the cortex and medulla. The pelvis was thickened. The ureter and bladder were not remarkable. At the hilum of the left kidney there was a large tuberculous lymph node which partially occluded the left renal artery. The only other evidence of tuberculosis were calcified nodules in the right lung and in the bronchial lymph nodes. There was moderate arteriosclerosis of the aorta, splenic, renal and coronary arter-
ies. At the orifice of the left renal artery there was a calcified plaque which partially occluded this vessel. The heart was enlarged and weighed 500 grams. There was an acute fibrinous pleurisy and pericarditis and a hemorrhagic esophago-gastro-enteritis. There was a bronchopneumonia of the upper lobes of both lungs.

Discussion. This case is of immense interest in view of the most recent ideas concerning the relation of the kidneys to hypertension: First, the tuberculosis pyelonephritis; second, the partial obstruction of the left renal artery by an enlarged lymph node; and third, the calcified plaque at the orifice of the left renal artery. The organic changes of the latter two are entirely analogous to the Goldblatt clamp in bringing about partial obstruction of the renal artery.

The finding of a tuberculous pyelonephritis of one kidney 23 years after the removal of a tuberculous kidney on the other side is remarkable. This is especially true since there were no other anatomical evidences of active tuberculosis in the body.

Urological Division

The 9:00 o’clock Monday morning conferences continued throughout the summer. All ward cases and a very large percent of private cases came before the staff; analysis of cases, particular interest being centered on cases of interpretation of pyelograms, presentation of pathological specimen, physiological analysis, and clinical discussion.

Several additions have been made on the Cystoscopic floor. A fourth Cystoscopic X-ray table with shock proof tube has been added to the west row of cystoscopic rooms by Dr. Sherwood Moore, Professor of Roentgenology.

Barnes Hospital, through its Superintendent, Dr. F. R. Bradley, has added a large amount of new electrical equipment and instruments necessary for transurethral prostatectomy, which is being done in increasing amount by the entire staff.

A small reference library has been started on the Cystoscopic Floor, Third Floor, Mallinckrodt Radiological Institute. This reference library has been very materially added to in
the form of forty-two volumes on urology. The late Dr. Perry Bromberg, Professor of Urology, Vanderbilt University, willed these volumes to Dr. Leon Bromberg, who very generously has given them to us. They will constitute an excellent urological reference library, on the spot, i. e. at the time of cystoscopic examination, and will prove to be of great value.

D. K. R.
News of the School

**DR. KATHERINE BAIN TO DO U. S. CHILD RESEARCH**

Dr. Katherine Bain, Instructor in Clinical Pediatrics in Washington University School of Medicine, has been named director of the division of research in child development of the United States Children's Bureau. Dr. Bain is a widely-known St. Louis physician and has done much research work in the field of pediatrics. From her headquarters in Washington, she will supervise research projects now under way in various American medical schools.

**DR. GRAHAM RECEIVES HONORARY DEGREE**

Dr. Evarts A. Graham, Professor of Surgery at Washington University Medical School, was the recipient of the honorary degree of Doctor of Science at the two-hundredth anniversary of the founding of the University of Pennsylvania in Philadelphia, September 21.

As part of the scholastic program of the celebration, Dr. Graham read a paper on "Two Centuries of Surgery."

Dr. Graham, 57 years old, was honored last October by medical leaders throughout the country when he completed 20 years on the Washington University faculty. At that time a visiting professorship was established in his honor.

**DR. COUGHLIN LEAVES SUM FOR ANNUAL LECTURE**

The will of the late Dr. William T. Coughlin, '01, left a sum of $5000.00 to the St. Louis Medical Society for the establishment and maintenance of an annual lecture to be known as the Robert James Terry Lecture. The purpose of this lecture has not yet been announced. Dr. Terry, for whom it is named, is Professor of Anatomy at Washington University Medical School.

"TWENTY-FIVE YEARS"

The twenty-five years of growth which have made the Washington University School of Medicine and its affiliated institutions the first recognized center of medical training and research west of the Mississippi and later a recognized center of international scope, are described in the booklet recently issued in celebration of this anniversary. This 34 page bro-
chure gives an intimate story of the School of these recent years. Pictures emphasize the great architectural growth of the School and its great medical accomplishments are reviewed. It points out the opportunities for future research and growth and the fact that the continuance of the medical center at its present scale will call for a much larger measure of financial support than has yet been provided.

“No department now has a budget large enough to meet its urgent needs,” the publication asserts. “The decline of yield from endowments has caused retrenchment in all departments. The most urgent need at present is for unrestricted funds to replace this loss in order that all essential activities may be maintained on a high level of efficiency.”

This first medical center in the middle west was created by an affiliation of the Barnes Hospital and the St. Louis Children’s Hospital and later the St. Louis Maternity Hospital with the medical school of Washington University which was built at a cost of about $8,000,000.00. The list of contributions made by the school and faculty to medical progress include findings which have saved thousands of human lives. Many “firsts” are indicated in this long list including the isolation of female sex hormones, expansion in the field of chest surgery, the development of plastic surgery, the identification of the causative agent of encephalitis, the study of trachoma, and the simplified methods for artificial feeding of infants.

The part played by Robert S. Brookings and many other friends in the beginning of the growth of the school and the center is described in other sections. The booklet ends with a statement of the opportunities for further work and with a table of milestones of 25 years. It also contains a photograph of 30 physicians who have been members of the faculty of Washington University School of Medicine for 25 years or longer. The school has been the recipient of innumerable unsolicited replies to this booklet from graduates of this and other schools as well as faculty members from other schools, all of which have been quite flattering. This booklet has apparently been very warmly received by the profession and lay members of communities alike and unquestionably has rekindled many memories for the graduates during these past twenty-five years.

F. E. W.
This is a very interesting comment received by Dr. Shaffer from a member of the Class of 1915.

Dear Dr. Shaffer:

Your Anniversary Brochure was the most pleasing piece of literature I have received in some time.

Twenty-five years ago two unsophisticated Nebraska boys decided they would like to take their last year of medical training at Washington University. They were Raleigh K. Andrews, who decided to stay on in St. Louis and is at present engaged in the practice of medicine in your city, and the other Earl C. Sage, who is in the practice of obstetrics and gynecology in Omaha, Nebr., and who incidentally is Professor of those subjects at the University of Nebr. College of Medicine and Chairman of that department. We were, therefore, in the first class which was fortunate enough to be housed at the new campus, and I am sure neither one of us ever regretted having made this choice.

The pictures of 1915 therefore brought back many happy memories. I highly prize this booklet and have already removed the cover showing the present panorama and am having this photograph framed.

Sincerely yours,

Earl C. Sage, M.D.

The Medical Library

The following alumni were in the library during the summer:

Dr. Edward L. Burns of New Orleans, La.
Dr. Bernard A. Cruvant of Washington, D. C.
Dr. Henry W. Edmonds of Boston, Mass.
Dr. Dorothy Gill of New York City.
Dr. William W. Herman of Cleveland, Ohio.
Dr. Mary Schmeckebier of San Francisco and St. Louis.
Dr. Charles M. Gruber, Professor of Pharmacology of Jefferson Medical College, dropped in to renew old acquaintances in August.

Miss Eunice Cox of the Law Library was a visitor in June.

In August the librarian of Howard University School of Medicine, Miss Josephine Morton, paid us a visit.
The following books are recent additions:
Bodansky, M. Physiological Chemistry. 4th ed., N. Y., 1939.
Bodansky, M., and Bodansky, O. Biochemistry of Disease. N. Y., 1940.
Denny-Brown, D., ed. Selected Writings of Sir Charles Sherrington. N. Y., 1939.
Levine, S. A. Clinical Heart Disease. 2d ed., Phila., 1940.
Menkin, V. Dynamics of Inflammation. N. Y., 1940.
Recent gifts include the following:
Eight new books from Dr. Hugh McCulloch.
New books and journals from Dr. Borden S. Veeder.

In Memoriam

Franklin Beyersdorf, Mo. '79, St. Helena, Calif.; died September 13, aged 87.
Allen C. Brown, Mo. '95, Stanwood, Wash.; aged 76; died, May 18.
J. M. Campbell, Mo. '80, East Moline, Ill.; aged 86; died, May 15, of uremia.
Lincoln C. Chenoweth, Mo. '86, Joplin, Mo.; aged 75; died, May 5.
Ernest Henry Cole, St. L. '85, St. Louis, Mo.; aged 82; died, May 22.
T. A. Cottingham, Mo. '80, Moberly, Mo.; died.
H. A. Hanser, Mo. '98, St. Louis, Mo.; aged 62; died, May 28, in Flagstaff, Ariz., of heart disease.
Louis Hauck, '80, St. Louis, Mo.; aged 81; died, June 8.
Daniel H. Hope, '04, Cape Girardeau, Mo.; aged 61; died, July 4, in St. Luke's Hospital, Denver.
Henry G. Horstman, Mo. '95, Murphysboro, Ill.; died, August 10.
Lewis Hunker, '03, Moberly, Mo.; aged 61; died, June 26, when he severed his left brachial artery.
Richard Kring, Mo. '91, St. Louis, Mo.; aged 76; died, May 16, in the Veterans Administration Facility, Danville, Ill., of chronic myocarditis and arteriosclerosis.
Ira Hamilton Miller, Mo. '99, Louisiana, Mo.; served during the World War; aged 63; died, June 6, of a self-inflicted bullet wound.
John Nusbaum, Mo. '88, Jonesboro, Ill.; died.
William Henry Pennington, Mo. '76, Mineral Wells, Texas; aged 84; died, May 9, in the Nazareth Hospital of diabetic acidosis.
Augustus Ralf Reder, '94, Aurora, Ill.; aged 68; died, July 9, in Hot Springs National Park, Ark., of carcinoma of the liver.
Wm. L. Sears, '90, Los Angeles, Cal.; died, March 22, 1939.
J. L. Tadlock, Mo. '84, Colorado Springs, Colo.; died.
Preston Thompson, '13, Lebanon, Mo.; served during the World War; aged 51; killed in accident, April 14.
Paul F. Vasterling, St. L. '83, Los Angeles, Calif.; aged 77; died, May 31, of carcinoma of the stomach.
James L. W. Young, Mo. '71, Portland, Ore.; aged 91; died, April 29, of myocarditis.
Can Anyone Give Address of, or Information About:

W. Hartwell Allen, '96
Goichi Asami, '20
J. H. Buford, '96
Ralph E. Dalton, '29
Rollin S. Fillmore, '83
Noakazu Fujimori, '04
Eldred LaMonte Gann, '37
George B. Garrison, '17
Hyman Wm. Gierson, '38
Edward August Hoefer, '98
Pearl Elizabeth Koch, '38
Robert Frederick Lamar, '39
William G. Maness, '93
J. E. McCormick, '97
Wayne Pickens McKee, '38
Alvin Ralph Miller, '33
Robert Hiestand Mitchell, '36
Michael K. O’Heeron, '35
G. H. Schmidt, '77
A. C. Schulenburg, '06
Wilcox G. Thorne, '10
T. B. Waters, '89
Corinne Westphal, '34
Marian E. Zonnis, '36

LOCATIONS FOR PRACTICE

Benton, Missouri. Benton and four nearby towns, population 1700. Contact Dr. W. O. Finney, Chaffee, Mo.

Rural community. Surrounding territory thickly settled. G. W. Rogers, Gainesville, Mo.

Anna, Illinois.

Medora, Illinois. Contact Mrs. O. P. Erwin.


The Kansas Medical Society informs us that they have a number of available locations in small and medium-sized communities. Contact Dr. A. C. Armitage, Kinsley, Kansas.

Prairie Grove, Arkansas. Population, 1000. General practitioner is looking for young associate to take over practice in few years. Contact Dr. Wm. H. Mock.

Pembina, North Dakota. Three miles from Canadian border, community of 300 population across river. Contact Mr. Ray C. Stinson.

Montrose, Colorado. A graduate of this Medical School wants an assistant. Must be good surgeon. Contact Dr. Isaiah Knott, '88.

A locality about 100 miles from San Antonio desires a young doctor who is willing to work. Knowledge of Bohemian or German would be an asset. Contact Dr. Ferdinand P. Herff, Nix Professional Bldg., San Antonio, Texas.


Practice and equipment for sale of deceased doctor in Southeastern, Iowa. Inquire, Dr. B. D. Ditto, Burlington, Iowa.

Widow of deceased physician would like to sell two pairs of obstetrical forceps. Inquire, Mrs. J. F. Flynt, Paris, Mo.
Alumni News

Moses D. Tibbett, '81, of Highland, Illinois is in his eighty-fourth year of a long and active life. He recently made a trip to Rochester, Minn. where he underwent a minor operation, but reports he is getting along nicely and receives a great deal of pleasure from driving his car daily.

Robert E. Schlueter, '95, Metropolitan Bldg., St. Louis, has been elected Vice-President of the Medical Library Association.

Joseph A. Hodam, '02, informs us that he recently moved to Filley, Neb.

E. O. Breckenridge, '23, announces the opening of an office in the Metropolitan Building, St. Louis, for the practice of Gynecology.

Harold Chandler, '26, is a physician on one of the large sugar plantations in Waipahu, Oahu, T. H. He recently returned for a visit to the Mainland and renewed many old acquaintances.

W. D. Balfour, '27, was a recent visitor to the Medical School. Upon his return to Hawaii, he will accept a new position in Pahala.

Edward W. Grove, '28, Gainesville, Ga., was a recent visitor in the Alumni Room. He stopped in St. Louis on his return trip home from a vacation spent in California.


Harry Staffer, '31, Jefferson City, Mo., is C. A. A. examiner for that district. Dr. Staffer is married and has a girl, 9, and a boy, 4.

Pendleton Tompkins, '31, is specializing in Obstetrics and Gynecology with offices at 253 South 17th St., Philadelphia. He is a Captain in the Medical Reserve Corps; a member of the faculty of the University of Pennsylvania, and is Vice-President of the Philadelphia Obstetrical Society. He has published: "The Treatment of Imperforate Hymen with Hematocaplas." J. A. M. A., 113: 913-916, Sept. 2, 1939. He married Miss Louise A. Mertz of Philadelphia in September, 1939.


Edwin S. Wallace, '35, is engaged in general practice in Lexington, Mo. He is married and is the proud father of a son, 5.

Edward Massie, '35, was married to Miss Felice Oserovich, D.D.S., on July 7. Mrs. Massie obtained her dental degree at the University of Nancy, Nancy, France. She is also an accomplished linguist and is a private instructor of French. Dr. Massie is Instructor of Clinical Medicine at Washington University, and Cardiological consultant at Homer G. Phillips Hospital. He has an office for the practice of Internal Medicine in the University Club Bldg., St. Louis. Among his recent publications are articles on "Shock; Syncope; Carotid Sinus Syndrome" in Dr. David P. Barr's
three volumes, "Modern Medical Therapy in General Practice"; and "Newer Aspects of Thiocyanate Therapy in Hypertension" in the next issue of International Clinics.

Robert L. Tolle, '35, recently opened an office in the Beaumont Bldg., St. Louis, for the practice of Obstetrics and Gynecology. Dr. Tolle is married and has one child, a boy, who will be 3 in November.

K. M. Amlin, '35, has an office for general practice with special interest in general and traumatic surgery in Waimea, Kauai, T. H. He was married in 1938 and has one child, a girl, 10 months old. He hopes to visit St. Louis and other medical centers next year.

Richard Sutter, '35, with offices in the Frisco Bldg., St. Louis, boasts of a monthly drug bill never under $40.00.

T. Wilson McVety, '36, Decatur, Ill., writes that practice in his specialty, obstetrics and gynecology, is going well. Dr. McVety is married and has a son, "Tommy," 15 months old.

Kenneth E. Pletcher, '36, Eldon, Mo., was a visitor in the Alumni Room, July 16th. He is married and has a daughter, two.

Nelson R. Saphir, '36, sends an announcement of the opening of his office for a practice limited to internal medicine at 475 Commonwealth Ave., Boston, Mass.

Robert W. Elliott, '36, announces the opening of his office for the practice of internal medicine in the Beaumont Bldg., St. Louis, Mo.

James W. McMullen, '37, is Resident in Radiology at Colorado General Hospital, Denver. He and Mrs. McMullen are receiving congratulations on the birth of a daughter June 17.

Joseph A. Florito, '37, writes that he just completed a successful year at the Royal Victoria Montreal Maternity Hospital and is now Associate Resident in Obstetrics and Gynecology at the New Haven Hospital, New Haven, Conn. He expresses the wish that his Medical School friends would drop in to see him when in that vicinity.

F. Dale Wilson, '38, writes that the Quarterly is "devoured with relish" in Montreal where he is resident in Surgery at the Children's Memorial Hospital. Dr. Wilson was married June 22 to Miss Flora D. Instone, '40, Washington University School of Nursing.

James B. Jones, '38, and Miss Eileen Henshaw were married May 3, 1940. Mrs. Jones was a nurse at St. Lukes Hospital before her marriage. They will reside in Rolla, Mo. where Dr. Jones has opened an office for general practice.

L. P. Mitchell, '38, has completed a year as Resident Physician at the Wabash Employees Hospital, Peru, Ind., and is opening an office for general practice in Spindale, N. C.

J. G. Harrell, '39, announces his association in practice of medicine and surgery with Dr. R. C. Brown at 203 S. Church St., Carmi, Ill.

Mr. & Mrs. S. J. Buckalaw, Dallas, announce the marriage of their daughter to Dr. Wilson G. Brown, '39. They will reside at 4111 Magnolia, St. Louis. Dr. Brown is a resident in Pathology in St. Louis City Hospital and is Assistant in Pathology at Washington University School of Medicine.

Mr. & Mrs. Thomas E. Hart announce the marriage of their daughter, Elva, to Dr. Robert E. Koch, '40. Dr. and Mrs. Koch will reside at 171 Linden Avenue, Clayton, Mo.
PLEASE CONTRIBUTE NEWS

for the Quarterly and Information for the Alumni Office

using the following form as a guide and sending your response
to Miss Louise Hunt, Washington University
School of Medicine

Full name (print) ..................................................

Class of ..............................

Office address: number and street, town and state ..........................................

Membership in medical and other scientific societies and offices held ..............

Field of work (as general practice, ophthalmology, public health, pathology, teaching, investigation, etc.) .................................................................

Connection with hospitals and schools .................................................................

Army and Navy (branch and rank) .................................................................

Papers published in present year (title, journal, volume, pages, and date) ..........

Books published (give full title, publisher, place, date, number of pages, illustrations)

(OVER)
Editor or associate editor of medical or other scientific journal. Election to honorary societies (name of society and date of election). Honorary degrees, citations, medals, prizes

Member of scientific expedition, medical survey

Recipient of fellowship or of grant-in-aid of investigation

Connection with or activity in any other province of medicine not covered by the above

Have you a son or daughter entering the School next year?

Recent marriage—name, date and place

Recent birth—sex, date

Death—name, class, date of death, place

Desirable location for practice: town and state, number and street

Remarks

Write a letter of 200-250 words to the Quarterly for publication.

Please donate to the Library of the School of Medicine copies of books and reprints of papers you have published. You will confer a benefit to the Library and help to establish a record of the literary contributions of our graduates and faculty.