

A BRIEF HISTORY OF THE
DEPARTMENT OF RADIOLOGY.

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We learn that Professor Jones yesterday located bullets in the legs of two patients of the City Hospital of St. Paul with the aid of the x-ray machine. This was done at the request of Dean Millard, and in both cases the photographs were successful.

- "Ariel", October 24, 1896

Little is known of the early history of Radiology at the University of Minnesota, but it is significant that within six months following the discovery of "a new kind of rays" by Wilhelm Konrad Roentgen in November, 1895, the University student newspaper, the "Ariel", was able to report:

Professor F. S. Jones' new fluoroscope and Crookes' tube have arrived and both proved to be all that was expected.

The same article notes that Professor Jones had taken an x-ray photograph of the hand with a five-minute exposure time. This rapid acceptance of the new diagnostic technique was typical of reaction from the entire scientific world. At this time, however, the University's Medical School did not possess its own hospital, and students received their clinical inpatient training at the city hospitals of Minneapolis and

St. Paul.

When the University Hospitals were founded in 1909, immediate thought was given by the faculty toward the creation of an x-ray service. The minutes of the Hospital Committee of the Medical School in 1910 and early 1911 record the concern of the Committee that a custodian for the x-ray room of the new Elliott Memorial Hospital be appointed as quickly as possible so that he might assist in the choice of equipment for the new room. Accordingly, Dr. Frank S. Bissell was appointed custodian of the x-ray room on June 2, 1911, and a Snook direct-current x-ray machine was installed in the new hospital late in 1911.

Dr. Bissell had joined the faculty of the Medical School in 1910 and held an appointment as an instructor in the Department of Medicine. As was true of a great proportion of the faculty, he devoted part time to a private practice in downtown Minneapolis. The x-ray room in the new hospital was located on the second floor at ground level in approximately the location of Station 22 in the present day hospital. Initially, the department was provided with a single room, but within a short time a second adjacent room was added. Bissell received the title of Radiographer to the University Hospitals in April, 1912. By 1916, he had been promoted to Assistant Professor and was offering an elective course in Roentgenology

to junior and senior medical students, involving eight hours of instruction. Prior to this time, no formal lectures had been given in Roentgenology, although the glass plates (this was prior to the era of x-ray film) were used in case demonstrations by other clinicians. Dr. Bissell performed investigative work in the field of pulmonary tuberculosis and was elected a Vice President of the Radiological Society of North America. During the period of his tenure as Radiographer (1911-1919), his service was a part of the Department of Medicine.

With the arrival of Dr. Robert Glen Allison as Roentgenologist to the University Hospitals, the service was placed under the administration of the Department of Surgery. Dr. Allison received an appointment as Assistant Professor of Roentgenology. He was a native of South Carolina and received his medical education at the University of Maryland. A very charming Southerner with a wonderful ability to make friends and to "sell" roentgen diagnosis as an important feature in medicine, Allison established a private office for the practice of radiology in downtown Minneapolis and was also attending radiologist at a number of local private hospitals. He had received training in Radiology during his World War I army service, following which he spent a year as a patient at the famous tuberculosis sanatorium at Saranac Lake, New York. While convalescing, he was able to observe and learn from Homer Sampson, no physician but a self-trained and

outstanding roentgenologist of his day.

With the arrival of Dr. Allison, time was allotted within the curriculum for the required study of Roentgenology. A course listed as Surgery 79 is noted in the Bulletin of the Medical School for 1920, and is described as including lectures, demonstrations, and plate reading. With increasing acceptance of the diagnostic value of the roentgenogram, a Division of Roentgenology was created within the Hospital Department of the Medical School in 1923 with a budget for the 1923-24 fiscal year amounting to the vast sum of \$7,800!

Dr. Allison offered four courses to undergraduate medical students, including the required lecture course and three elective subjects: plate reading, x-ray technique, and x-ray therapy. Allison was the sole radiologist in the University Hospitals during this period. In 1923, Dr. Milton Geyman became his first resident. More properly, this was a type of preceptorship since Dr. Geyman had no official appointment to the University. A similar arrangement was provided for Dr. Russell Gates one year later. Both of these men not only read films and performed fluoroscopy at the University Hospitals but also at Dr. Allison's office and in the other hospitals where he attended. Upon completing their preceptorships, both Geyman and Gates joined Allison in his flourishing practice.

Although Allison was very busy and could devote only a

few hours a day to the x-ray division at the University, his services were highly sought after and his lectures were well attended. In particular, his lecture on foreign bodies in the tracheobronchial tree was regarded as a classic by both medical students and faculty. Although he was promoted to Associate Professor in 1924, there arose a demand within the faculty for a full-time person in radiology which Dr. Allison was unwilling to satisfy.

At about this time, there was a young man at the Minneapolis General Hospital, a resident in internal medicine, who had exhibited a considerable degree of interest and facility in the field of radiology. Leo G. Rigler was born in 1896 and educated in the schools of Minneapolis. He was a graduate of the University, receiving his undergraduate degree in 1917 and his M.D. in 1920. Following internship and a year in general practice in North Dakota, Dr. Rigler had returned to Minneapolis to continue his training and had almost immediately become interested in x-ray diagnosis. This led him to spend a number of months during 1924 in Michigan, first at the Battle Creek Sanatorium with Dr. James Case and then at the University of Michigan with Dr. Preston Hickey. Following this period, his enthusiasm and skill rapidly gained him good notice in the medical community. He was appointed Radiologist to the Minneapolis General Hospital, and was invited to give lectures in roentgen anatomy to freshman medical students at

the University. These lectures met with an excellent response. Accordingly, when the new chief of the Department of Medicine, Dr. Hilding Berglund from Stockholm, and the Dean of the Medical School, Dr. E. P. Lyon, determined that a full-time person was needed in x-ray diagnosis, they turned to Dr. Rigler.

In a letter to the writers, Rigler describes his reaction:

"Since I was at the General Hospital at this time, Dr. Berglund and Dean Lyon came to see me and offered to give me a special grant of \$1,000 if I would go to Sweden to study with Gosta Forssell for one year. I suspect that this was the first time the University had made this sort of offer, and I was enormously flattered by it. Obviously, \$1,000 even at that time was a small amount in proportion to the total cost for my wife and myself, but we had some savings and accepted this. The idea was that I would spend a year abroad, then return and be made the head of a division of diagnostic radiology with the title of associate professor."

Dr. Forssell was perhaps the most prominent figure in

radiology at this time and to him was due a large measure of credit for establishing early Swedish preeminence in the field of radiology. Even to this day, the Swedes are regarded with the highest respect in this specialty. Rigler spent six months with Forssell at the Karolinska Institute in Stockholm. Following a tour of several other centers of radiology on the continent, he returned on July 1, 1927, to assume control of the x-ray division at the University Hospitals. Dr. Allison, finding himself increasingly busy with his flourishing practice, gave Dr. Rigler his blessing and remained on the clinical teaching staff of the division until his death in 1947.

With the arrival of Dr. Rigler, the Division of Radiology was returned to the auspices of the Department of Medicine. The new Cancer Institute wing had recently been completed, but the x-ray division remained in its original location. Dr. Rigler describes the department at that time:

"The x-ray department consisted of one large room which served as a reception room for patients, as a film conference room for the staff, as a film interpretation room, as a secretarial and clerical office, and for any other miscellaneous tasks which were needed. In addition,

there was a very small darkroom for processing, and a small fluoroscopic room with one dressing room connected with it for gastrointestinal and other fluoroscopic examinations. The staff consisted of Mrs. Lillian Dahl, who was technician, secretary, receptionist, and so forth, all rolled into one. In addition, she typed the reports and waited on the staff, helped with the barium meals, and saw to it that the patients were properly prepared. She did the darkroom processing as well."

Almost immediately, Dr. Rigler attracted able young men for residency training in this blossoming new specialty. Initially, Dr. Malcolm Hanson and Dr. Harry Hillstrom enrolled, the latter also assisting Dr. K. W. Stenstrom in radiation therapy and physics. At this time, Dr. Stenstrom was on the staff of the Department of Surgery and of the new Cancer Institute, but he and Dr. Rigler set up a cooperative arrangement and a three-year program for training which was adhered to for many years, even though this was long before the days of the American Board of Radiology. Upon completion of his training, Dr. Hillstrom was given an appointment as Associate

Professor of Radiology at Vanderbilt University. His tragic death in an auto accident a short time later cut short a promising career in teaching and research. However, his appointment had set a tone and goal for Dr. Rigler's department from the very beginning.

Dr. Rigler was dissatisfied with the status of the Division within the Department of Medicine, feeling that the department served all the clinical areas. Shortly thereafter, Radiology was made again a division of the Hospital, although Radiation Therapy remained within the Department of Surgery.

Whereas in 1927 some twenty examinations per day were being done in the Division, within two years the total had risen to eighty per day and larger facilities were desperately needed. The work was performed by Dr. Rigler and two residents, each of whom was paid the sum of \$900.00 per year, a figure in line with similar positions in other clinical departments. In addition to routine chest, abdomen, and bone film examinations and fluoroscopic examinations of the gastrointestinal tract, newer procedures had been introduced and accepted, including contrast examinations of the biliary and urinary tracts and bronchography. Dr. Jacob Sagel and Dr. Cyrus Hansen had enrolled in the residency program.

It was evident to all concerned that more space was

badly needed and therefore in 1929, the Division moved to the fifth floor of the Hospital. Four rooms and an office were made available to Dr. Rigler. Dr. Cyrus Hansen recalls well the hospital staff marvelling over the fact that one room was to be devoted to chest radiography only! The fifth floor space had previously been occupied by the hospital photographer and the dermatology service. The x-ray department remained in this area for twenty-five years, only to again relinquish this space to medical art and photography in 1954. Dr. Rigler states:

"In setting up this new department on the fifth floor, we instituted a new procedure which had probably never been done in the United States before, namely, the development of a wet film viewing room, the films being arranged that they could be seen while still being in the clearing solution in order to expedite rapid communication, especially concerning urgent cases. In addition, it permitted us to inspect the technique to be sure the films were satisfactory before the patient left. About a year later, I saw an exactly similar arrange-

ment at the Mallinckrodt Institute in
St. Louis in their new x-ray department,
independently conceived."

The introduction of a wet film viewing room was neither the first nor the most notable of Dr. Rigler's contributions. He quickly became engaged in a number of research projects including studies of the barium-filled esophagus for the evaluation of cardiac enlargement and the demonstration of abnormalities in the heart, and studies on the distribution and movement of pleural effusions. He introduced and popularized the lateral decubitus projection for the evaluation of the presence and location of pleural effusion and his articles on this subject in the early 1930's are classics in the field of chest x-ray diagnosis. Within two years following his appointment to the University staff, Leo Rigler was promoted to the rank of full Professor at the age of 33.

During the years that followed, Dr. Rigler's curiosity and enthusiasm resulted in many contributions to the field of diagnostic radiology. He described a number of roentgen signs of acute abdominal conditions, including strangulated intestinal obstructions. He became interested in the problem of early detection of carcinoma of the lung at a time when this disease was not nearly so prevalent as it is today and described important roentgen signs of pulmonary malignancy.

In the 1940's he investigated and reported on the association of pernicious anemia and tumors of the stomach, both benign polyps and carcinomas. Always the outstanding educator, he wrote an "Outline of Roentgen Diagnosis" for the undergraduate lecture course, which won quick acceptance from students, residents, and practitioners alike. This book, originally published in 1938, was given a second edition in 1943. His textbook on "The Chest" was also given a second edition, being published originally in 1946 with a new edition in 1954. This book remains today an outstanding text and reference for the student of x-ray diagnosis of the chest.

Dr. Rigler has served as an associate editor of "Radiology", assistant editor of "Diseases of the Chest" and as a member of the editorial board of "Surgery" and "The New Physician". He has been recipient of signal honors too numerous to cite in this brief survey, and was president of the Radiological Society of North America in 1958. Always first the educator, he takes great pride in the number of former students and associates now occupying positions of prominence in the field of academic radiology. A short listing would include the following heads of departments:

Harold O. Peterson, M.D., University of Minnesota

Herbert M. Stauffer, M.D., Temple University

Henry S. Kaplan, M.D., Stanford University

Bernard J. O'Loughlin, M.D., California College
of Medicine

Charles M. Nice, Jr., M.D., Tulane University

Hymer Friedell, M.D., Western Reserve University

Sidney P. Traub, M.D., University of Oklahoma

Elliott Lasser, M.D., University of Pittsburgh

Harry Mellins, M.D., State University of New
York (Downstate)

E. Robert Heitzman, M.D., State University of
New York (Syracuse-Diagnosis)

Alexander Margulis, M.D., University of California

Joseph Jorgens, M.D., Veterans Administration
Hospital, Minneapolis

John Amberg, M.D., Veterans Administration
Hospital, San Francisco

Richard G. Lester, M.D., Duke University

Richard H. Greenspan, M.D., Yale University

Bertram Levin, M.D., Michael Reese Hospital

A. N. K. Menon, Stanley Medical School,
Madras, India

Francis F. Ruzicka, Jr., M.D., St. Vincent's
Hospital, New York

During the course of their training, residents in Dr. Rigler's department were encouraged to participate in clinical or laboratory research and to take an advanced degree. Many did achieve a Master of Science in Radiology and a few achieved the signal distinction of the Ph.D.

Beginning in the early 1930's with an association with the Minneapolis General Hospital under Dr. Walter Ude and then Dr. Oscar Lipschultz and with the Ancker Hospital in St. Paul under Dr. J. Richards Aurelius, residents from the University department were rotated to these general hospitals where they were exposed to more trauma and other acute conditions than were generally available at the University Hospitals. Shortly after the end of World War II, as part of the Dean's Committee arrangement with the Veterans Administration, Dr. Daniel Fink was named the first chief of the department there under the auspices of the Medical School. His successors have included Dr. B. J. O'Loughlin and Dr. Joseph Jorgens. During this period, of course, the number of residents in active specialty training under the auspices of the department gradually increased.

With the increasing acceptance and importance of roentgen diagnosis, Dr. Rigler sought full departmental status for radiology. Initial attempts by Dean Lyon

to give full departmental status to radiology were rebuffed by President Coffman in 1930, but finally in 1935 an autonomous Department of Radiology was created with Dr. Rigler as chief. The department also included radiation therapy and physical medicine, but the former was given division status under Dr. Stenstrom and the latter was separated from radiology in 1941.

Always the enthusiastic educator, Dr. Rigler early became concerned about the need for short courses for radiologists. The first postgraduate course in radiology in the United States was held at the Center for Continuation Study in 1938. The subject was "Radiology of the Chest" and the course lasted three days. The following year, the first of several highly successful courses in neuroradiology was given with distinguished radiologists from the United States and Europe participating. The outstanding staff of the Mayo Clinic in diagnostic radiology early agreed to act as a partial faculty for these courses whose popularity rapidly increased. Within a few years, the courses grew to the point where difficulty was encountered in accommodating all the applicants. Today, the annual Continuation Course in Radiology in the fall represents one of the largest postgraduate teaching exercises in the country and has been much imitated.

Dr. Rigler describes the problems of the increasing work load of his department in the 1930's:

"The budgetary problem was severe, the Medical School having very little funds. Fortunately, we were able to persuade Mr. Amberg, who was at this time the Director of the Hospital, to allocate funds from the Hospital for a full-time assistant. By 1936, therefore, I was able to bring Dr. Harold Peterson from Boston to the department. The demands for neuro-radiology had increased apace with the development of an active neurosurgical and neurological department, and we were unable to cope with them adequately. Dr. Peterson was given this task and, of course, as is well known, performed it superbly."

Dr. Peterson was the first of an illustrious group of young men who came to work and teach in Dr. Rigler's department, most of whom are included in the listing above. Peterson remained on the full-time staff until 1940 when he entered private practice in St. Paul.

However, he remained active on a part-time basis during the ensuing years.

With the outbreak of World War II, the problems of the Department of Radiology were greatly compounded. Almost all of the residents were taken into the service very quickly. For a short period, Dr. Rigler and one resident constituted the entire full-time staff. In time, the armed services were persuaded to permit a few residents to complete their training, allowing the large work load to be spread among a few more pairs of hands.

With the conclusion of hostilities, the problem of limited physical space became acute as the work load continued to rise by leaps and bounds. Expansion of the quarters on the fifth floor was not possible. Accordingly, expansion had to await the opening of an entirely new department in the new Mayo Memorial Building in 1954. Additional space had been secured for Radiology in the new Variety Club Heart Hospital opened in 1949. In this department, spurred by the outstanding accomplishments of the cardiac surgeons, Lewis, Lillehi, and Varco, and by men of similar caliber in pediatric and adult cardiology, a whole new branch of the field of Radiology was developed. Serial angiocardiology, employing

rapid film changers to make as many as six exposures per second, enabled the delineation and classification of a large number of previously poorly understood congenital abnormalities of the heart. Jorgens, Lester, Amplatz and Carey all contributed greatly to the development of this field while working in and supervising the X-ray Department in the Heart Hospital.

Finally, in 1954, a new and much larger department was opened on the second floor of the new Mayo Memorial Building. The department contained eleven x-ray rooms, housing a variety of radiographic and fluoroscopic equipment. In addition, a whole suite of offices and viewing rooms was included. Almost immediately, however, the new department was taxed to its capacity and space limitations have grown gradually more severe through the years, as is indeed true of the entire history of this department.

It would be remiss not to mention one other, and perhaps the most important, accomplishment of Dr. Rigler's department during his tenure. Not only were men trained who made their contribution in academic radiology, but also the department represented the major source of supply of radiologists for Minnesota

and the surrounding area. The generally high level of quality of the practice of Radiology in the Upper Midwest relates, in the opinion of many qualified observers, to the graduate and postgraduate training programs at the University of Minnesota.

Another aspect of the department's activities is described by Dr. Rigler:

"One of the enterprises which affected us seriously was the institution of the Cancer Detection program. Prior to that time I had undertaken on my own to do routine semiannual examinations of the stomach on patients with pernicious anemia, and this led to a large number of contributions in a research way insofar as cancer of the stomach is concerned. Under Dr. Wangensteen's direction, we entered into an additional program of similar character but in which we made roentgen examination of the stomach at annual intervals of all patients coming to the outpatient clinic who

could have a histamine-stimulated gastric analysis and showed either low or no hydrochloric acid. This, of course, caused a much greater load on the department. By the time we had moved down into the new quarters in the Mayo Memorial Building, we were doing as many as fifty gastrointestinal examinations in a morning, a large number of them, of course, being routine examinations on asymptomatic individuals who were a part of the study. The institution of the Cancer Detection Center likewise increased our work in the stomach, colon, and chest areas."

Dr. Rigler "retired" from his position as head of the Department of Radiology in September, 1957 and departed for milder climes. He became Executive Director of the Cedars - Sinai Medical Center in Los Angeles. For the past several years he has been Professor of Radiology in Residence at the University of California in Los Angeles where today he directs

the residency teaching program in the Department of Radiology and remains, as always, enthusiastic and productive. In tribute to his outstanding contribution to Radiology and to the University of Minnesota Medical School, his former residents and associates have endowed the Leo G. Rigler Lectureship in Radiology which annually invites an outstanding scientist to speak at the Medical School during the week of the Continuation Course in Radiology. Dr. Rigler himself was persuaded to give the 1965 Rigler Lecture and delivered a fascinating exposition on the radiological examination of the liver. As an indication of the stature he enjoys throughout the world, there is also a Leo Rigler Lectureship at the Municipal Hospitals in Tel Aviv, Israel.

The new Chief, Dr. Harold Peterson, was certainly no stranger to the department. As has already been noted, he was the first full-time assistant appointed by Dr. Rigler some twenty years earlier. Following his entry into private practice in 1940, Dr. Peterson remained on the faculty in a part-time clinical position and achieved the rank of Clinical Professor in Radiology in 1956. He had during these years established an international reputation in the field of neuroradiology, and his technique for myelography was world renowned. His

reputation for intellectual honesty had earned him great respect among the Medical School faculty, the practicing physicians of the community, and the radiologists of the United States. A biographical sketch of Dr. Peterson follows this article.

The years (nearly a decade now) which have followed Dr. Peterson's assumption of the chairmanship have been characterized by further steady growth of the department. The total volume of examinations performed during the most recent fiscal year was 77,000, a figure which places the University of Minnesota as one of the largest academic departments in the country. This growth has been augmented by the development of an outstanding radiology service at the Minneapolis Veterans Administration Hospital under the dynamic leadership of Dr. Joseph Jorgens. The residency program including both institutions is now the largest in the country with nearly fifty physicians in postgraduate training.

In addition to the growth in volume of patients and residents, the past decade has witnessed a true revolution in the field of Radiology. As a result of tremendous strides in improvement of equipment and with the increasing emphasis on special procedures,

the radiologist has become more and more an active participant in the diagnostic work-up of the patient. Electronic intensification of the fluoroscopic image has permitted the department to completely discard the red goggles formerly worn for accommodation of the eyes to dim light. The markedly amplified image has resulted in improvement in quality of fluoroscopic examinations and increasing acceptance of a whole new host of procedures. Automatic film processing has been improved to the point where the main X-ray Department now contains no wet processing facilities. Films of good quality are now available for reading, completely dried, within ninety seconds. New, more powerful transformers and x-ray tubes have led to the development of complex rapid film changers making simultaneous exposures in two planes at rates of up to twelve films per second. The availability of an intensified image has led to an increasing acceptance of cine techniques allowing motion studies of contrast-filled organs.

Perhaps the most significant development of recent years has been the rapid growth in angiography. Dr. Kurt Amplatz, now Associate Professor of Radiology, joined the staff of the department in 1957 and has been a pioneer in the development of techniques for accurate

visualization of blood vessels. It was he who modified the original percutaneous vessel puncture technique of Seldinger and developed a simple safe technique for catheter replacement allowing selective opacification of nearly all the arteries of the body. His techniques have been widely copied and his articles in the fields of renal physiology and arteriography, cardiac angiography, and peripheral vessel studies have won him high acclaim. A man of varied talents, Amplatz has also designed the first effective light-weight portable injector for angiography, an accurate isotope inhalation method for detection of small intracardiac shunts, and a somersaulting chair for pneumoencephalography.

During these years, other outstanding staff members of the Department of Radiology have contributed to the growth and development of this specialty. Drs. Richard Lester, Lewis Carey, and Eugene Gedgaudas have helped to classify and understand the complex area of congenital heart malformations and the text coauthored in part by the former two is now regarded as a classic in its field. Dr. Leonard O. Langer, Jr. has made a considerable contribution in the area of congenital bony dystrophies and has diagnosed and

classified many previously poorly understood syndromes. His present status as Radiologist to a national committee on the classification of congenital abnormalities headed by Dr. Victor McKusick of Baltimore testifies to his stature in this area.

Although the first official residencies in Radiology were not created until 1927, the past decade has witnessed the development of advanced post-residency training in the radiologic subspecialties. Active postresidency training programs in neuro-radiology and in cardiovascular radiology are now the pride of the department. These have been developed because of a need for more highly trained personnel in these areas, and it is expected that the future will bring similar programs in other areas of this expanding specialty.

It has been only seventy years since Roentgen first described the rays which bear his name and only slightly more than thirty years since Radiology was given full departmental status in the University of Minnesota Medical School. The contributions, both from an academic and service standpoint, made by this department during this relatively short span of time are impressive. A recent poll of chiefs of radiology departments

in over eighty of the accredited medical schools in this country disclosed that the University of Minnesota ranked number one in the opinions of these qualified observers, both from a standpoint of academic contributions and over-all quality of the residency program. The history of the department is one of outstanding leadership -- Rigler and Peterson. With pride in this heritage, the future is bright.