The American Journal of Roentgenology

Edited by P. M. Hickey, M. D.
Associate Editor, F. C. Zapffe, M.D.

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THE AMERICAN JOURNAL OF ROENTGENOLOGY

Editor, P. M. Hickey, M. D., Detroit
Associate Editor, F. C. Zapffe, M. D., Chicago

VOL. I NEW SERIES, JULY, 1914 No. 9

NEW APPLICATIONS OF ARTIFICIAL PNEUMOTHORAX AS A THERAPEUTIC MEASURE

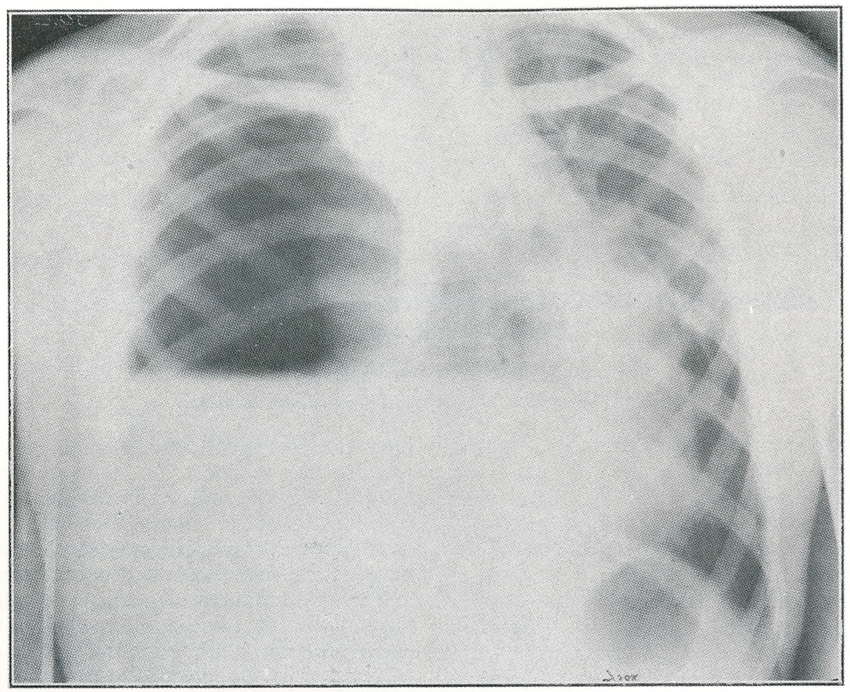
By KENNON DUNHAM, M. D.
Visiting Physician, Cincinnati Tuberculosis Hospital.

Therapeutic Pneumothorax has opened up a new field for roentgenological work, since roentgenograms and the manometer, as instruments of precision, have given us a scientific accuracy in the selections of care and cases. Last September I reported in the Journal of the American Medical Association twenty cases of "Artificial Pneumothorax as a Palliative Measure in Tuberculosis." It was in the co-operative use of stereo-roentgenograms in this procedure, and in other uses of Artificial Pneumothorax, that my definite contribution lay.

To men who have never known the illumination of having their uncontested physical examinations constantly checked up by the bald black and white of stereo-roentgenograms, the claim I make for the necessity of their use seems based upon either an inability to make good physical examinations or an undue enthusiasm for the roentgen rays. But constant use of the roentgenological method since 1909, both in conjunction with my own physical examinations and those of the best men I know, as well as with post-mortems, has enabled me to consider the following statements not unduly enthusiastic. The best work in Artificial Pneumothorax requires accurate selection of cases, constant watching of the progress of the disease, knowledge of the extent and nature of the lung collapse, the noting of the pressure upon the heart and mediastinum, the determining the existence or non-existence of pleural effusion and the safe-guarding of the unfilled side. These facts may be in part gained by the ordinary physical examination, but their accuracy, upon which the safety of the patient depends, is established, not only by the additional knowledge stereo-roentgenograms may give, but by their corroboration of the physical examination.

From roentgenograms, as from physical examinations, we cannot ascertain whether we may or may not enter the pleural cavity. Of course, the plates show us the fibrosis, and we know that when there is but a small amount of connective tissue entrance is usually easy, and when there is great fibrosis, entrance is difficult or impossible, but among the intermediate cases it is hard to differentiate.

The roentgenograms, however, do give us accurate information when percussion and auscultation fail, for we have learned from stereoscopic roentgenograms that it is almost impossible to map out accurately the extent of pneumothorax by percussion, because in some cases the lung is collapsed anteroposteriorly and in others from the mediastinum toward the chest wall; in others the lung is adherent to the chest wall as a streamer, collapse taking place around various attachments, whereas complete col-



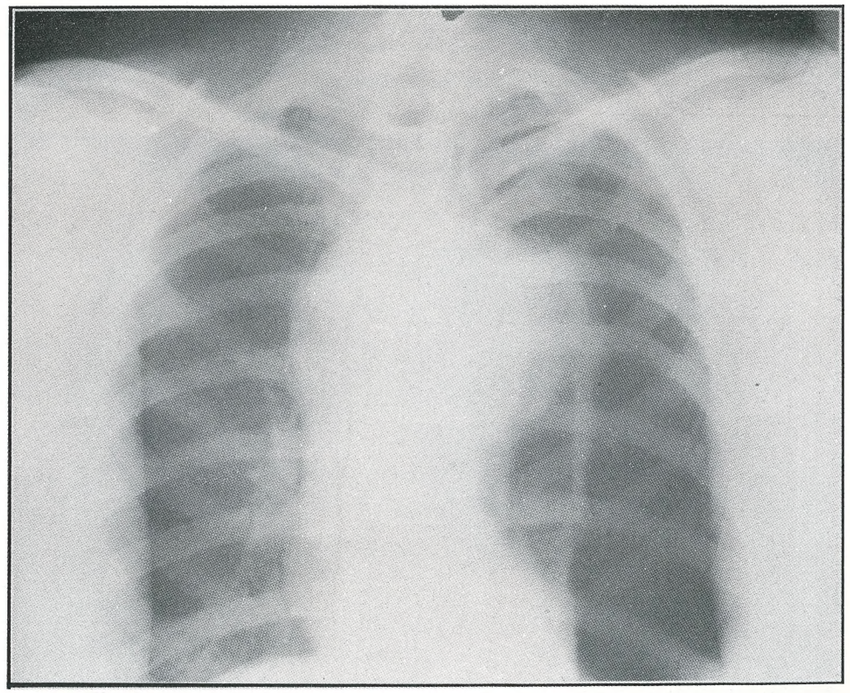
Case No 1

lapse from chest wall to mediastinum is rather the exception. It is of great interest in any of these cases to watch the cavities becoming gradually obliterated by successive injections of the gas. The position of the heart cannot always be made out by percussion or auscultation either, as it is frequently pushed from the left posteriorly, rather than altogether from the left to the right. In short, these conditions can be determined accurately only by the Roentgen rays.

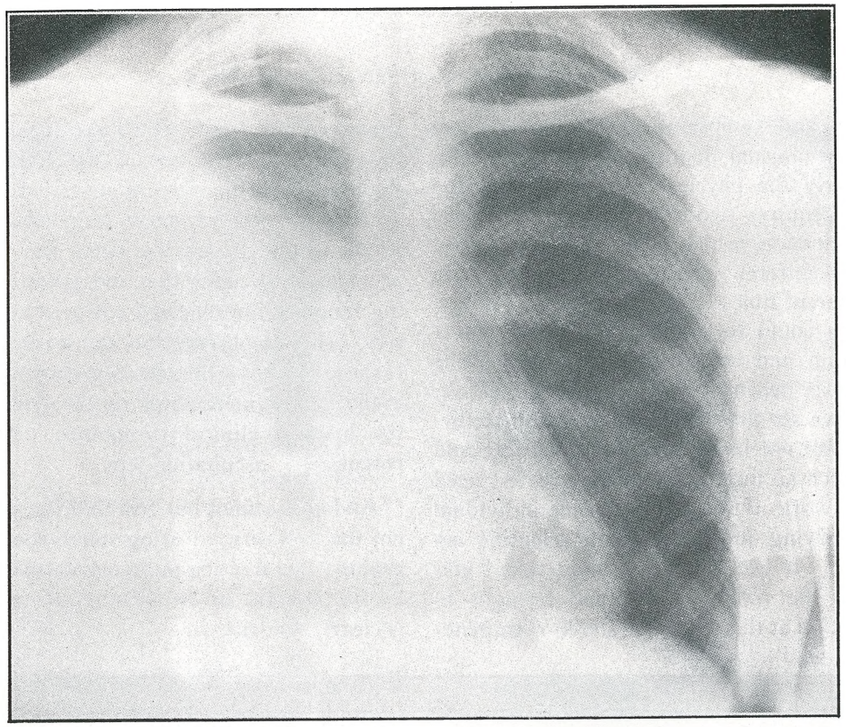
When Anenburgger in 1761 introduced immediate percussion, followed by Piorry's gift of the plexímeter, and Laennec in 1819 gave us the stethoscope, they added the scientific element to the study of the thorax, which study previously had consisted simply of a review of the history and observation of the clinical symptoms. The usefulness of these instruments was rapidly increased by the work of a host of men, of whom Skoda and Flint are prominent examples. This development consisted not only in greater refinement in the use of these instruments, but in the study of the relation of adventitious sounds to pathological conditions. Thus in the latter half of the 19th century these methods were brought to a high degree of accuracy and were generally used by the profession. Nevertheless, the objective findings of a physical examination at times become very subjective since men are at the mercy not only of their lack of knowledge, but of their personal physical condition. It is very easy to be misled as to the importance and significance of certain findings, by the com-

plaints and symptoms of the patient and also by unusual distortions of the viscera. Similarly the physical examination of the chest requires acute perception and keen concentration, which must vary greatly not only in different men but in the same man at different times. And even if these observations could be standardized, their interpretation and correlation, upon which the diagnosis depends, must still be subjective. Thus we see that the plexímeter and stethescope are not instruments of precision, and that such an instrument is the greatest need in the work, if we are to replace individual and varying judgments with scientific accuracy. It was to fill this need that I employed the roentgen ray, and brought to perfection at this clinic the stereo-roentgenograms of the chest, which are records, not observations. The use of the X-ray with fluoroscope, or fluorescent screen which presents an evanescent image, is of great value in the study of moving parts, but like all previous work along this line, gives us nothing tangible for renewed study or comparison. It is an observation, not a record. It is these records—the stereo-roentgenograms—that enable us to check up the evidence of the history, clinical symptoms, palpation, percussion, auscultation, etc.

And so I cannot but feel that the value, if not the necessity, of using stereo-roentgenograms when treating pulmonary tuberculosis by the method of Artificial Pneumothorax is clearly evident.



Case No. 2



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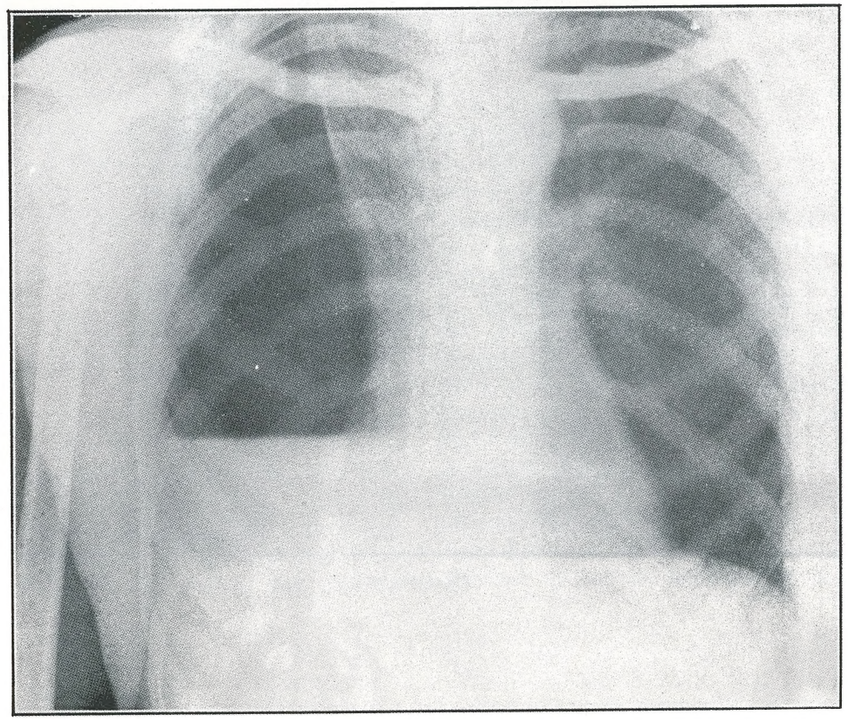


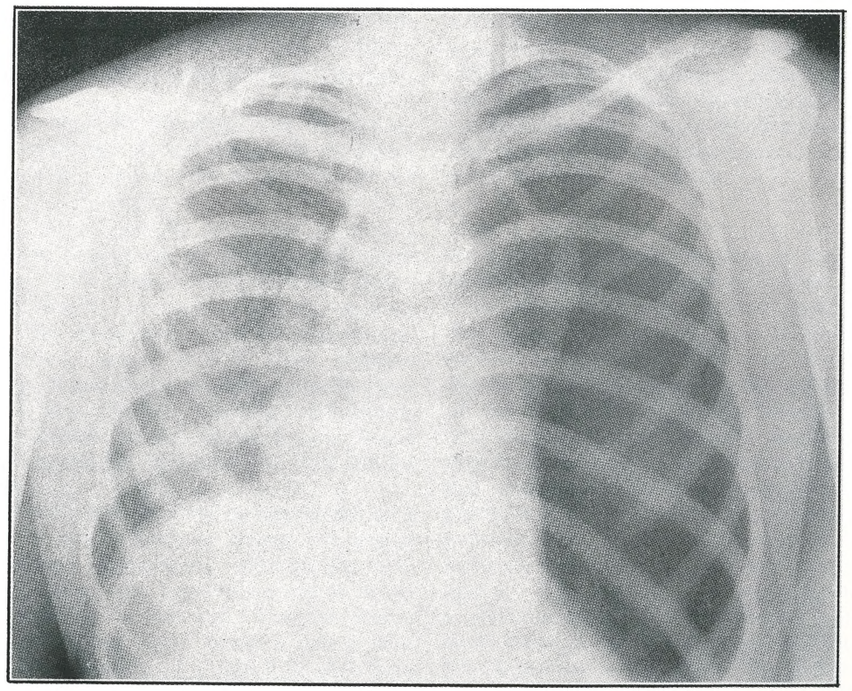
Case No. 3—After

But I have now to present conditions, other than pulmonary tuberculosis, which I have been enabled to relieve with Artificial Pneumothorax. These are—aneurism, an undiagnosed lesion, which without the X-ray was diagnosed tuberculosis, and several conditions of recurrent distressing fluid in the pleural cavity, as hydro-pneumothorax, haemothorax and pleurisy with effusion. With the exception of pleurisy with effusion, this application of the therapy is new to me.

The points I have just presented can best be made clear by the illustration of the following cases:

Case 1. Tuberculosis with hydro-pneumothorax. Patient complains of great distress from sheer weight of fluid which almost completely filled right side. Aspirated three times. Fluid accumulated so rapidly. Case was referred to my service. Fourth aspiration was followed by injection of nitrogen gas, distress greatly relieved and while patient will not completely recover, he is happy and able to do light work around the institution.

Case 2. Aortic Aneurism. Referred to my service as unilateral tuberculosis. Physical examination showed signs of bronchial stenosis rather than tuberculosis. Aneurism was suspected mostly on account of specific history and high blood pressure, 130 and 180. But until after Roentgen examination signs were not sufficiently clear to make a diagnosis. Plates illustrate condition before filling, after par-



Case No. 4

tial filling, after sufficient filling and after case had refused filling for one year. The only discomfort experienced after complete filling was slightly increased shortness of breath and the hacking cough immediately became goose-like. Summary of this case: While this treatment is open to criticism both from its imperfections, lack of support to the opp. side and the imperfect support of the aneurismal sack, and the newness of this procedure, I firmly believe that had the fillings been continued and the anti-syphilitic treatment pushed to the maximum that he would be far better off than he is today. Further, that the treatment has done him no harm. I would use it in any similar case.

Furthermore, if the progress of the disease seemed hastened by the refilling, no harm could be done as otherwise patient's prospects were hopeless.

Case 3. Stab-wound with bloody effusion, drawn off twice and refilled promptly, removed third time, gas injected since which aspiration has not been necessary.

Case 4. Normal collapse case, cavity—haemorrhage, if all collapsed like this Artificial Pneumothorax would be easy and such study as I am presenting would not be necessary. Only slight pressure necessary or advisable.

INDICATIONS AFFORDED BY X-RAYS, FOR AND AGAINST OPERATIONS ON THE STOMACH, AND THE RESULTS OBTAINED FROM SUCH OPERATIONS

By A. HOWARD PIRIE, M. D., Montreal.

There are three definite stages through which surgery of the stomach has passed, and we are now entering on a fourth stage. The first stage was when surgeons did not open the abdomen and the patient died. The second stage was when they opened the abdomen to find out what was wrong, and found frequently that nothing could be done. The third stage through which we are now passing is that in which, thanks to X-rays, the surgeon can frequently be given an exact diagnosis, so that he operates or holds his hand as he thinks he can best benefit the patient. The fourth stage towards which we are striving will be reached when the surgeon can be told by X-rays and other aids what the lesion is, so that by rule of thumb he will know at once whether or not to operate.

Every day Radiologists are extending their knowledge in the diagnosis of abdominal lesions, and as our experience grows greater so our diagnosis grows more correct.

In my experience the following conditions have been diagnosed by X-rays, and operated on, viz.: chronic gastric ulcer, hourglass stomach, carcinoma, pyloric stenosis caused by duodenal ulcer or carcinoma, gastroptosis, acute gastric ulcer, tumors pressing on and distorting the stomach, stenosis of the cardiac opening, adhesions, foreign bodies in the stomach, and lastly normal stomachs operated on and found normal.

In *chronic gastric ulcer* accompanied by a cavity in which barium lodges, we got a characteristic appearance. Haudek has very fully described the condition, and it is no doubt familiar to you all. I show you a slide of a typical case. Patient was a thin woman with history of stomach trouble during the last 8 years. You will notice: (1) the hourglass stomach; (2) the ulcer filled with barium; (3) upper horizontal level of fluid in the ulcer; (4) bubble of gas; (5) ulcer full after 4 hours and stomach empty. In regard to treatment of such cases, I have seen three failures in which gastro-gastrostomy was done, and one successful case. In the latter the stomach was divided into two parts by a strip of fascia bound tightly around it, just above the ulcer. By this means the ulcer was put at rest. A loop of the jejunum was anastomosed to the cardiac portion of the stomach close to the constricting band, and the food passed freely from the cardiac part of the stomach into the jejunum. In operations on dogs I have seen a similar operation done, viz.: the pylorus was closed and anastomosis made into the cardiac end of the stomach. The dog wasted and had to be killed. During last winter I examined with X-rays, about a dozen dogs and cats on which experimental gastro-enterostomies had been done, by Dr. Archibald and Dr. Scrimger at McGill. We saw that when a gastro-enterostomy was done without closing the pylorus, that it was *not* a success; that it *was* a success when the pylorus was closed and the new opening was made near the pylorus; that it was not a success when the pylorus was closed and the new opening was in the cardiac end of the stomach. It seems natural to believe that the proper place for the new opening should be where the pressure is greatest, and one can see by the peristalsis that the pressure is greatest where the obstruction is greatest, viz., at the stenosed part of the stomach whether it is the pylorus or elsewhere. The rate of exit of food through a gastro-enterostomy is variable. It may pour through the stomach so that no gastric digestion is possible. In such a case I have seen a patient in perfect health 5 years after his operation. In other equally

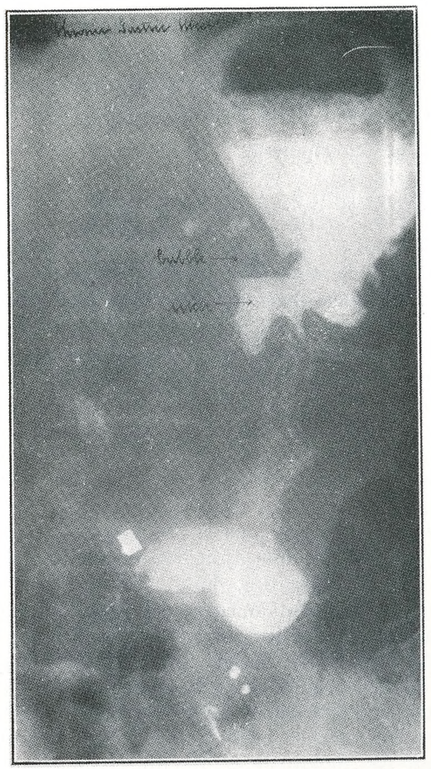


FIG. 1

Penetrating Gastric Ulcer, showing the ulcer filled by barium sulphate with a horizontal upper border, and a bubble of gas above. Hourglass contraction shown, disappeared at time of operation. Gastro-gastrostomy was done. Patient died.

successful cases I have seen the food require 4 hours to leave the stomach. When gastro-enterostomy is done at a considerable distance from the pylorus, residual food remains in the stomach between the pylorus and the opening, just like residual urine in a bladder. This is avoided by having the opening near the pylorus.

In *acute gastric ulcer,* I have seen cases presenting a deep permanent indentation in the greater curvature and some delay in the exit of food. No case has in my experience been operated on. I have had one case in which the surgeon reported to me that he had found two very small indurated ulcers on the anterior and posterior walls just internal to the pylorus. In this case food remained in the stomach for eight hours after eating, at the same time there was considerable gastroptosis and excess of gas in the stomach. The presence of these ulcers was indicated by the moderate delay, but I failed to diagnose them.

I shall touch shortly on *Carcinoma of the Stomach.* In advanced cases, the condition is so evident, both clinically and by X-rays, that it is not necessary to describe the appearance. I show you a slide of such a case in which you see the eaten out appearance caused by the invasion of the stomach by the growth. The eaten out appearance is best described by imagining the stomach as a lump of putty into which a child has pushed his finger tips. When this appearance is at all extensive there is no use advising operation. I have not yet succeeded in finding a case showing this appearance early enough to advise operation. No doubt others have been more successful in this way than I have. Dr. Franz Groedel told me last month that he had been able to make four diagnoses of early carcinoma of the stomach in time to have them completely removed. I show you a slide of a case in which carcinoma of the stomach was not suspected, but the X-rays showed, not only its presence, but the fact that it was irremovable. Operation proved this to be the case. The patient was a young man and appeared to be in fairly good health, no mass could be felt in the abdomen, but he had had gastric pain and loss of weight.

The indented appearance of carcinoma is so characteristic that one should be able to find it in very early cases, but (as in carcinoma of the breast) the patient does not apply to a physician till after it is too late. The symptoms of early carcinoma are vague and common to other diseases, so that one has to examine many normal stomachs before finding one of early carcinoma. Stomach symptoms accompanied by loss of weight should demand X-ray examination for early

carcinoma. When a lump can be felt the case is beyond surgical aid.

Pyloric Obstruction is frequently observed by X-rays. When barium remains more than six hours in the stomach, it is usually due to pyloric obstruction. One must be careful that the patient does not eat nor drink for six hours after the barium meal, for if a barium breakfast is given at 9:30 A. M. to a normal person, and an ordinary lunch is taken at 12:30, the lunch mixes with the remains of the barium breakfast and if at 4.30 tea is taken it mixes with the remains of the lunch, so that at 7:30 P. M. there may be a fair quantity of barium in the stomach. Whereas in a normal person a barium breakfast will be evacuated completely from the stomach five hours after the meal, provided no food is taken during these five hours. If this precaution is taken then pyloric obstruction is easily observed. Delay is not always caused by obstruction; want of peristalsis may cause delay. I have seen barium remain for ten hours in the stomach in a case a year after gastro-enterostomy had been done. In this case the surgeon found the pylorus quite free, but it is possible that a viscous cycle had been established. The patient was in a very weak condition. Stenosis caused by carcinoma is usually evidenced by the characteristic finger-like indentations. When due to duodenal ulcer, characteristic changes have been noted by several observers in the first part of the duodenum. Whether the delay is due to duodenal ulcer or to carcinoma, it calls for surgical operation and a gastro-enterostomy. When the stenosis is due to duodenal ulcer a gastro-enterostomy gives excellent results, but when due to carcinoma the benefit is usually temporary.

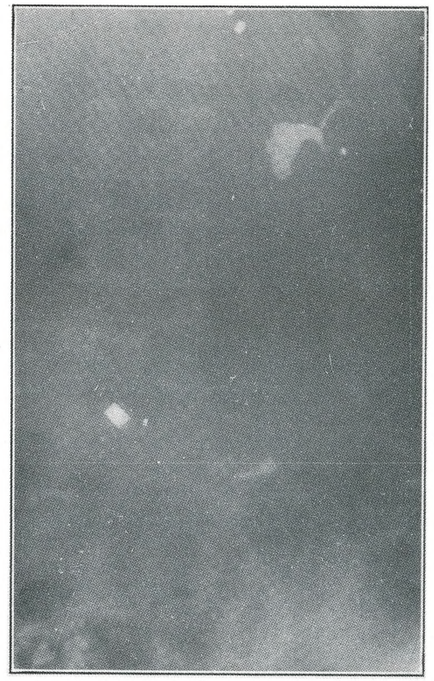


FIG. 2

Is the appearance of No. 1 four hours after barium meal was given. It shows that the stomach has emptied and left the ulcer filled by barium. Note the horizontal upper border and the bubble of gas above.

Gastroptosis is frequently seen by X-rays, and is usually accompanied by poor health and a neurasthenic condition. I have seen it operated on and the stomach raised two inches, as shown by X-rays, but the patient remained a neurasthenic after the operation. Gastroptosis per se is not accompanied by delay in exit of stomach contents nor by a residuum in the lowest part of the ptosed stomach as one might possibly expect. It does not call for operation for itself, but one should remember that gastroptosis often goes with pyloric stenosis, and that the latter calls for operation. Good results have been reported from the use of abdominal belts in cases of gastroptosis, but I have no experience of such treatment.

Tumours pressing on the stomach may so deform it that the change in the shape of the barium filled stomach helps in the diagnosis of the tumour. I show you a slide of a barium filled stomach in which the lesser curvature appears to be indented by a tumour. From the smooth rounded edge I diagnosed a fluid tumour. The attending physi-

cian had diagnosed it as an inflammatory mass surrounding a penetrating gastric ulcer. It proved to be a pancreatic cyst.

The stomach is very much displaced by a large spleen in Splenic Leukaemia. I show you a slide of such a case.

When the transverse and descending colon are very distended by gas they press on the stomach, and cause so much distress that the patient will submit to an operation to get rid of this distress. The condition is easily shown by X-rays and can be cured by appropriate medical treatment.

Stenosis of the cardiac opening of the stomach is easily diagnosed by X-rays but I have seen it mistaken for pyloric stenosis without the help of X-rays. In this case the patient vomited food he had taken the previous day, and this gave rise to the idea of pyloric obstruction. The X-ray examination revealed the cardiac stenosis and so avoided an operation on the pylorus.

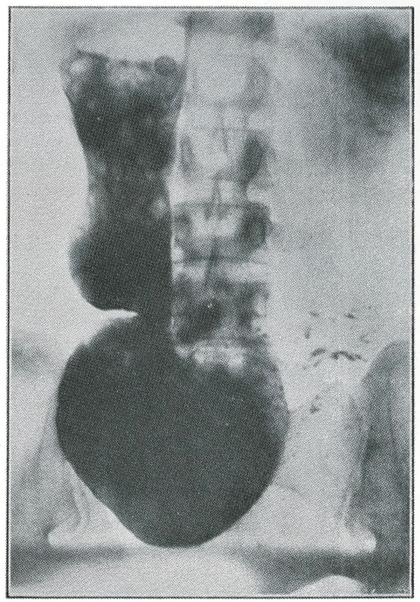


FIG 3

Acute Gastric Ulcer, showing a permanent contraction in the greater curvature opposite the ulcer. No operation.

Foreign bodies in the stomach do not often call for operation. Any foreign body which can pass the oesophagus can as a rule pass the pylorus. I have seen an English halfpenny remain in a child's stomach for ten days, causing no inconvenience, and then it passed out. I have twice seen an open safety pin pass right through the intestinal tract. A needle having two sharp ends will not pass. It usually does not even reach the stomach but a pin with a blunt and a sharp end will pass safely through the stomach, though it may lodge in the caecum. I have only seen one case of foreign body in the stomach operated on. This was in the case of a sword swallower who swallowed a packet of four-inch nails bound together, and these had to be removed by operation. He must have had a dilated oesophagus from his practice in sword swallowing. The passage through the stomach and bowels of sharp ended foreign bodies should be compared with the way an ear of barley will creep up one's sleeve when placed there with the free ends of the barbs pointing to the hand.

Adhesions affecting the stomach can be recognized directly and indirectly. Direct evidence is obtained in cases of hourglass stomach (see slide). In the case I show you adhesions occurred from the fundus of the gall bladder to the free edge of the gastro-hepatic omentum and involved the second part of the duodenum. A side view of this case showed that the upper sac lay horizontally and the lower sac lay perpendicular.

Indirect evidence of adhesions about the pylorus is got when the pylorus lies higher than usual and food escapes through it quicker than usually. In this case the adhesions prevent the pylorus closing and so the stomach contents escape more quickly. The same condition is seen at the ileo-cæcal valve when adhesions keep the valve open and allow reverse peristalsis to return the contents of the cæcum into the ileum. As

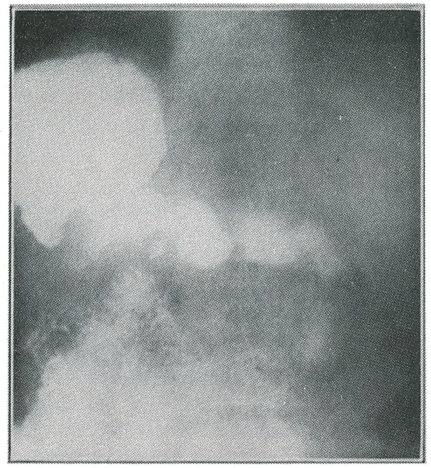


FIG. 4

Typical Pyloric Carcinoma. No mass could be felt as the ribs covered the carcinoma. At operation found unremovable.

a result of rapid transit of food through the stomach, it grows small and is placed relatively high in the abdomen. It is the effect of disuse atrophy. Stating this in other words a small high stomach always empties quickly, therefore the small high stomach is found most marked in: (1) Gastro-enterostomy where the food runs quickly through the stomach; (2) In carcinoma affecting the pylorus and destroying its action; (3) In some cases of duodenal ulcer where adhesions prevent the sphincter action of the pylorus; (4) In cases of gallstones with adhesions acting similarly; (5) Adhesions from any cause preventing the sphincter action of the pylorus. But the same disease may produce either obstruction or undue relaxation in the pylorus. For instance, I have seen a duodenal ulcer which caused such spasm of the pylorus that barium remained in the stomach for 24 hours, yet at the operation the surgeon reported that he found the ulcer but could put his two thumbs through the pylorus and that there was no stenosis. One sees the same condition in hourglass stomach accompanying chronic gastric ulcer, i. e., the opening between the upper and lower sac may be so small that fluid will only trickle slowly through it, yet when the patient is under chloroform the surgeon finds a wide communication between the sacs. I have also seen duodenal ulcer with adhesions affecting the pylorus preventing its sphincter action and so causing rapid evacuation of stomach contents. I think it is also possible to have normal speed of evacuation of stomach contents in cases of duodenal ulcer by a combination of adhesions and spasm.

The *normal stomach* may show certain anomalies against which we must be on guard. For instance a surgeon demonstrated to me a normal stomach when delay of eight hours had occurred in evacuation of stomach contents. I could only account for this by the fact that the patient was a neurasthenic girl, and the excitement of the examination had delayed the normal action of the stomach. Permanent irregularities in the greater curvature are not uncommon and may be of no pathological importance. I do not refer to the finger-like indentations of carcinoma but to wider, irregular curves probably caused by pressure of neighbouring organs. One sees frequently irregularities in the perpendicular part of the greater curvature when the splenic flexure is distended by gas and presses on the stomach or when a large spleen indents it. When the pylorus seems to lie farther to the right than usual one must be sure that the appearance is not due to technique. Error is avoided by placing a lead marker on the umbilicus and making its shadow coincide with the middle of the spine. There is room for error even in this method as a pendulous belly may allow lateral displacement of the umbilicus when pressure is applied to it. A mysterious case of persistent vomiting avoided operation by the X-ray diagnosis of normal stomach. The vomiting continued, and caused much anxiety till it was discovered that the patient was pregnant. When asked to examine the stomach we should not be satisfied till we have examined the whole alimentary tract.

I recall such a case in which I found the stomach normal but barium filled the appendix for 43 days. I warned the patient of her danger of an attack of appendicitis and three weeks later she had an attack accompanied by abscess. Her health was restored after the operation and she lost her stomach symptoms. I believe that it is a good plan to make further examination of barium meal. In such a case a barium injection may show an incompetent ileo-cæcal valve, and justify the recommendation of removal of the appendix.

Besides finding indications for and against operation by means of X-rays, we are at times justified in recommending medical or rather reasonable treatment. For instance, show a patient that his stomach is half full four hours after a meal and ask him if it is right to load it with more food. Establish for him the average time it takes him to digest a meal, and advise him to space his meals accordingly, adding from half to one hour so as to give his stomach a rest. Point out that every organ is allowed to rest—even the heart rests between beats, so why not the stomach between meals? If, as I stated above, a small high stomach is the result of rapid evacuation it is possible to imagine that a case of gastroptosis could be turned into a small high stomach by keeping it empty. This might be accomplished by a wide gastro-enterostomy so that the food passed at once into the jejunum. I would like to hear if any one has experience of this.

When a stomach is empty between meals, incoming food is not infected by bacteria or sarcinae remaining from the former meal whereas the stomach which is seldom or never emptied becomes like a cesspool. I believe the stomach should be empty all night and three times a day in order to do its best work. More people die from overeating than from undereating, and this method of advising them by X-rays, how much and when to eat is one which is of great importance for their health.

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EDITORIAL

The Cleveland meeting was a success from every standpoint. The program presented was complete and interesting. The quality of the papers presented was certainly above the average and fully repaid those who listened to them. The efficient work of the Local Committee enabled the officers to carry on the work of the meeting with the least possible delay.

The hall in which the meetings were held was well suited for the convention and was ventilated better than the average meeting place. The fact that the officers submitted a preliminary program to all subscribers of the Journal brought a number of visitors and formed an additional stimulus to the speakers.

The Manufacturers Exhibit was managed under the auspices of the manufacturers themselves which enabled them to arrange their exhibit hall and accessories at a minimum cost, although the Society realized about as much as in former meetings. This arrangement took a vast deal of work from off the shoulders of the local committee and officers of the Society and enabled the manufacturers to curtail their expenses. Much new and interesting apparatus was shown and the attendance outside of the meeting hours was very large.

The Plate Exhibit Committee furnished a remarkably planned and well arranged collection of interesting and instructive plates. The catalog which they had printed and which was ready before the meeting was a model production. A detailed report of this committee will be made by its Chairman in a coming issue of the Journal.

Everyone went home well satisfied with what he had seen and heard and feeling well paid for his attendance.

THE next meeting of the Chicago Roentgen Society will be held **Friday, October 9th,** at 8 p. m., the meeting to be held in the Clinical Amphitheatre at Mercy Hospital.

Dr. Emil G. Beck will relate some of his observations on roentgenology during a recent trip to Europe.

At the last meeting of the Society, it was voted that the subject of this October meeting should be **"Tumors of Bone,"** everybody to take part in the discussion. It is earnestly requested that each member contribute at least ten minutes' discussion to this topic. If the members will present the Secretary with a written summary of their remarks, it will make possible the publication of the reports of our meetings.

Very sincerely yours,

J. T. CASE,
Secretary.

AMERICAN ROENTGEN RAY SOCIETY

Minutes of the Fifteenth Annual Meeting, held in the Hotel Hollenden, Cleveland, Ohio, September 9, 10, 11, and 12, 1914.

The President, Dr. Sidney Lange, Cincinnati, Ohio, in the Chair.

FIRST DAY—MORNING SESSION

The President called the meeting to order at ten o'clock.

The minutes of the previous meeting were called for, and the Secretary stated that the minutes had been published in the December, 1913, issue of the AMERICAN JOURNAL OF ROENTGENOLOGY. On motion, the minutes as printed were accepted.

Dr. Alfred L. Gray, Chairman of the Executive Committee, then gave his report.

On motion of Dr. Pfahler, duly seconded, the report was received and accepted.

After a few brief but timely remarks by the President, Dr. Lange, the regular scientific program was taken up. The following papers comprised a symposium on the Head:

"A New Technic for Roentgen Examinations of the Sphenoidal Sinus," by Dr. David R. Bowen, Philadelphia.

This paper was discussed by Drs. Pfahler, Manges, Law, Hubeny, and Bowen.

Dr. P. M. Hickey, Detroit, followed with a paper on "A Study of the Interpretation of Head Roentgenograms."

This paper was discussed by Drs. Manges, Gray, Holding, and Hickey.

The next paper in the symposium, entitled "Variations in the Base of the Skull in Epilepsy and Pituitary Struma," was read by Dr. George C. Johnston, Pittsburg, and discussed by Drs. T. M. T. McKennon, Pfahler, and Hickey.

The Society then adjourned until 2 P. M.

AFTERNOON SESSION

The Society was called to order at 2 P. M. by the President.

Dr. Percy Brown, Boston, read a paper on "The Production and Maintenance of Complete Immobilization in Capital Roentgenography."

The paper was discussed by Drs. Darling, Johnston, and Brown.

The following papers were read in the symposium on "Intestinal Diagnosis:"

"Roentgen Studies of Acute Intestinal Obstruction," by Dr. J. T. Case, Battle Creek, Mich.

This paper was discussed by Drs. Le Wald, Pancoast, Eisen, and Case.

The following papers were read and discussed jointly:

"Roentgen Interpretation of Pericolic Membranes," by Dr. Edward H. Skinner, Kansas City.

"Chronic Intestinal Stasis: The Fluoroscopic and Roentgenographic Diagnosis in the Light of Operative Findings," by Dr. Wm. Seaman Bainbridge, New York City.

"Roentgen Interpretation of Intestinal Conditions," by Dr. A. Judson Quimby, New York City.

The discussion on these papers was participated in by Drs. Hunter, Pfahler, L. G. Cole, A. W. Crane, A. M. Cole, Johnston, Case, Skinner, Quimby, and Bainbridge.

Dr. H. M. Imboden, New York City, followed with a paper entitled "Roentgen Diagnosis of Some Lesions of the Vermiform Appendix."

This paper was discussed by Drs. Pirie, Eisen, Pfahler, D. R. Bowen, Quimby, Skinner, Darling, Le Wald, Friedman, Case, W. H. Stewart, Crane, Bainbridge, and Imboden.

The Society then adjourned until Thursday, at 9:30 A. M.

SECOND DAY—MORNING SESSION

The Society was called to order by the President at 9:30 A. M.

Dr. Gray, Chairman of the Executive Committee, recommended for membership the following:

M. J. Hubeny, J. W. Frank, E. G. Edward, A. Luger, J. S. Duerr, S. B. Childs, W. B. Bowman, E. S. Blaine, H. B. Thompson, R. E. Austin, A. Bassler, and for corresponding membership, F. Howard Humphries, London.

On motion of Dr. Pfahler, the Secretary was instructed to cast the unanimous ballot of the Society for the election to membership of those named. The Secretary cast the ballot as instructed, and the Chair declared the candidates elected to membership.

The Chair announced here that the ballot-box would be open at 12 noon until 12 noon the following day for the election of one member of the Executive Committee, the term of Dr. Gray having expired. He appointed as Tellers Drs. Pancoast and Chas. F. Bowen.

The Treasurer's report was then called for, and was presented by Dr. Reu, the Treasurer.

On motion, the report was referred to the Executive Committee for audit.

The scientific program was then taken up. The symposium on head rays was then presented and consisted of the following papers:

"Physics of Radiation as Applied in Medicine," by Prof. J. S. Shearer, Ithaca, N. Y.

"Hard Rays," by Mr. W. D. Coolidge, Schenectady, N. Y.

"The Relation of Gamma Rays to X-Rays," by Prof. Wm. Duane, Boston.

"The Protection Necessary When Using the Harder Rays," by Dr. H. W. Van Allen, Springfield, Mass.

These papers were discussed by Drs. Caldwell, Snook, Shearer, Coolidge, and Duane.

The Society then adjourned until 2 P. M.

AFTERNOON SESSION

The President called the Society to order at 2 P. M.

The following papers were read in the symposium on Roentgen therapy:

"Some Experiments and Observations on the Technic for Deep Roentgen Therapy," by Dr. George E. Pfahler, Philadelphia.

"Use of Radium and Mesothorium in Connection With the Roentgen Ray," by Dr. Russell H. Boggs, Pittsburg.

"Treatment of Malignant Conditions by Physical Methods, With and Without Surgery," by Dr. Arthur F. Holding, New York City.

"Roentgen Deep Therapy and Its Application in the Treatment of Malignant Growths," by Dr. Samuel Stern, New York City.

"Technic and Recent Results of Deep Roentgen Therapy, Using the Harder Rays," by Drs. J. T. Case and L. L. Jones, Battle Creek, Mich.

"The Massive Dose Versus the Fractional Dose in Roentgen Therapy," by Dr. A. M. Cole, Indianapolis.

The discussion on these papers was participated in by Drs. Edmonson, Johnston, Crane, D. R. Bowen, Stevens, Shearer, Duane, Dachtler, Pancoast, Pfahler, Holding, Stern, Case, and Cole.

The Society then adjourned until Friday morning at 9 o'clock.

On the evening of this day Dr. Percy Brown, of Boston, read a very interesting paper on "The Case System of Teaching Roentgenology." Various members then showed lantern slides, the gathering breaking up at about 10:30 o'clock.

THIRD DAY—MORNING SESSION

The Society was called to order by the President at 9:30 o'clock.

Dr. Gray reported that the Executive Committee had received word that Dr. Brennemann, of Scranton, and Dr. Price, of ————, had applied for reinstatement to membership. The Committee recommended that application be made to the Executive Committee, and that all back dues be paid before reinstatement would be made.

The Committee further recommended the adoption of a distinctive membership button.

Also that the Editor of the JOURNAL be appointed before and not after the annual session.

That fifty dollars per month be paid to the Editor of the JOURNAL, to secure such assistance as was necessary in the preparation of manuscripts.

That the amendment to Section III, Article VI, proposed and laid on the table at the 1913 meeting, be reconsidered and adopted.

That the accounts of the Treasurer had been audited and found correct.

Dr. Pancoast moved that the report be received, and that the recommendations made therein be acted on separately. Seconded and carried.

Dr. Pancoast moved further that Drs. Brennemann and Price be required to apply for membership in the Society in the regular way. Seconded and carried.

With reference to the money to be expended for editorial work, Dr. Pfahler moved that this matter be left entirely to the discretion of the Publication Committee. Seconded and carried.

Dr. Johnston moved that the matter of the amendment of Section III, Article VI, be made a special order of business on Saturday morning at 9 o'clock. Seconded and carried.

That portion of the report of the Executive Committee dealing with the accounts of the Treasurer was accepted, on motion, duly seconded.

The scientific program was then resumed. The following papers comprising the symposium on "Gastric and Duodenal Diagnosis" were then read:

"Cinematography of the Antrum Pylori, Pylorus, and First Part of Duodenum; Apparatus Used and Clinical Results," by Dr. A. Howard Pirie, Montreal.

"Negative Diagnosis of Surgical Lesions of the Stomach and Cap," by Dr. Lewis Gregory Cole, New York City.

"Roentgen Findings in Duodenal Ulcer; A Review of the Literature," by Dr. Paul Eisen, Chicago.

These papers were discussed by Drs. Pfahler, Le Wald, Johnston, Hulst, Pirie, Cole, and Eisen.

Dr. A. W. George, Boston, followed with a paper on "Diagnosis of Gall-stones by the Roentgen Method, and Observations from the Study of One Thousand Gastro-Intestinal Cases."

This paper was discussed by Drs. Brown, Holding, Crane, Pfahler, Skinner, Palmer, Le Wald, L. G. Cole, Johnston, and George.

At this juncture the Chair appointed the Nominating Committee:

Drs. L. T. Le Wald, H. E. Potter, and A. M. Cole.

The Society then adjourned until 2 P. M.

AFTERNOON SESSION

The Society was called to order by the President at 2:15 P. M.

The Executive Committee, through its Chairman, Dr. Gray, recommended for election to membership, Dr. Wm. A. Evans, of Detroit, Mich. On motion of Dr. Pancoast, the Secretary cast the ballot of the Society for the election to membership of Dr. Evans.

The Chair here announced that Dr. H. W. Van Allen had received the greatest number of votes cast for member of the Executive Committee, and declared him duly elected to that office.

Dr. Skinner moved that the Chair instruct the Nominating Committee to present more than one name for each office. Seconded.

Dr. Hickey moved to amend: That the Nominating Committee *may* present more than one name for each office.

Dr. Skinner accepted the amendment.

The motion, as amended, was carried, and the Chair so instructed the Nominating Committee.

Dr. W. H. Stewart, New York City, then read a paper on "Advanced Roentgen Technic in the Diagnosis of Esophageal Lesions." It was discussed by Drs. D. R. Bowen, Darling, Brady, and W. H. Stewart.

Dr. L. T. Le Wald, New York City, followed with a paper entitled, "Operative Indications in Gastro-Intestinal Lesions." This paper was discussed by Drs. L. G. Cole, Johnston, Pirie, Eisen, Pancoast, and Le Wald.

Dr. George W. Grier, Pittsburg, presented a paper on "A Practical Method of Determining the Degree of Movability of the Abdominal Viscera."

Dr. E. W. Caldwell, New York City, followed with a paper on "Personal Observations in the Treatment of Chronic Roentgen Dermatitis of the Hands."

Dr. Walter J. Dodd, Boston, read a paper on "Treatment of Acute Roentgen Dermatitis."

These papers were discussed by Drs. Le Wald, Stern, Pancoast, and Dodd.

Dr. Johnston moved that the Society extend to Dr. Hickey a vote of appreciation for his services as Editor of the JOURNAL. Seconded and carried.

Dr. E. W. Caldwell, Chairman of the Committee on Standards, made a brief verbal report.

The Society then adjourned until Saturday morning at 9 o'clock.

FOURTH DAY—MORNING SESSION

The Society was called to order by the President at 9 o'clock.

The special order of business at this hour was the consideration of the amendment of Article VI, Section III. This section was read and its adoption was moved. A ballot was taken, Drs. Cheyne and Bissell acting as Tellers.

The count showed that the amendment had carried, and was so declared by the Chair.

Dr. D. R. Bowen reported briefly on behalf of the Plate Exhibit Committee.

Dr. Gray moved a vote of thanks to the committee, and that it be continued. Seconded and carried.

Dr. Gray stated that the Executive Committee had received numerous invitations for place of meeting of the sixteenth annual meeting of the Society, and therefore the committee felt itself powerless to make a choice. The committee recommended that the selection of the place for holding the next meeting be postponed until after a postal card vote of the whole membership of the Society had been taken.

On motion, duly seconded, this recommendation was concurred in by the membership.

Dr. Le Wald, the Chairman of the Nominating Committee, then presented the following report: President, Alfred L. Gray and James T. Case; Vice-Presidents, A. H. Pirie, W. H. Stewart, D. R. Bowen, and George H. Stover; Secretary, W. F. Manges; Treasurer, L. E. Reu; Member of Publication Committee, Dr. Edward H. Skinner; Librarian, H. W. Dachtler.

On motion of Dr. Pancoast, the Secretary was instructed to cast the unanimous ballot of the Society for the election to office of those nominees whose names were presented singly by the Committee; that is, all except for the office of President and Vice-Presidents. Seconded and carried.

Dr. James T. Case withdrew his name, and the Secretary was instructed to cast the ballot of the Society for the election of Dr. Gray to the office of President, which he did.

A ballot was taken for Vice-Presidents. Drs. Soiland and Charles F. Bowen acted as Tellers. The vote resulted in the election of Dr. A. Howard Pirie for First Vice-President, and Dr. David R. Bowen for Second Vice-President.

The scientific program was then resumed.

Dr. Frank S. Bissell, Minneapolis, read a paper entitled, "The Value and Limitations of the Roentgen Method in the Early Diagnosis of Pulmonary Tuberculosis."

The paper was discussed by Drs. Le Wald, Dachtler, Brady, Gray, and Bissell.

Dr. A. Howard Pirie, Montreal, followed with a paper on "Lung Abscess," which was discussed by Drs. Le Wald, Hickey, and Pirie.

Dr. Albertus Cotton, Baltimore, read a paper on "The Use of the Roentgen Ray in Fractures."

This paper was discussed by Drs. Hunter, Hammond, Duerr, Dachtler, Skinner, Pirie, Heck, Johnston, and Cotton.

On motion of Dr. Hammond, a rising vote of thanks was extended to the local committee for the splendid and successful arrangements made for the conduct of the meeting.

There being no further business to come before the Society, the meeting was adjourned *sine die*.

SIDNEY LANGE, *President*.
W. F. MANGES, *Secretary*.

ABSTRACTS

George, A. W., and Gerber, I., Boston: Roentgen diagnosis of duodenal ulcer. A comparison of the direct and indirect methods. (Surg., Gyn. and Obstet., Sept., 1914.)

In the Roentgen diagnosis of duodenal ulcer two methods of study have gradually developed. These are the direct and the indirect methods of diagnosis.

The indirect method, generally used by European observers, is based upon a consideration of "symptoms-complex." These are groups of signs, usually of a functional nature, such as hyperperistalsis, hypermotility, six-hour gastric stasis, etc., which have been found associated with organic lesions.

The direct school of Roentgen diagnosis disregards all these indirect, so-called, "major" or "minor" signs, and restricts itself to one problem, namely, the attempt to demonstrate adequately the anatomic condition of the duodenum and the determination as to whether the duodenum so demonstrated is normal or pathological. This problem is largely one of careful and exact technic.

The fluoroscopic method, when applied to the study of duodenal ulcer from this strict point of view, is entirely unsatisfactory. It is only with the plate method, carefully carried out, that the duodenum can be demonstrated in its entirety. The fluoroscope undoubtedly has its valuable applications in the study of the stomach and many other parts of the alimentary tract; however, when it comes to a study of the duodenum and the problems involved in duodenal ulcer, the fluoroscope must really be considered as of little value.

Serial roentgenography is the ideal way of studying these cases, but it is not necessary always to take an extremely large number of plates; only enough plates need be taken as will convince the investigator of either the normal condition of the duodenum or its constant abnormal condition. No set rules can be given as to the position of the patient during examination. All the positions—prone, standing, and lateral—may have to be used in order to obtain the desired information. The exact procedure to be followed must be worked out in each individual case as it goes along. This requires the use of rapid developers and the development of plates constantly during the course of the examination. Of course, this is a more troublesome process than the indirect method, but the more accurate results obtained are certainly worth the slight extra trouble and expense.

The authors were the first to emphasize the value of the LATERAL VIEW in the study of the duodenum.* They believe that this is the most important single method known that will adequately demonstrate the duodenum every time. The technic is very simple. The patient lies on the right side, on a small plate with an intensifying screen. The rays enter the left side of the patient. It is advisable to use the smallest cone and diaphragm obtainable, and the cone must be placed almost in contact with the left side. The length of time of the exposure depends upon the size of the patient. In general, it should be about twice as long as is necessary to obtain a satisfactory plate of the same patient in the prone position.

With this technic not only the first portion of the duodenum, but the descending duodenum, and in many instances the transverse portion, are readily brought into view. In well-nourished persons this position is the only one that will bring out the first portion of the duodenum satisfactorily. These people usually have the steer-horn type of stomach, with the pylorus and duodenum held over to the right, behind the antrum. These regions are not brought well into view when plates are taken, or fluoroscopic examination is made, in either the prone or standing positions.

*Amer. Quart. of Roent., 1913, iv:193.

Likewise, the lateral position is of value in those cases where there is pylorospasm. Here the force of gravity is added to the peristaltic force of the stomach, and the weight of the meal will relax the spasm and enable the duodenum to be well filled out. This sometimes may require an hour or more to wait, and in rare instances may even require a repeated examination on another day; but at some time the spasm will relax and the duodenum will fill out. This renders possible an opinion as to whether a spasm is the result of duodenal ulcer or not.

Ninety-five per cent of all duodenal ulcers, as is well known, occur in the first portion of the duodenum. Therefore, careful anatomical study of this part, as outlined with bismuth, affords the opportunity of studying the great majority of ulcers. The smaller group, which is found in the descending and transverse portions of the duodenum, likewise give Roentgen signs which are quite definite. Duodenal ulcers show a characteristic deformity, due to connective tissue, with often a stream of bismuth seen entering the mucosal defect.

The only possible type of duodenal ulcer that cannot be shown is the true simple duodenal ulcer, such as is found at autopsy with severe toxic conditions, such as uremia or the toxemia following a severe burn. These are truly limited to the mucous membrane, and they cannot be felt by the palpating finger from the peritoneal surface. It is only this type of ulcer that cannot be demonstrated by the Roentgen ray. This, however, is not the sort of ulcer that gives symptoms; it is not the duodenal ulcer with which clinicians are concerned; and it certainly is not the type with which surgeons can have anything to do. The authors, therefore, feel confident in stating that the demonstration upon plates of a normal duodenum definitely rules out the possibility of indurated or surgical duodenal ulcer.

They have had, up to date, 82 operated cases of duodenal ulcer, all of which were previously examined by their method. Out of this number a correct diagnosis of duodenal ulcer, with its exact location and extent, was made in 78 cases. In 3 of the cases a diagnosis of duodenal ulcer was made, but there was a failure in several minor details. In one case only of the series was there an absolute failure in diagnosis. In this case the diagnosis of duodenal ulcer was made in spite of the fact that one of the lateral views showed a normal duodenum. Of 150 operated cases in which a negative Roentgen diagnosis was made, duodenal ulcer was not found in any case. In one autopsied case a duodenal ulcer was found, where the previous report had been negative.

Cole, Lewis Gregory, Professor of Roentgenology in Cornell University Medical College: Relation of lesions of the small intestine to disorders of the stomach and cap as observed roentgenologically. (Amer. Jour. Med. Sci., July, 1914.)

Cole says in order to obtain the findings upon which his observations are based, an extensive routine examination of the entire gastro-intestinal tract is essential. About 11 p. m., or ten hours before the roentgenographical examination, the patient takes bismuth or barium suspended in buttermilk, in conjunction with a meal of meat, potatoes, and bread. At 9 o'clock the next morning he presents himself for examination. A roentgenogram of the whole abdomen is made to determine how far the meal taken the night before has progressed. This information can usually be obtained from the fluoroscopic examination, which is made simultaneously; but if any doubt exists the plate should be developed rapidly in order to ascertain with certainty whether or not the ileum is empty. If food still remains in the ileum the same examination is repeated bi-hourly until the ileum is completely

evacuated, then the patient takes bismuth or barium suspended in buttermilk. After the passage of the ingesta through the esophagus has been observed fluoroscopically, the stomach is examined by combined fluoroscopy and serial roentgenography.

Serial Roentgenography of the Stomach. — Twelve roentgenograms are made in the prone posture, four to six in the lateral direction, two posteriorly, and twelve with the patient erect, after which the patient at once eats a meal of meat, potatoes, and bread. Two hours later another series of six to twelve roentgenograms is made, two of them stereoscopic roentgenograms of the entire gastro-intestinal tract. As this series often gives the most valuable information, we are therefore increasing the number of exposures made at this time. If further details concerning the progress of gastric digestion seem desirable, another series of roentgenograms is made four hours after ingestion. A pair of stereoroentgenograms is invariably taken six hours after the bismuth meal. If at this time the fluoroscope reveals an appreciable gastric retention, five or six roentgenograms of the stomach are made.

Examination of Ileocecal Region.— As the condition of filling in the ileocecal region is of prime diagnostic importance at this time, two small stereoroentgenograms (8x10 inches) are made of this portion of the tract, and if marked stasis or any other unusual finding is observed fluoroscopically, six to eight small roentgenograms of this region are made. Two hours later, i. e., eight hours after ingestion, one plain roentgenogram or a pair of stereoroentgenograms is made. This completes the examination for that day. At 9 o'clock the next morning, i. e., twenty-four hours after the ingestion of bismuth and buttermilk, another roentgenogram is obtained. If there is evidence of colonic stasis or constipation a roentgenogram is made every twenty-four hours until the colon is evacuated. In case the patient habitually depends upon a cathartic, it should be allowed as usual, but an active purgative is undesirable.

After the examination just described there remains to be made an examination of the gall-bladder for possible calculi, and also an examination of the colon, while mechanically distended, for the purpose of discovering any spasmodic or organic lesions not detected when the bismuth passed through from above.

The night before this examination an active cathartic is administered. If this is not effective, the patient takes a saline cathartic early in the morning, but on no account an enema, as this might be retained and dilute the bismuth clyster, which is used to distend the colon.

Examination of Gall-Bladder.—Before the colon is examined, roentgenograms are made over the gall-bladder region, as biliary calculi can be detected in at least fifty per cent of the cases when they are present.

Examination of the Colon.—A clyster of bismuth or barium, mucilage of acacia, and hot water (barium sulphate ℥v, mucilage of acacia ℥xij, hot water q. s., ℥xxx) is now administered and retained by the patient while a pair of stereoroentgenograms of the colon are made. It is a wise procedure to make a third plain roentgenogram or another pair of stereoroentgenograms, because it is sometimes difficult to differentiate between spasms and organic lesions in a single pair of stereoroentgenograms. A study of about three hundred such cases, showing the stomach, small intestine, and colon at various intervals after the ingestion of food, has revealed a great variety of significant findings, a correlation of which leads Cole to the publication of his preliminary report.

Cole emphasizes that the region previously termed the first or ascending portion of the duodenum is not the duodenum in any sense, but is actually the cap of the stomach (pilleus ventriculi). The duodenum can be identified by its shape, and position, and the ring-like appearance of its circular contractions. Its motor phenomena is a broad, rapid, periodical, propulsive peristalsis, and a churning or mixing motion of the circular folds. From the horizontal duodenum the ingesta pass into the jejunum in the upper left quadrant of the abdomen, where they are broken up into finely comminuted particles. Roentgenographically these fragments present the flocculent appearance which distinguishes the jejunum from the rest of the small intestine. As the chyme reaches the center of the small intestine and occupies the ileum, it begins to form into coagulated masses. The ileum, therefore, is recognized roentgenographically by its location in the right lower quadrant of the abdomen and the coagulated appearance of the contents in its upper portion, and the well-defined worm-like coils in its lower portion.

Spasm of the Pars Pylorica, Pyloric Sphincter, and Cap.—The roentgenographical picture of spasmodic contraction of the pars pylorica shows that portion of the gastric lumen reduced in size out of all proportion to the dimensions of the pars media and pars cardiaca. The whole or only the pyloric end of the region may be distorted. The mucosa and submucosa, normally ribbed by shallow rugæ, are puckered into deep folds, which give the lumen a corrugated appearance. These furrows may run transversely or obliquely. The roentgenogram which presents these phenomena may be followed by one showing a perfectly smooth, well-distended contour of the same region, indicating that the spasm has relaxed its grip temporarily. Sometimes the spasm occurs only at a certain stage of digestion, and is absent in all the roentgenograms made before and after this interval.

The presence of a spasmodic constriction of the pyloric sphincter may be inferred from the absence of bismuth in the lumen of the sphincter and cap, provided the bismuth is seen passing freely from the stomach into the cap in roentgenograms made previously and subsequently. If the cap is quickly evacuated by duodenal peristalsis, its outlines will remain indistinct or invisible until a relaxation of the pyloric sphincter opens the passage from the pars pylorica through which the cap is resupplied with contents.

In spite of Kreuzfuch's reports to the contrary, Cole's observations have been that the gastric peristalsis may be just as active while a spasm involves the pyloric sphincter as it is when the sphincter is functionating normally. Constriction of the cap from spasmodic contraction presents roentgenographical evidence similar to that caused by a spasm of the colon. The cap has the appearance of having been twisted or wrung empty of its contents, only a suggestion of its bismuth impregnated contents being visible, caught or entangled under the constricting folds. As a result the distorted lumen casts a corrugated or fluted shadow on the roentgenograms.

Permanent Changes in the Pars Pylorica, Pyloric Sphincter and Cap.— Frequent spasm of the pars pylorica causes a contraction of the muscular coat, and a consequent diminution of the lumen of this region as compared with lumen of the pars media and pars cardiaca. The mucosa and submucosa heap up into deep folds and attain a permanently puckered appearance, such as they formerly presented only when dominated by a spasm. The region lacks pliability, presenting unusually broad peristaltic contractions, but exhibits a regular systole and diastole.

The result of spasm of the pyloric sphincter is not quite so characteristic. It may be described as a puckering resembling the folds near a purse string that had been tightly drawn, and is most prominent during the stage of diastole, when the adjacent tissue is completely relaxed. The sphincter may be thicker than normal, but at some stage of digestion its lumen should be distinctly shown.

The roentgenological findings of permanent changes resulting from spasm of the cap are so similar to those of post-pyloric

ulcer that the two conditions are sometimes difficult to differentiate.

Careful observation of the entire gastro-intestinal tract at different periods after ingestion has shown that the inhibition of duodenal peristalsis during the later stages of digestion is usually associated with a distention or dilatation of the terminal portion of the ileum. It has been noted that as the chyme accumulates in and distends the ileum, duodenal peristalsis diminishes. The replete ileum, no longer a hungry gut, apparently exerts its influence to prevent overfilling by cutting off the supply from above.

Roentgenological evidence indicates that iliac stasis, or rather iliac dilatation, may be caused by:

1. Incomplete evacuation or fecal impaction in the cecum and ascending colon.
2. Various types of membranes and veils involving the colon and terminal cecum.
3. Kinks of the terminal portion of the ileum.
4. Insufficiency of the ileocecal valve.
5. Chronic appendicitis (primary or secondarily from adhesions, either before or after its removal).

All of these conditions may be recognized and differentiated from each other with a remarkable degree of accuracy by a thorough roentgenological examination, preferably in conjunction with a serial roentgenographical examination of the stomach and duodenum.

Pfahler, George E., Philadelphia: Roentgenotherapy in uterine hemorrhage. (Jour. A. M. A., Aug. 22, 1914.)

The treatment of uterine hemorrhage by means of the Roentgen rays really consists in the treatment of the causes of the hemorrhage.

Indications in Hemorrhages Due to Myomas.—(1) All cases of myoma in older women in whom there is already a well-advanced anemia, which may be the cause of an anemic heart. (2) All elderly and young women with myomas, in whom there is marked organic heart-disease, diabetes mellitus, chronic nephritis, marked lung-disease and goiter with cardiac symptoms. (3) All patients beyond the age of forty, in whom there is no contraindication to the treatment. In general, the older the patient, and the nearer she has approached the menopause, the more prompt and satisfactory will be the result. Under forty, roentgenotherapy is not the method of choice, but good results can be obtained, though the younger the patient, the more treatment will be required. (4) The intramural, or the interstitial variety of tumor, gives the best results.

Contraindications.—(1) All cases of myomas in which the tumor is pedunculated, or which can be excised without destroying the reproductive powers of the patient. (2) Fibroids that have undergone malignant degeneration, or that have become gangrenous, should not be treated. (3) Fibroids associated with disease of the adnexa. (4) Fibromas which are producing such marked symptoms that the patient is endangered more by waiting two or three months for results of roentgenotherapy, than by the result of an operation.

Results to be Expected in the Treatment of Fibroids.—The decrease, or cessation of the hemorrhage, is the first result to be expected. The effect is more prompt the older the patient, or the nearer the menopause has been reached. Generally there is a decrease or cessation of the flow within a month or two after the first two series of the application of the rays. At times, after the first series of treatments, there may be an increase in the hemorrhage; in fact, the two subsequent menstrual periods may at times be increased. Generally, the first menstrual period following the first series of irradiations is not decreased and is at times increased. The second period, which usually follows the second series of irradiations, is usually diminished and the third menstrual period commonly disappears. The increase in hemorrhage following the first series of irradiations is due to the stimulating effect of the rays on the cells. Following this the vitality of the cells is depressed, and finally destroyed. Increase in hemorrhage is more often observed with the subserous variety of fibroids, and in patients who are very anemic. Therefore, when beginning treatment in this class, there should be a special effort made to place the patient in bed following the treatment, and the attending physician should be prepared, if necessary, to tampon the vagina. In patients beyond the age of forty, there are usually required from three to six series of irradiations given in from three to five months. In patients under forty, considerably more treatment will be needed than in the older patients, and at times it seems only possible to stop the intermenstrual flow, and restore the menses to a normal quantity. At times the cessation of hemorrhage is almost miraculous. With the establishment of permanent amenorrhea or an artificial menopause, the patient is likely to have the same group of symptoms which occur with a normal menopause. They are more likely to occur if the menopause has been produced rapidly. With the cessation of hemorrhage, the general health improves, the patient regains color, weight, strength and appetite; sleep improves and the hemoglobin and red corpuscles increase to nearly normal. Both the hemoglobin and the weight should be recorded repeatedly during the course of treatment, for if there is no increase in the weight and hemoglobin, the case is not purely one of myoma, but should always make one suspicious of a malignant disease. The tumor is usually the last to show any effect. Occasionally it decreases in size before the bleeding ceases. Generally there is a decided reduction in the size of the tumor at the time of cessation of treatment, and the reduction continues from this time forward. The tumor continues to decrease in size long after the cessation of treatment. In 75 per cent. of Pfahler's patients who have ceased treatment, the tumor has disappeared. With a decrease in the size of the tumor, the pressure symptoms disappear. No case of malignant degeneration subsequent to this treatment has been observed. The relief of pain will depend in great part on its cause. If it is caused by pressure of a large fibroid, the pain, of course, will not be greatly relieved until there is sufficient reduction in the size of the tumor to release the pressure. If the pain is due to hypersensitive ovaries or ovarian excitability, it will be relieved comparatively early, because the earliest effect of the rays is shown on the ovaries. Such conditions sometimes exist in dysmenorrhea. The relief of pressure symptoms, such as constipation, swelling of the lower extremities, irritability of the bladder, etc., will, of course, await the reduction of the size of the tumor, and, since this is the latest effect to be seen, it may persist for several months after beginning treatment.

In general, the object of the treatment is (1) to depress or obliterate the functions of the ovaries, thus producing an amenorrhea or oligomenorrhea; and (2) to cause an atrophy of fibroids, if present, (a) by action on the ovaries; (b) by direct action on the tumor; (3) to cause degeneration of the carcinoma cells, which should be replaced by healthy connective tissue; and (4) to restore the bleeding mucous membrane in the metropathic cases, to a normal or healthy condition. This should be accomplished without damage to the skin, the bowels or the lymph glands, with a fair degree of certainty and within a reasonably short time. Therefore, the greatest attention must be given to technic. The exciting instrument should give a uniform current of high voltage, and sufficient in quantity to excite any given tube to a high degree of efficiency. Previous to the development of the Coolidge tube, Pfahler preferred the high-power, high-speed static machine, forty plates. Since the development of this new tube, which marks a wonderful advance in roentgenotherapy, he prefers the transformer type of inductor,

having a rhythmeur attachment, which gives the greatest degree of efficiency, and enables one to give a dose in the shortest period of time. Any type of exciting apparatus can be used if the proper balance is maintained between the amount of current used and the proper degree of penetration of the rays from the tube, with a corresponding duration of the treatment. The tube should be one that will keep a constant high vacuum of from seven to eight Benoist. If the tube is allowed to get soft, the rays will be absorbed in the superficial tissues, resulting in a burn, and the deep effect on the ovaries will not be obtained. The most practical distance of the target of the tube from the skin of the patient, with the present type of holder and present shape of tubes, is eight inches. The field of application of the rays is over the diseased area, and in the case of fibroids should be especially directed toward the ovaries, and include the fibroid from every possible direction. The rays should be confined to the area treated as much as possible. If a rapid result is desired, large doses must be given; the field of application must be subdivided in such a manner that by cross-firing, an increased dose will reach the deep tissues without affecting the skin. Treating a small fibroid which is entirely in the pelvis and is in a thin patient, the subdivisions and fields for the entrance of the rays can be at a minimum, and good results can be obtained by giving a series of treatments through three fields anteriorly and one field in the perineal region. On the other hand, if the fibroid is large and the abdomen thick, Pfahler commonly divides the area into twenty-five or more doses, and in carcinoma of the abdomen he at times treats through thirty-five or forty subdivisions, giving the limit of skin tolerance through each area. Generally, in the treatment of fibroids, it is not desirable to bring on a very rapid menopause, for by producing this change gradually there is given an opportunity for the system to accommodate itself to the change.

The time required to give any particular treatment will depend on the character of equipment and the technic of the individual operator, as well as on the condition and circumstances of the patient. Generally, Pfahler uses one, two or three days to give any series of treatments, depending chiefly on the number of doses that have to be given in a series. The total dose given in any series varies from forty to about eight hundred X. The interval between any series of treatments should not be less than two weeks. The favorable time for treatment is immediately after a menstrual period. When one has a choice in the matter, the treatment should at least be given ten days before the beginning of the succeeding period. If the bleeding is continuous, the treatment should be given just after the time that would correspond to a period. The skin dose, or total quantity of rays applied to the surface, should be measured carefully, so as to avoid burns.

A dose refers to the amount of rays that the skin will tolerate without producing more than a slight erythema. This dose, measured by the Kienbock quantimeter, is referred to as 10 X. Measured by the Sabouraud and Noire pastilles or disks, it is recognized as Tint B; or, measured by the Holzknecht radiometer, it would correspond to 10 units. As referred to in the general literature, the units 10 X (Kienbock) or 5 H. (Holzknecht) correspond to an erythema dose, given without filtration. With filtration, this dose, when measured under 3 mm. of aluminum, can be increased to from 20 to 30 X. To do this, however, one must have a tube that is giving uniform rays.

Filters should be used to cut off the rays that are mostly absorbed by the skin. For this purpose the leather filter, first recommended by Pfahler, has served well. On top of this he now adds for this deep roentgenotherapy, 3 mm. of aluminum, and places these just above the diaphragm of the tube stand.

At present he is giving a dose of 30 X through each area treated, but he does not recommend this extremely high dosage for general use.

The disadvantages are the following: (1) The prolonged course of treatment that is usually necessary. (2) There is danger to the overlying tissues, if the rays are not properly applied. (3) It has been claimed to be more expensive than operation.

The advantages are: (1) It is painless. (2) It avoids the shock of an operation. (3) It preserves to a certain extent, he believes, the internal secretion which is lost in a complete oophorectomy. (4) It does not interrupt the usual habits. (5) Confinement in a hospital is avoided. (6) In the hands of a skilful operator it is without risk. (7) The menopause is brought on gradually, when necessary. (8) The amount of treatment can be graded to the needs of the patient.

Mowat, Harold, Edinburgh, Scotland: The Roentgen ray treatment of tuberculous glands. (The Brit. Med. Jour., July 4, 1914.)

Mowat uses a hard tube, and filters the rays through aluminum or felt, generally through 1.5 mm. of aluminum. He says that the current should range from two to three milliamperemeters, and the rays be applied directly to the affected parts, a suitable lead-glass screen being used of the requisite size. The exposure given should be at any rate one full Sabouraud dose, but in some cases it is advisable to exceed this by about a quarter. Cases may be treated twice a week. Most of those reported were only seen once a week, or even less frequently, owing to the difficulty of persuading the patients to come to the hospital; had the attendances been more regular even more rapid cures would have resulted.

The following is a record of cases recently treated:

1. S. P., aged 10. Large mass of tuberculous glands situated on right side of neck. Treatment was given once a week for seven weeks. At the end of that time all trace of glands had disappeared. A marked improvement was noticed after the fourth treatment. The patient has been seen within the last week, and no recurrence has taken place.

2. F. H., aged one year and ten months. Mass of fungating tuberculous glands in neck. From December 8th to 22nd four treatments were given, and a very marked improvement noticed. After this the child was not brought back, and on inquiry it was ascertained that the parents could not afford the railway fare to come to hospital.

3. S. M., aged 11. Tuberculous glands in submaxillary triangle; one large mass on the right side 2½ inches by 2 inches; smaller mass on left side, ½ inch by ½ inch. Thirteen treatments have been given during period of two and a half months. Glands have greatly diminished, are softer, and freely movable.

4. M. H., aged 31. Tuberculous glands on left side, very extensive and numerous. Ten years ago the patient had an operation on this side. Since then glands have returned worse than before. Twelve treatments have been given over period of two months. There has been a great improvement, and now only one gland is left.

5. D. O., aged 19. Tuberculous glands; large mass on right side of neck, also large submental glands. Eleven treatments have been given over period of two and a half months, and although the glands are still felt they have diminished in size, are softer, and movable.

6. W. J., aged 7. Tuberculous mass in left side of neck. Five treatments have been given over period of one month, and considerable improvement is noted.

7. H. W., aged 23. Tuberculous suppurating glands in neck. Six treatments have been given over period of one month; the glands have disappeared, and the surface has healed.

8. G. M., aged 11. Suppurating glands in axilla. Two treatments only required for complete dissolution.

Chapin, Henry Dwight, New York: Roentgenograms of the lower bowel in infants. (The Post-Graduate, July, 1914.)

The object of this study was to find out the location and general configuration of the sigmoid flexure, the splenic flexure, the hepatic flexure, the cecum, and the general mobility of the lower bowel. For some years Chapin has been convinced that treatment given by the so-called "high enemas" was based on a fallacy, and that much of this treatment was unavailing and useless. He first gave the children a tablespoonful of castor oil in order to clear the bowel before the experiments. Half an hour before the experiments, eight drops of paregoric were given, and the rectum was painted with a two per cent. solution of cocaine. With these precautions he could generally control the bowel and have it retain the enema. The tube was passed four inches into the rectum through the anal ring. The bag was held about eighteen inches above the body of the child, so as to have the fluid run in slowly. With these precautions he found that he could make the study. Without them, it was very difficult.

The youngest case was a baby, two months old, and the oldest was twenty-five months of age—the series of thirteen experiments running between these ages. An ordinary Roentgen ray tube was used with an intensifying screen, the length of the exposures being one-tenth of a second.

These pictures teach one or two practical points—one being that we can reach the whole intestine without force, only a short time elapsing before the injection fills the bowel. The second point is that it is practically impossible to pass a high tube, as it has been supposed we could, around the sigmoid flexure; it is longer and more tortuous than has been supposed, and there is a greater variation in its location and form—and it is a physical impossibility to pass a tube through. What happens is that the tube is passed in to the root of the sigmoid flexure and then turns around.

Henriques, Adolph, and Ambrose, Lodilla, New Orleans, La.: Instruction in Roentgenology. (Jour. A. M. A., Aug. 22, 1914.)

The Committee of the Deutsche Roentgen-Gesellschaft has submitted its report on instruction in medical roentgenology in the German higher institutions, and this report has been sent to the medical faculties of the German-speaking higher institutions of Germany, Austria and Switzerland. The D. R. G. has undertaken to direct the attention of the medical faculties of the various German-speaking institutions to the necessity of thorough instruction in roentgenology, and to the desirability of having the fostering co-operation of the universities in future research in this field. The D. R. G. unanimously adopted the following resolutions:

(1) Roentgenology is a fully justified medical specialty. (2) The roentgenologist is a specialist, and, as such, and in accordance with generally accepted usages, is consulted by physicians or patients for the making or the verification of a diagnosis. (3) The roentgenologist, in addition to general clinical methods, makes use of the Roentgen procedure. He decides which procedure (photograph, fluoroscopic examination, orthodiagraphy, teleroentgenography, etc.) should be used.

This report has led Henriques and Ambrose to a study of the roentgenologic instruction in the United States. For this purpose has been chosen the list of the "A plus" group of medical colleges, as given in The Journal of the American Medical Association, August 23, 1913, page 585. The latest catalogue (that is, the publication representing the teaching work of 1912-1913, or the announcements for 1913-1914) of each of these institutions has been carefully examined for information regarding instruction in roentgenology of whatever quality or quantity. Only a summary of the details of this compilation will be given here:

1. Titles Used in Designating This Instruction. The terms used in referring to the subject are, actinography, radiography, radiology, roentgenology, Roentgen ray and X-ray, with more institutions using the word "roentgenology" than any other one term. This is also the word adopted in Germany. Of the institutions whose catalogues furnish any data, two have professors of this one subject, two have an associate professor for this and another specialty combined, two have an instructor for roentgenology; two, a lecturer; one, a demonstrator, and some of these have assistants in addition; five recognize positions of varying titles in connection with some hospital; all of which tends to show that up to the present time there has been no standardizing of the position of the teacher of roentgenology in American medical colleges.

2. Roentgenology as a Distinct Department of Instruction. Four institutions—Northwestern University, Harvard University, Cornell University and the University and Bellevue Hospital Medical College—recognize roentgenology as a distinct department of instruction co-ordinate with the other medical specialties. In those institutions in which a course in roentgenology is offered, but in a subordinate relation to some previously existing department, there is no uniformity as to the department with which it is incorporated.

3. Year in Which Instruction in Roentgenology is Offered. Concerning the institutions whose catalogues furnish any data, the facts are: Undergraduate course, required, in second year, 1; in third year, 2; in fourth year, 6; in third and fourth years, 1; undergraduate course, elective, in fourth year, 1; graduate course, 1.

4. Number of Hours of Undergraduate Instruction in Roentgenology, and Character of Instruction, Whether Didactic or Laboratory (exclusive of use of plates to illustrate work in other subjects): Concerning the institutions whose catalogues furnish any data, the facts are: *Didactic,* instruction given but hours not stated, 4; "all day throughout the year," 1; 9 hours, 1; 11 hours, 1; 16 hours, 2; 17 hours, 1; 30 hours, 1. *Laboratory,* "elective," 1; instruction given but hours not stated, 1; 40 hours, 1; 51 hours, 1.

The self-evident conclusion from this study of the official catalogues of the medical colleges in the "A plus" group is that in about one-third of them instruction in roentgenology is omitted altogether, and that in the others it has no standardized status. Further, this being the case in the highest group, it is fair to infer that still less instruction in this subject is given in the other groups. Therefore, it becomes apparent that the opportunities in this country for the systematic study of medical roentgenology are very meager.

Stoll, H. F., and Heublein, A. C., Hartford, Conn.: Tuberculosis of the bronchial lymph nodes and lung hilus, a clinical and Roentgenographic study. (Am. Jour. Med. Sci., Sept., 1914.)

The large central shadow observed in the normal thorax is due to the heart and mediastinal contents. Extending out laterally are the heavy shadows caused by the large or stem bronchi. On the right side both ascending and descending bronchi are distinctly seen, but on the left, due to the intervention of the cardiac shadow, the greater part of the descending bronchus is not visible. The density of these shadows increases with age, being, as a rule, much heavier in the adult. Radiating from these coarser markings are finer lines which project into the lung field for varying distances, but do not extend normally to the surface of the lung. These markings are produced by the walls of the bronchi and the blood and lymph vessels with their contents.

Dunham and Boardman found that in early tuberculosis these fine lines often reach the periphery of the lung at the site

of the lesion. While the authors' series of stereoscopic plates is small, in a number of instances they have observed this. In the infant with early miliary tuberculosis above referred to, which came to autopsy, the most distinctive feature was the filling of both lung fields with fine interweaving lines. In other cases where these lines did not extend into the lung field for any considerable distance, they were much more numerous and heavier than normal about the hilus region. In a few instances they have seen near the root small "soft" shadows with hazy irregular borders, which are well shown in the stereoscopic negatives. Fine lines can be seen connecting these shadows with the lung root. This is apparently an early involvement of the lung parenchyma in the hilus region. In non-stereoscopic negatives they have observed a shadow which is in the position normally occupied by the superior vena cava. This shadow is concave to the right, while the one caused by glands is convex, and is, moreover, of greater density, and protrudes farther into the lung field. It extends from the tip of the third cartilage upward toward the clavicle, giving an increased width to the root of the lung. Since drawing attention to this shadow in 1910, a number of other observers have mentioned it as an early evidence of enlarged bronchial glands. Involvement of the parenchyma in the hilus region is usually roughly wedge-shaped with the apex at the hilus. When the disease is but slightly active the shadow borders are usually sharp. In the more acute cases the shadow is softer and the border often ill-defined (acute exudative type of Cole). Because of the interposition of the cardiac shadow the paratracheal glands are usually not seen.

It is impossible for one who has not studied stereoscopic negatives to appreciate their superiority over the single plate method. While a lesion may be distinctly shown by the later process, its exact situation cannot be determined. It is desirable for the clinician to learn to interpret his own radiographs, as only by this means can he satisfactorily compare his physical signs with the X-ray findings. All the cases were examined and the physical signs recorded before being roentgenographed.

TECHNIC: The method they find most desirable, and the one giving the best soft-tissue detail, is as follows: With the patient in the erect position a moderately soft tube is placed approximately six feet from the plate (14 x 17 mounted in a screen). A small diaphragm is used and an exposure of one-half to one second is made. For stereoscopic work they use an automatic plate-changing device. The right oblique position has not proved very satisfactory.

Stoll and Heublein claim that prior to the fifteenth year, tuberculosis of the bronchial glands and lung hilus is the most common form of tuberculous disease. The early symptoms are usually indefinite and chiefly of toxic origin. While a cough is generally present, it may be entirely absent, even with advanced disease of the bronchial glands. Although the orthodox signs of incipient (apical) tuberculosis are not present in these cases—in fact, the primary lesion is often in the lower lobe—there are certain physical signs which are indicative of a pathological process at the lung root. The significant signs are a "hilus dimple" (noted anteriorly over the hilus region at the end of inspiration), dilated veins, parasternal and paravertebral dullness, and, most significant of all, a well-marked whispered bronchophony in the interscapular region (d'Espine's sign). Roentgenography, and especially stereoroentgenography, is of the utmost value in these cases, as it shows the exact location and extent of the morbid process, and is the greatest stimulus to careful clinical work.