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Edited by P.M. Hickey, M.D.
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No. 12

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

VOL. I

NEW SERIES, OCTOBER, 1914

No. 12

ROENTGEN EXAMINATION OF THE SPHENOIDAL SINUS Presenting a Vertical Technique

By DAVID RALPH BOWEN, M. D.

Roentgenologist at the Pennsylvania Hospital; Asst. Roentgenologist at the Jefferson Hospital, Philadelphia.

The doing of new things, even in so new a scientific art as roentgenology, is not common and I shall be neither surprised nor chagrined to find that very similar methods have been used or even, in a limited way, published. If not new, it is at least not common. I have never seen another's roentgenogram made in this position; nor have I been able to find any original article or reference concerning it, with the possible exception of Dr. Pfahler's paper before this Society (1912) in which he mentions, but does not describe, a "vertical position."

Nor should it be necessary, in this paper, to more than mention the need for amplification of current methods. Our shortcomings and disappointments in facing this increasingly important subject are too well known. In April of the present year, Dr. MacFarlan, a Philadelphia laryngologist appearing before a section of the College of Physicians, read a paper entitled "Radiography of the Nasal Sinuses." Published in *Laryngoscope*, May 1914. Dr. MacFarlan talked with me during the final preparation of his paper and has kindly loaned me some of the illustrations used in it. The position he used, patient dorso-ventral with plate under the strongly extended chin (Fig. 1), impressed me as affording information that had not been obtained before.

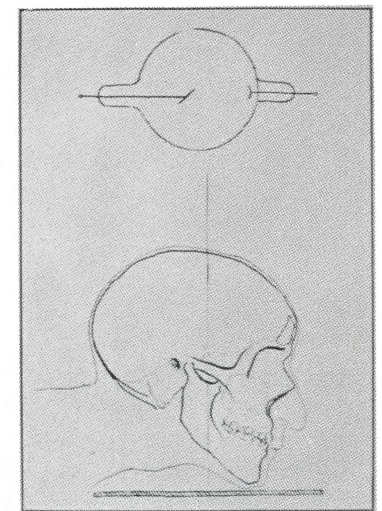


FIG. 1.

But, practically, it proved disappointing because the mandible and teeth so persistently occupy the foreground. (Fig. 2.) Stereo exposures were especially disappointing. With the patient sitting and extending the chin over a plate on the table, the results were even less to my liking. The thought lingered for some time before it occurred to me to use the position which now seems to me to present considerable possibilities. Technique—With the patient on the table in the ventro-dorsal position, the head is drop-



FIG. 2.

Plate made in position as shown in Fig. 1. Anterior portion of sphenoidal sinus covered by shadow of mandible.

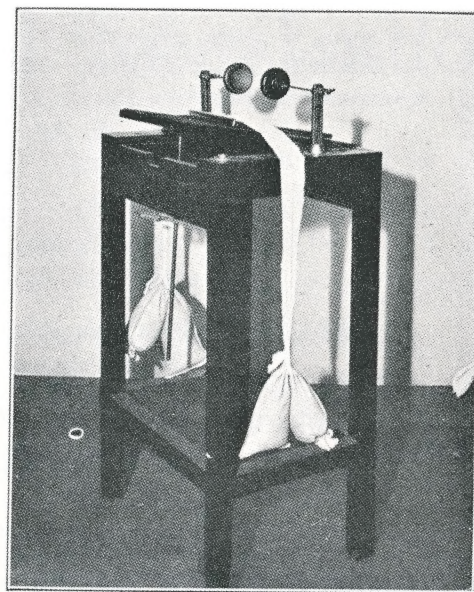


FIG. 3. ACCESSORY TABLE.

The top tilts. The small stereo changer rests firmly on corrugated rubber matting. The bandage with sand-bags holds the chin forward.

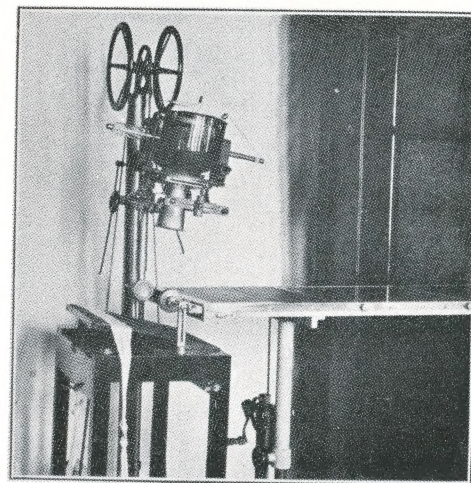


FIG. 4.

Table and accessory in position. Table cranked up to desired height.

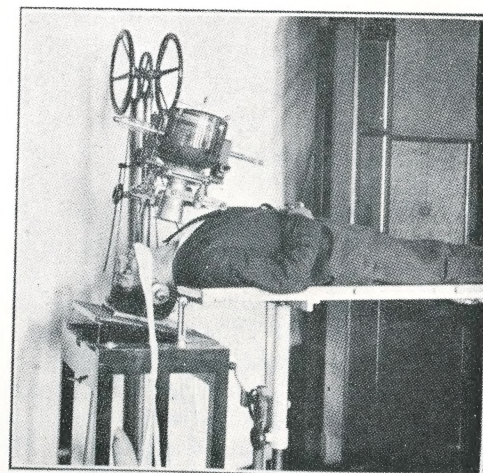


FIG. 5.

Patient in position with weight over chin. Stereo plate changer under head.

ped over the end of the table to a support from four to five and a half inches lower. This distance varies with individuals but is usually within these limits. I have chosen to use an accessory table as illustrated. (Fig. 3.) This has a tilting top covered with corrugated rubber matting, the better to hold the small stereo holder which I have described elsewhere. Lateral clamps are provided for fixing the head. The variable distance is secured by adjusting the radiographic table. (Fig. 4.)

The head being in this position, the top

of the accessory is tilted to bring it parallel with a line drawn between the external auditory meatus and the tip of the nose. (Fig. 5.) Considerable difficulty has been experienced from the very natural tendency, even with the best intentioned patients, to tilt the chin to a more comfortable angle. The best device for preventing this seems to be a strip of muslin bandage, heavily weighted at the ends and hung over the chin, somewhat after the method that Dr. Gray has so well described. Perfect immobilization is imperative.

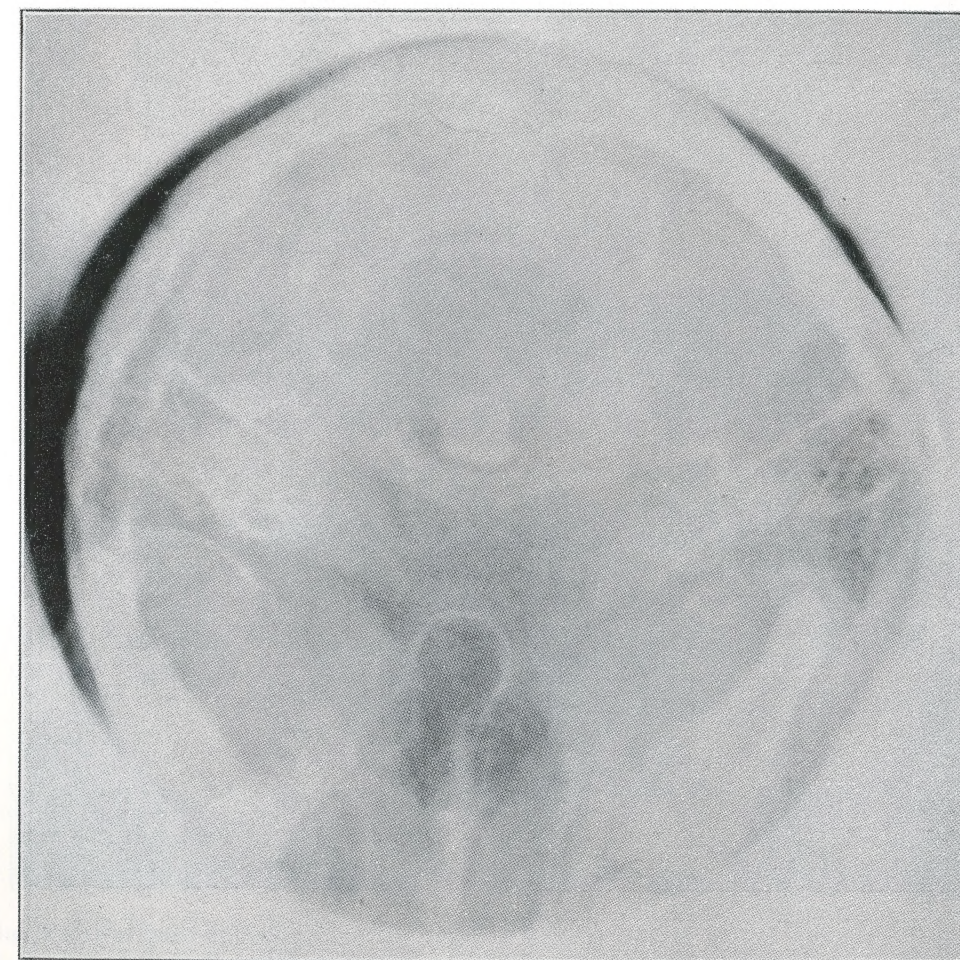


FIG. 6.

Typical plate non stereoscopic. Sphenoidal sinus is in this patient, trefoil shaped with the septum deviated sharply to the left.

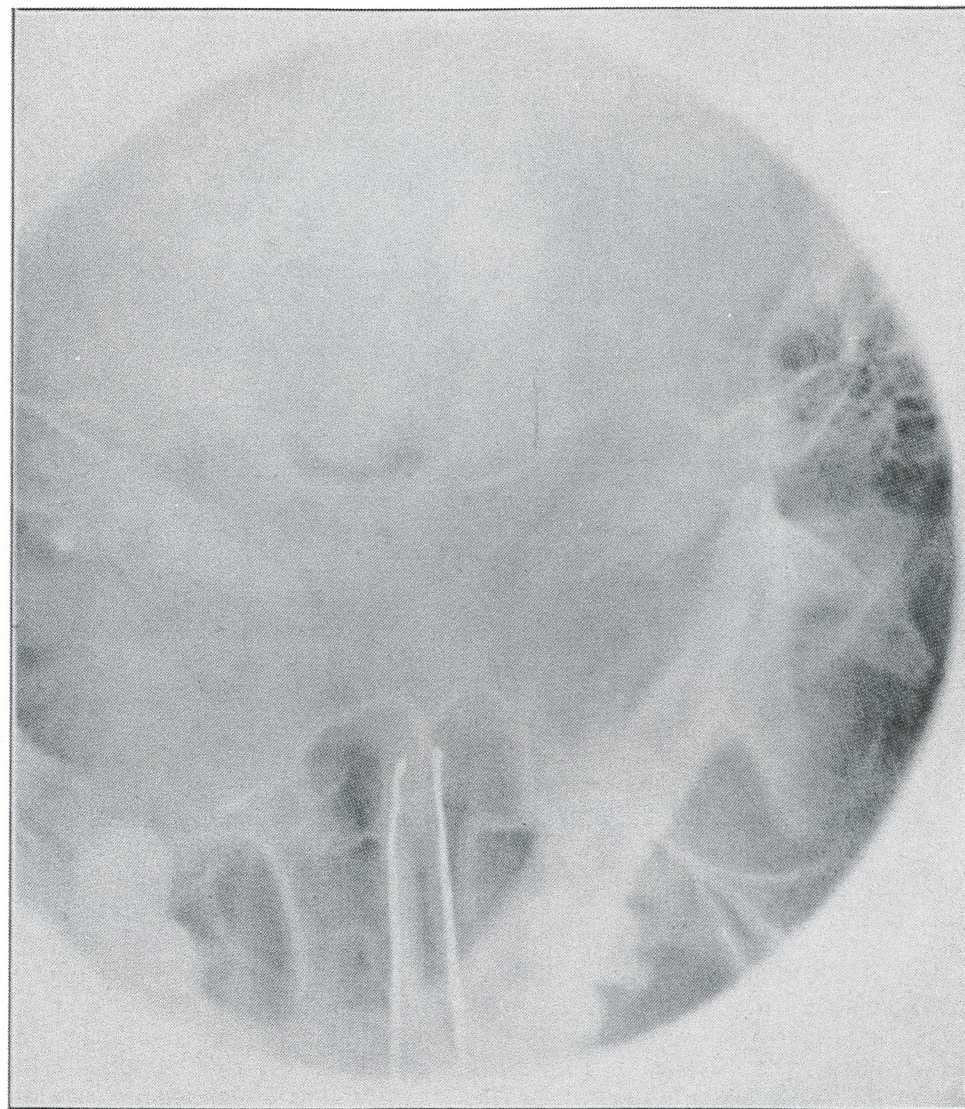


FIG. 9.

Typical plate stereoscopic. Same patient as Fig. 10 which shows why probes do not reach posterior border. The most symmetrical sinus examined, though septum here deviates to left somewhat.

treme rear. Another impressive finding is the usually unequal division by the septum and the frequent marked deviation of the whole cavity to one or the other side. This latter fact, perhaps, explains the rather frequent disappointments in the use of Pfahler's method. When both sinuses are on the right side, the orbital projection of the left obviously presents unknown difficulties.

In addition to slides already shown, I present one showing large right and small left cavity, the left clearly casting an abnormal shadow and having a probe in situ. (Fig. 11.)

The last slide, one of my earliest attempts, shows the effect of a tube position too far

forward, or, the tube and plate being in proper position, and the base line forming an acute angle with the plate, instead of being parallel to it. (Fig. 12.)

This paper, hardly more than a preliminary report, does not, I am sure, begin to exhaust the possibilities of the method.

And, in addition to the examination of the sphenoid, it has possibilities in the examination of the mastoid and in fracture of the base.

Nor is it highly improbable that, in a former patient, sarcomatous involvement of the base could have been detected and a fruitless operation, with acceleration of the fatal issue, avoided.

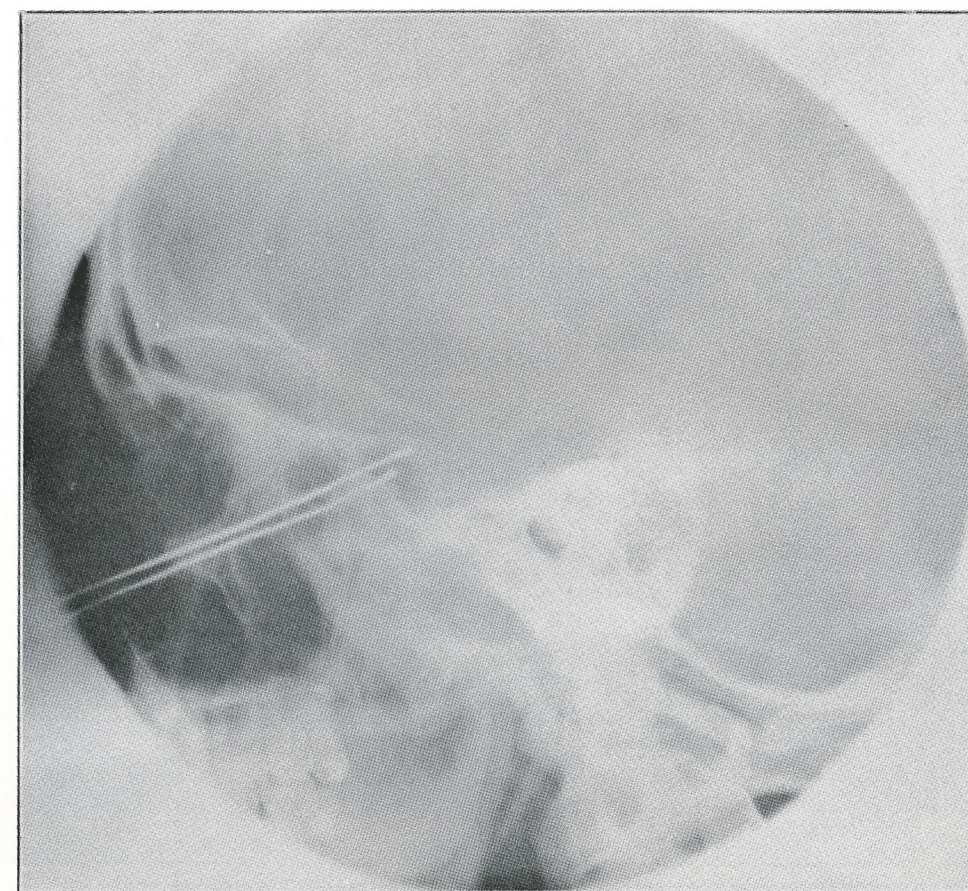


FIG. 10.

Lateral view, same patient as Fig. 9.
Probe which seems on other view to reach only part way to posterior wall is shown here to touch a sloping sinus roof.

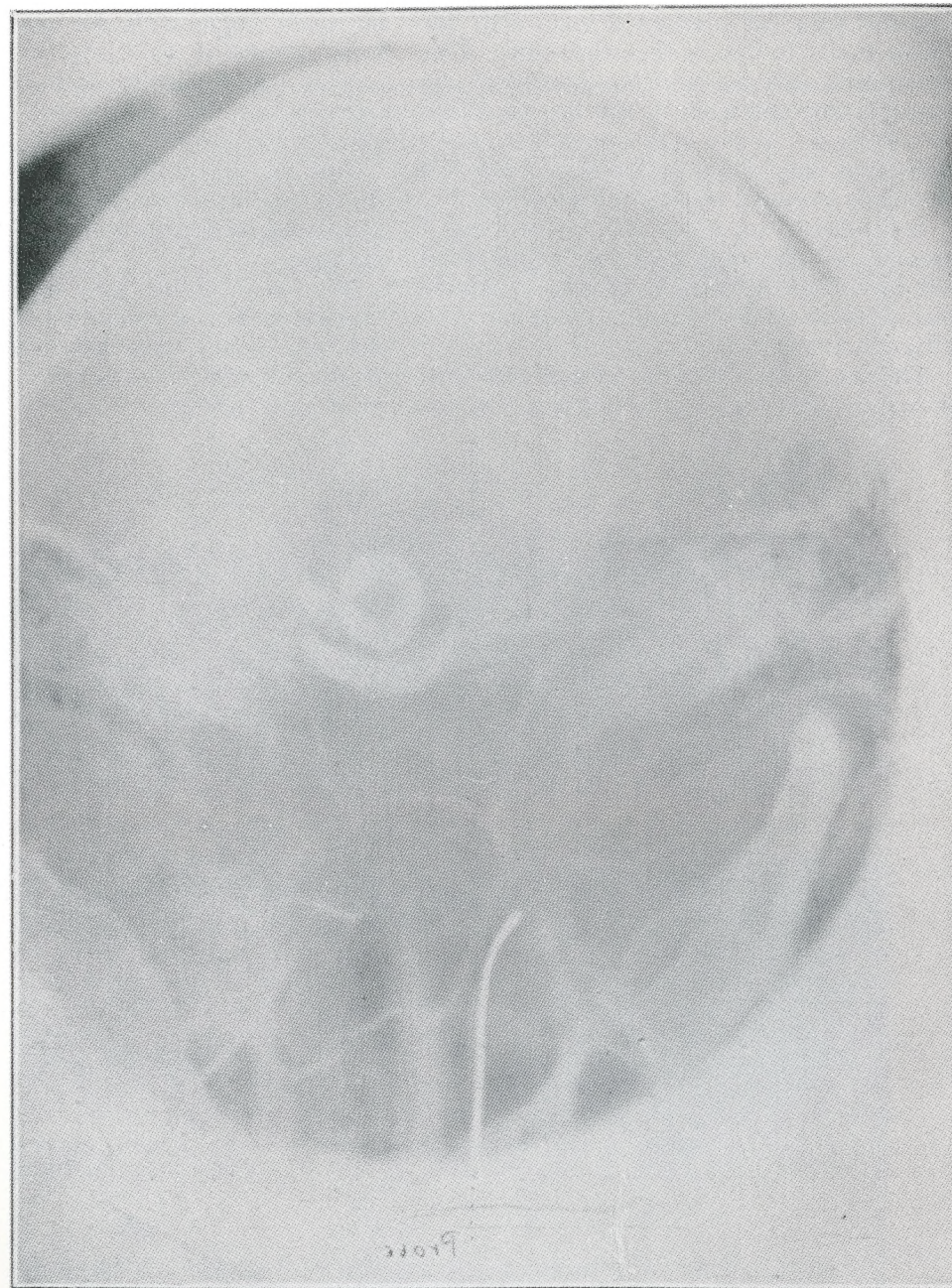


FIG. 11.
Probe in left sphenoidal sinus.

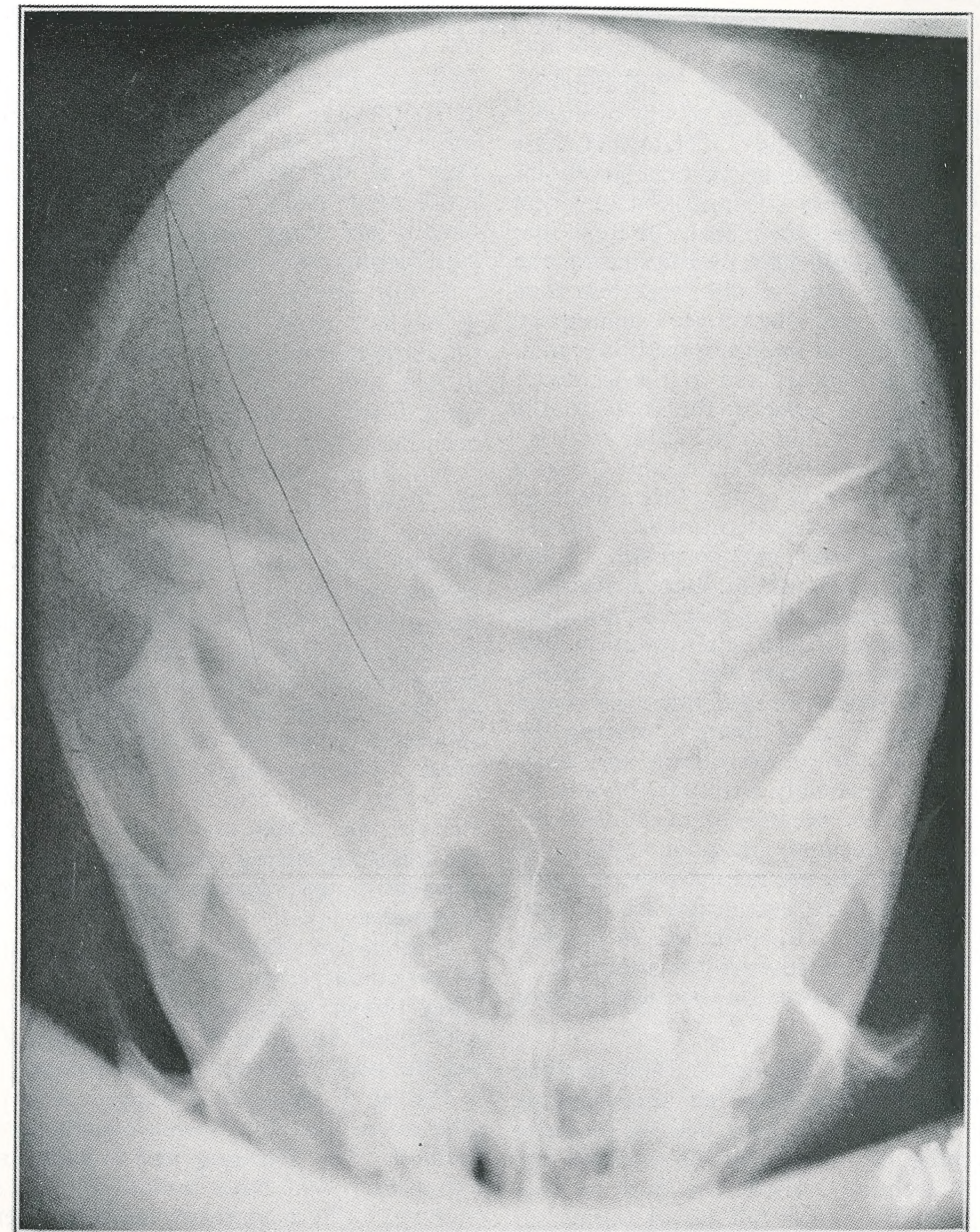


FIG. 12.
Result of faulty position. Produced either by placing tube too far toward the chin or, with proper position of the tube, not extending the chin far enough.

DISCUSSION ON DR. BOWEN'S PAPER

DR. GEORGE E. PFAHLER, Philadelphia: Dr. Bowen kindly referred to my reference to the various positions. I had tried these positions and two other vertical positions, but my results were so unsatisfactory that I merely mentioned them with the hope that someone else would take up the matter and develop it. My own results were less than tolerably good, and, therefore, I abandoned this work. This is unquestionably a valuable addition to the technic in the study of these sinuses, not alone in the study of the sinuses themselves, but in the study of fractures at the base of the skull, and of such conditions as tumors and other swellings which erode the bones of the skull, with extension of abscesses, and so forth. I believe that the study of all these conditions will be made easier by using Dr. Bowen's position. There is one other position that I tried, but did not have very good success with it, and, therefore, did not even waste paper in describing it, namely, placing the film on the inside of the mouth and sending the rays vertically through the top of the skull. Either because of insufficient development or because of poor technic, or some other reason, my results were not sufficiently brilliant to encourage me in continuing the work. However, this is another line of endeavor worthy of our attention. I congratulate Dr. Bowen on the improvement in his technic.

DR. WILLIS F. MANGES, Philadelphia: The subject of sinus study has interested me greatly, especially as I have had the pleasure of watching Dr. Bowen in his research for this new technic. About the time he was starting on this I was talking of taking up a line of study just mentioned by Dr. Pfahler, namely, placing the film in the mouth and raying from the top of the head. It seems to me that my most satisfactory views of the sphenoid sinus have been those obtained by stereoscopic postero-anterior ex-

posure, with the head in the position as for a frontal sinus, or perhaps, better, in making the exposure in the maxillary antra. In that way one gets the antero-posterior relation very nicely, and the sphenoid sinuses usually are large, and one can get a very satisfactory view of them.

I am afraid that Dr. Bowen's technic would not work out very well in the case of short-necked, stout people. In young people, and those who have a fairly long neck, I believe it is the best position that has been described so far.

DR. FREDERICK M. LAW, New York City: Dr. Bowen has described what seems to me to be a very awkward position in preference to one more comfortable, with the chin resting on the plate. We have been using that position for sphenoids in the Manhattan Eye and Ear Hospital in New York for nearly a year, and in only a few cases have we been unable to get a good view of the sphenoids when the chin is resting on the plate. The ray must be directed slightly back instead of vertical. We invariably use stereoscopic plates, and in conjunction with the antero-posterior and lateral views it is possible to get satisfactory plates of the sphenoids.

I think Dr. Bowen's position would be objectionable when the patient is a woman. They object to lying on a table, any way, and would strenuously protest against having the neck stretched to that extent.

DR. M. J. HUBENY, Chicago: I am very glad to see that Dr. Bowen has adopted this method. Dr. Hartung and I have used it extensively and have found it very satisfactory. The asymmetry of the sphenoids accounts for failures. There is one way of using one plate on top of another, thus overcoming any possible inequality of the silver coating, or unusual thickness of the emulsion, which might cause defects due to gradation of the shadows.

DR. DAVID BOWEN (closing the discussion): I have not been able to get as good plates with the chin on the plate as with the position I advocated. I could not get the whole sinus, for one thing, because a part of it always was covered by the lower jaw. All of the plates shown here with one exception were made of female patients, and the very best one I have made was of a

short-necked, stout German lady. If a little tact is used, the patient does not object to the position. I rather emphasize to them that they are going to be uncomfortable; in fact, more so than will really be the case, and then they are pleasantly disappointed. I am always careful not to put the sand-bag on until I am quite ready to make the exposure, because that is uncomfortable.

ROENTGENOGRAMS

By PROFESSOR DR. ALBAN KÖHLER, Wiesbaden, Germany

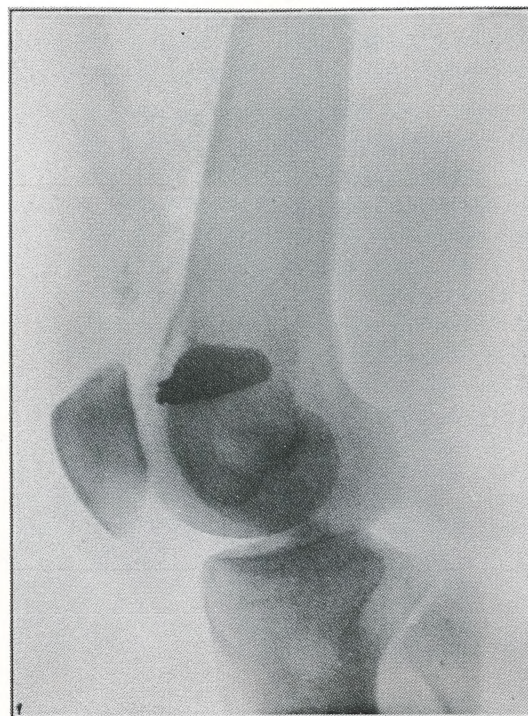


FIG. 1—Large grenade sliver in knee. It lay directly under the cortical part of the femur, which it raised slightly.

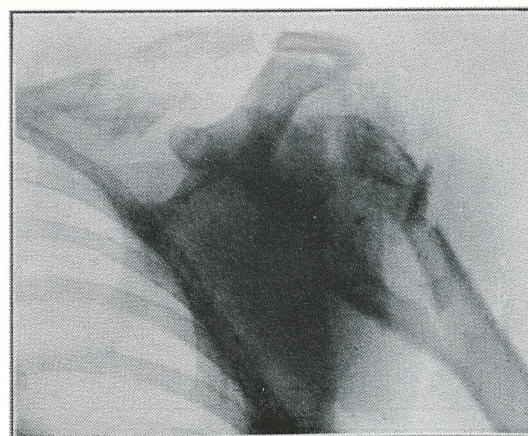


FIG. 2—Shoulder blade severely shattered by infantry shot, which entered the neck and passed out through the middle of the upper arm.



FIG. 3—Humerus severely shattered by infantry projectile.

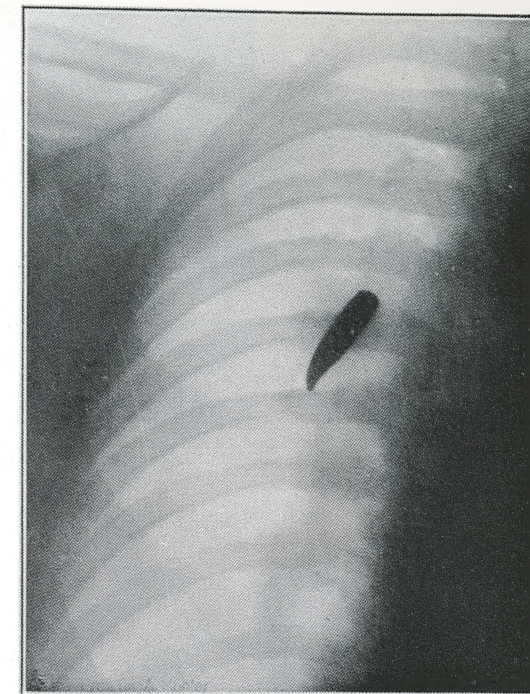


FIG. 4—French infantry projectile in the back.



FIG. 5—Small grenade sliver in the palm of the hand.

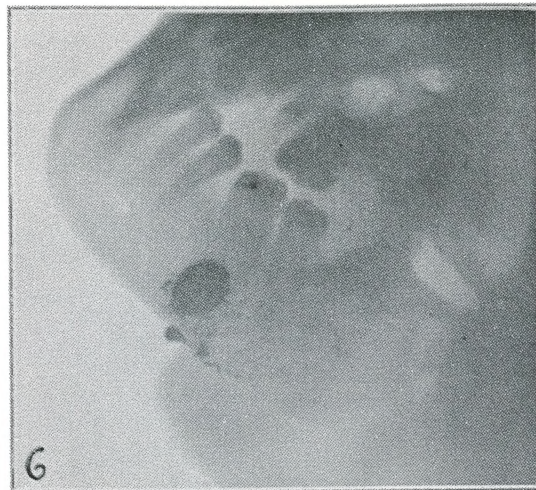


FIG. 6—Shrapnel in the lower jaw, surrounded by small pieces of metal.



FIGS. 7 and 7A—Radius shattered by infantry projectiles.

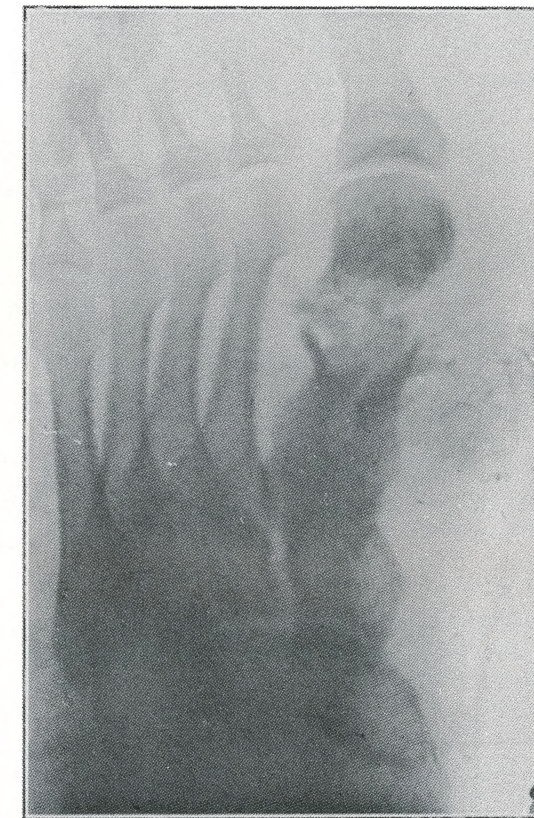


FIG. 8—First metatarsus shattered in the middle.

ADVANCED ROENTGEN TECHNIQUE IN THE DIAGNOSIS OF OESOPHAGEAL LESIONS

By DR. W. H. STEWART, New York, N. Y.

Fortunately for humanity and unfortunately for the Roentgenologist, there are only a limited number of cases of obstruction to the oesophagus; in consequence, many of the problems arising can only be worked out slowly as the cases appear.

Realizing that in order to accomplish results quickly, it will be necessary for a large number of observers to be working along the same lines at the same time, I have ventured to suggest some improved methods of examination which I believe to be a distinct advancement over our present technique. No doubt, you have all had cases with symptoms of oesophageal obstruction which, no matter how much care was used in the Roentgen examination, gave negative results.

This must necessarily occur with the old methods where the oesophageal involvement is early and not sufficient to produce any delay of our bismuth pastes. Then again, while I have been able to obtain fairly accurate results in those cases where the obstruction is sufficient to delay the paste, I have never felt satisfied that I have been showing the necessary amount of detail at the point of involvement, particularly the course of the oesophagus through the growth, the amount of the tube diseased and the conditions below the tumor.

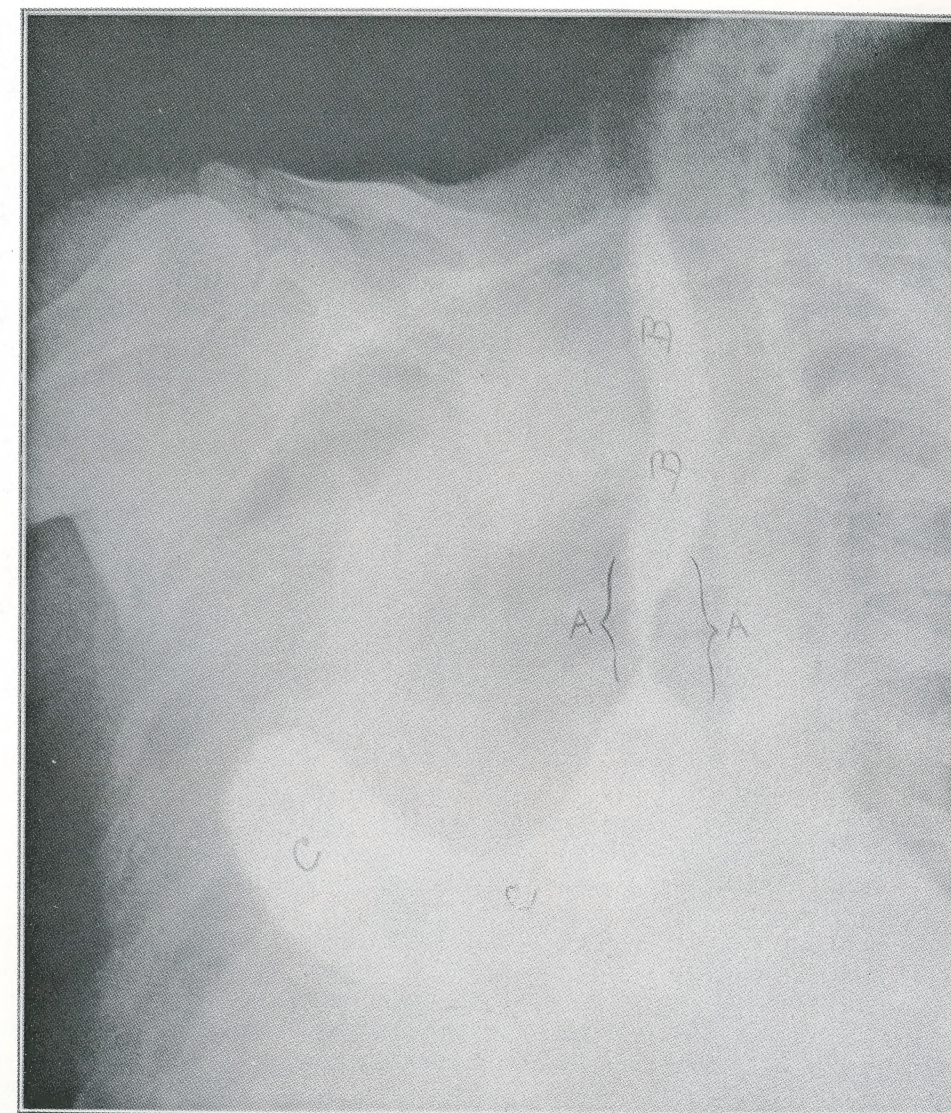
It was these experiences and desires which influenced me to seek this improvement in technic which I believe has well solved the problems referred to.

In the main, the idea is to insert into the oesophagus either by the natural act of swallowing or by artificial introduction a long hollow cylinder of some soft material which, after being placed in position, could be filled with a bismuth solution. This bismuth-filled tube, adapting itself to the

natural form of the oesophagus will give, either by the fluoroscope or by the Roentgenogram, an accurate reproduction of the oesophagus.

Thin tubing of rubber, gold beater's skin, hog or sheep casing was used. Up to the present time, however, I have been most successful with the best grade of hog casing.

The following procedure has been found most successful: It may be well to state here that in the introduction of the casing each case requires a technic of its own. Given a case of supposed oesophageal obstruction, I first examine the patient in the erect position under the fluoroscope, watching the act of deglutition as the patient swallows 15 grs. of subcarbonate of bismuth in an ounce of water. This is then followed by a stereo-roentgenographic examination with the patient in the left posterior oblique position, after administering 1 oz. of bismuth subcarbonate in 2 oz. of thickened cream of wheat. If the case is well advanced this may give all the information necessary. If, however, this examination does not reveal an obstruction or fails to give accurate detail at the point of obstruction then we proceed with our investigations. In introducing the hog casing there must necessarily be considerable nervous strain and sense of suffocation, particularly when the bismuth solution is injected into the tubing. As a rule it can be overcome by quiet assurance and slow procedure; in these cases the preliminary examination has been of great advantage in as much as it has given the patient an idea of the actual procedure, so that he appears at the second visit with much more confidence and quietude. I would recommend, however, that 15 grs. of chlorotone be given the patient some 15 minutes before the examination is made. Having gained our patient's



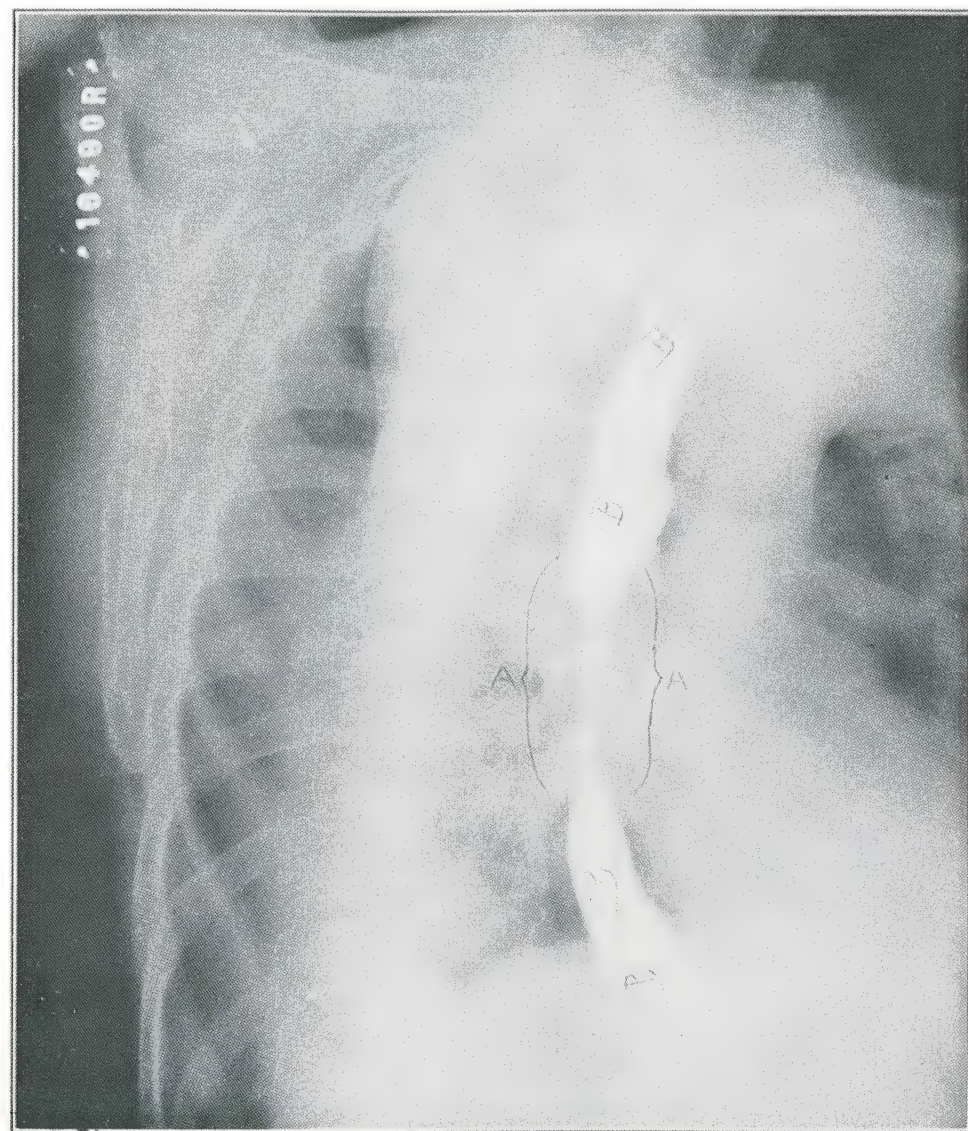
CASE No. 1.

Benign Stricture of the Oesophagus about 5 c. m. above the cardia.

"A"—Obstruction.

"B"—Casing filled with bismuth solution inside the oesophagus.

"C"—Bismuth filled casing lying in the upper portion of the stomach.



CASE No. 2.

Benign Stricture of the Oesophagus about 7 c. m. above sternal notch.

"A"—Location of stricture. (Note thickening of the oesophageal wall in this locality.)

"B"—The bismuth solution inside the casing.

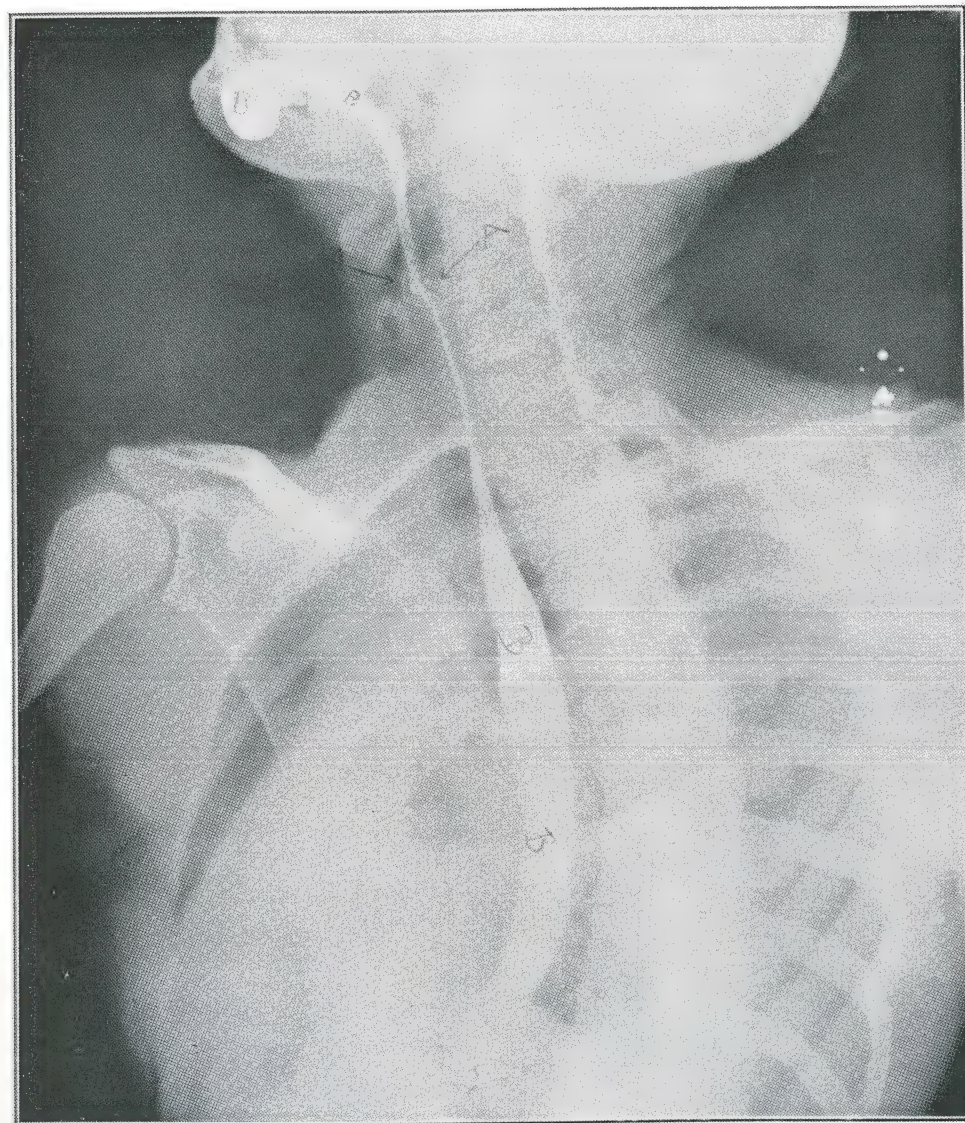
confidence, and quieted him with chlorotone, in addition, it is advisable to spray the pharynx with a 2% solution of cocaine to prevent gagging and coughing.

A section of hog casing is then selected about 16 to 18 inches in length—it must be tested with water before using to be sure no bad leaks are present—one end is tied firmly with some dental floss; it is then tested to see that this end is absolutely closed. There will, however, be considerable oozing through the membrane in all sections; this is not a disadvantage as the oozing may fill up sacculations or defects in the oesophageal wall which the casing itself does not reach. After lubricating the casing the first procedure is to attempt to have the patient swallow this down to or through the obstruction. Many patients, by peculiar contortions and swallowing efforts are able to force this slippery tube through the contracted lumen, which result is most gratifying to the operator as well as the patient.

In cases, however, in which the stricture is very tight and the patients themselves are unable to pass it on beyond the obstruction, we must resort to artificial means of introduction, preferably by means of a French catheter. This catheter is inserted within the casing after having been lubricated with an emulsion of Irish moss; catheter and casing are now introduced into the oesophagus. After having pushed the casing through the obstruction and well beyond, the catheter can be deftly removed by quick withdrawal. There are cases, however, in which the stricture is so tight that an attempt to withdraw the catheter also removes the casing; in these patients, we have provided a rubber tubing, about 12 inches long with a hollow metal tip at the lower end and a metal junction at the upper end to which is attached another piece of rubber tubing about 7 inches long. The lower tube is fenestrated at frequent points. This lower section is passed into a piece of hog casing previously tested and found satisfactory, and tied firmly below to the metal tip and above to the metal junction after which it is

again tested with water to see that no leaks are present. Into this rubber tubing is placed a metal introducer much the same as in a styletted catheter. The introducer, however, should be well lubricated before the attempt at introduction is made. The patient is then placed in the sitting posture with the head well back, passing the first finger of the left hand as a guide, as far into the larynx as possible, the tubing is directed downward into the oesophagus and passed a sufficient distance to feel confident that the lower metal tip lies within the stomach. Then with a quick upward motion the introducer can be safely removed. We now have the hog casing within the oesophagus enclosing a rubber fenestrated tube. It is only necessary now to inject sufficient of the bismuth solution to balloon out the casing. We are usually about able to tell when this has been accomplished by the symptoms of the patient, who immediately complains of a feeling of distress along the line of the sternum, with dyspnoea; it is in these cases that chlorotone acts so well. As a precautionary measure, however, it may be necessary to measure the capacity of your casing before the injection so that the measured quantity introduced will give you an accurate idea of the amount of dilatation of the tubing. Before the injection of the bismuth solution is commenced, the patient is placed on the table, in the left posterior oblique position, with the plate beneath and the tube accurately adjusted above. Gravitation has been found the best method in which to fill the tube. An ordinary salvarsan irrigator, attached to the upper section of the rubber tubing is used, the bismuth solution being allowed to pass in very slowly aided by frequent swallowing efforts on the part of the patient.

When the required quantity has passed in or the patient complains of marked dyspnoea it is well to discontinue, placing a clamp on the rubber tubing. The plate should then be rapidly made. Considerable spasmodic element is always present and persistency of defect is quite as necessary in oesophageal work as of other portions of the

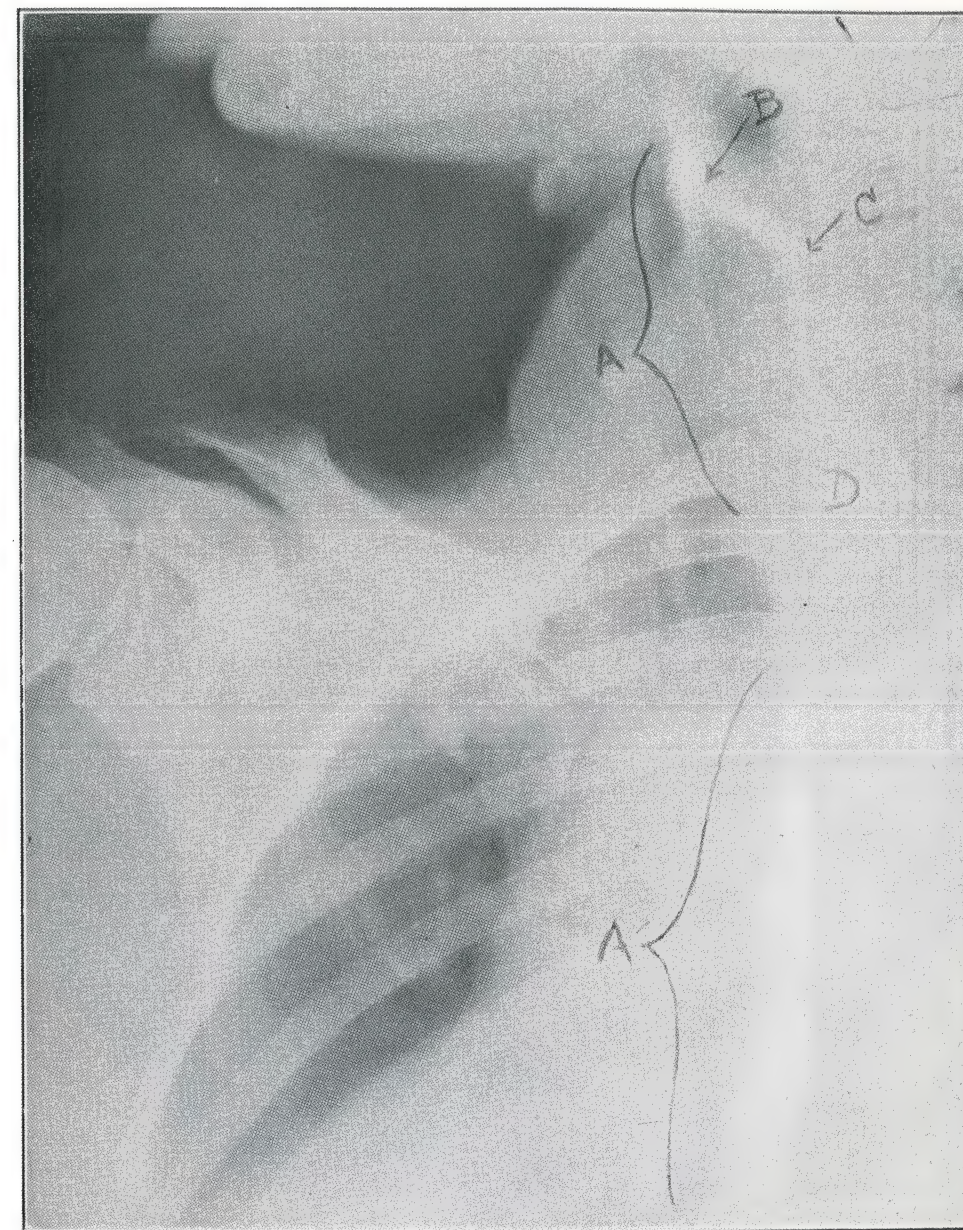


CASE No. 3.

Carcinoma of the Oesophagus, the center of the growth about 10 c. m. above the cardia.

"A"—Extent of Involvement.

"B"—Casing filled with bismuth inside the Oesophagus. (Note the detail in this case. The actual degree of the obstruction, the amount of the oesophagus involved and the condition below the growth are all beautifully shown.)

CASE No. 4.
Diverticulum.

"A"—The casing with bismuth inside the Oesophagus.

"B"—The location of the connection between the Diverticulum and the Oesophagus.

"C"—The neck of the Diverticulum.

"D"—The pouch which was filled with bismuth paste before the introduction of the casing. (Note the absolute certainty of the diagnosis as the pouch can be seen directly posteriorly to the oesophagus containing the bismuth in the casing.)

gastro-intestinal tract, so that it is often advisable to take two, three or even more Roentgenograms, before each exposure, allowing a small amount of bismuth solution to pass in to compensate for the amount of oozing that occurs through the casing.

As a rule this procedure will be successful although the amount of disturbance to the patient may be considerable at the first examination, in which case it is best that for a day or two the patient's throat and oesophagus be trained to the use of instruments delaying the re-examination until such time as the introduction can be made with the minimum amount of disturbance. This method has been found most successful in lesions below the sternal notch; above that point the strong pharyngeal muscles contract so actively that they do not allow, in many cases, the ballooning out of the casing, in consequence most of the detail in that locality is lost. From the sternal notch to the diaphragm, however, most accurate observations can be made.

We have been very successful in using this method in differentiating between diverticulum and carcinoma, one of the most puzzling problems to solve. The vital observation necessary in differentiation, is the presence of the sacculum posterior and outside of

the bismuth filled hog casing lying within the oesophagus.

The removal of the casing or the tube in the casing after the examination is completed is not difficult. Usually a little gentle traction aided by some gagging efforts on the part of the patient with the body bent well forward will succeed. In some cases the patient may become frightened and make extreme efforts at removal which induces a certain amount of spasm, in consequence, the traction on the casing is too great and it tears off at a level somewhere near the sternal notch. There is no danger in such an occurrence as the bismuth solution is thin and in perfect emulsion and the casing digestible. Where the tube inside the casing has been used, the clamp on the inner tube is removed and the bismuth emulsion allowed to flow out. As soon as the caliber of the bismuth-distended casing is reduced sufficiently, it is easily slipped through the obstruction and removed.

N. B.—My thanks are due to Doctors Armstead C. Crump and Anthony Bassler for their aid and encouragement, and particularly to Dr. Crump for the suggestion of the use of sausage skin.

Since reading this article before the American Roentgen Ray Society at Cleveland on September 11, 1914, my attention has been called to the fact that Doctor Hessel, of Kreuznach has been using this method for some time. Present conditions prevent correspondence to ascertain the exact date of his communication.

ROENTGENOGRAMS

By LEIGHTON R. CORNMAN, M. D., Rochester, N. Y.



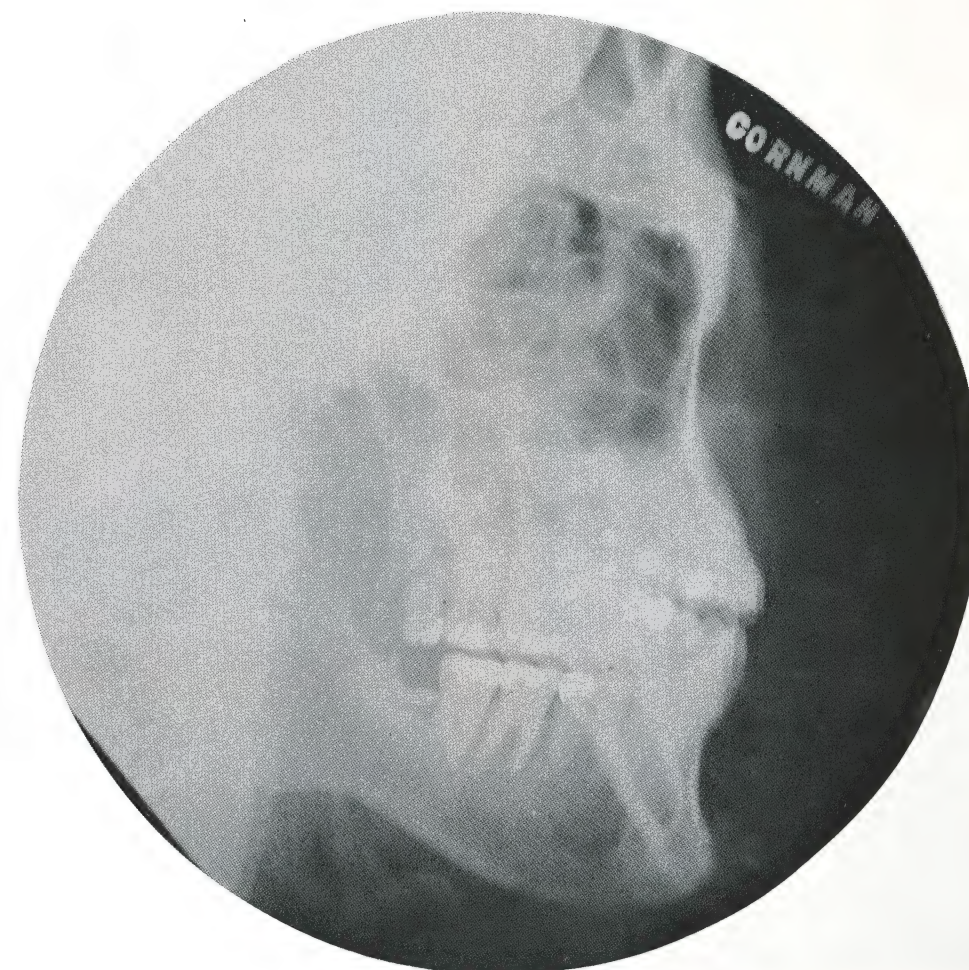
CASE NO. 1.

German boy of 13. Six months ago, lump began to develop over right side of lower jaw at point marked by letter "R," and when seen was size of hickory nut. Roentgenogram taken March 18, 1913, showed unerupted first bicuspid, completely surrounded by its sac, but with area of lessened density anteriorly and inferiorly. Diagnosis of cyst containing tooth and fluid was confirmed by operation.



CASE No. 2.

Man 62, American. Because of severe facial neuralgia, first and second lower right molars were removed. Pain and swelling continued. Two months later portion of alveolus loosened and was removed. Afterwards, jaw began to show expansion at angle and pain increased. X-Ray films were taken by a local physician, and diagnosis of periostitis made, so bone was curetted but no benefit resulted. Five months after removal of molars, on making plates of jaw, an area size of dime, of marked decrease in density was located just anterior to angle, and, as it contained fragment of tooth, diagnosis was made of necrosed third molar surrounded by cyst. Bone was incised, necrotic tooth removed, cavity scraped, packed and drained, resulting in prompt recovery.



CASE No. 3.

Man 25, American. Impacted third molar was broken in attempt at extraction. If Roentgenogram had been taken before doing anything, impossibility of safe extraction would have been seen. Tooth was removed by excision of triangular piece of bone posterior to same.

THE INTERPRETATION OF PERICOLIC MEMBRANES

By E. H. SKINNER, M. D., of Kansas City, Mo.

Pericolic bands may be found about any portion of the colon and may or may not produce adhesions capable of obstructing the progress of food residues. Some pericolic membranes do not produce obstruction, but act as bands of tension which produce symptoms.

One distinct type of pericolic membrane has been described by Jackson (1) with the following clinical symptom-complex:

1—Diffuse right-sided abdominal pain, usually over the ascending colon.

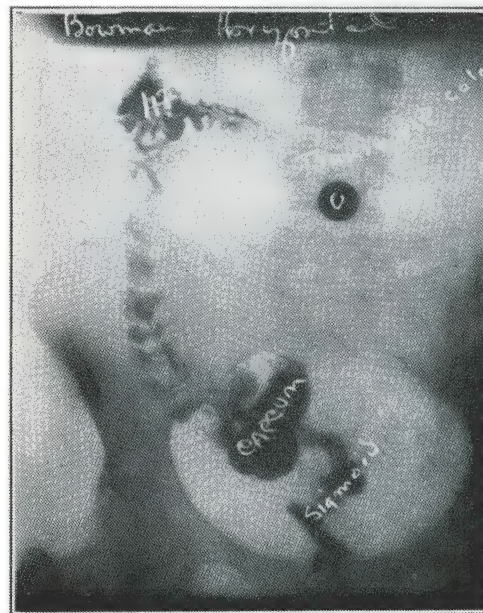


FIG. 1. PERICOLITIS DEXTRA.

Typical Roentgen findings of pericolicitis dextra which is an extremely rare condition. Note the caecum loaded with mass bismuth shadows and lying within the true pelvis; the haustral outline of the outer wall of the ascending colon with failure of the haustral outline upon the inner wall of the ascending colon because of pericolic membrane formation about this portion of the colon; the high position of the hepatic flexure; the stringy mucous shadows in the transverse colon. Patient was tender along ascending colon upon visualized Roentgen palpation.



FIG. 2. FAULTY FILLING.

Arrow points to portion of ascending colon where a non-opaque meal has produced an apparent or illusional filling defect in the bismuth outlines.

2—General right-sided tenderness, more acutely at McBurney's point.

3—Marked constipation relieved by catharsis.

4—Frequent mucous discharge from bowel.

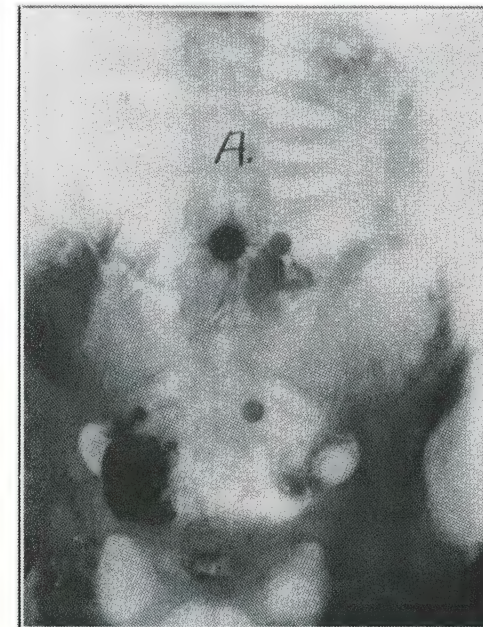
5—Distention of abdomen preferably right-sided with exacerbations.

6—Progressive loss of weight and muscular tonus.

7—Chronic indefinite stomach symptoms.

He relates the pathological basis of the above symptomatology as follows:

- 1—Fixed ascending colon.
- 2—Hepatic flexure at usual normal height.
- 3—Dilated cecum.
- 4—Fixation of ascending colon and paralleling of ascending colon and first portion of transverse colon which may be described sometimes as an acute angulation of hepatic flexure.
- 5—Spastic terminal colon—mild mucous colitis.



FIGS. 3A AND 3B. PRESSURE ALTERATIONS OF BISMUTH FILLINGS.

(a) Horizontal position of a thin patient, plate upon abdomen, tube beneath. Note the loaded caecum in true pelvis and the portion of the ascending colon above free from bismuth shadows. This absence of bismuth shadows is due to the true brim of the pelvis producing the gravity changes in the bismuth filling of a dilated caecum and ascending colon.

(b) Shows this same case at the same time, but in the vertical position.

The bony pelvis in thin women easily produces pressure changes in the bismuth shadows in the horizontal position of the patient with the cassette resting upon the abdomen or the patient lying upon the cassette.

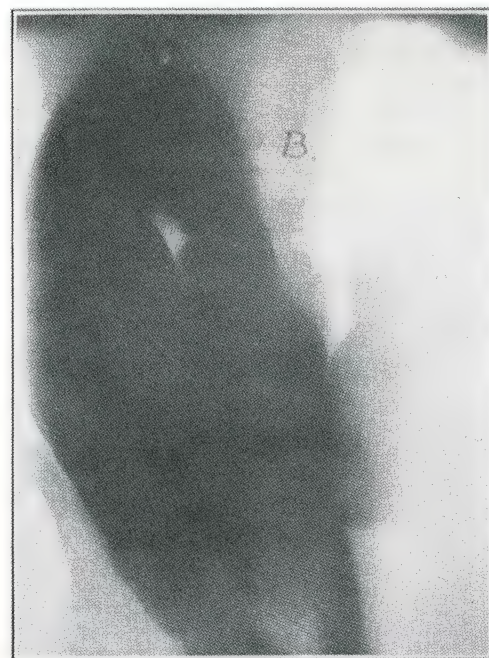
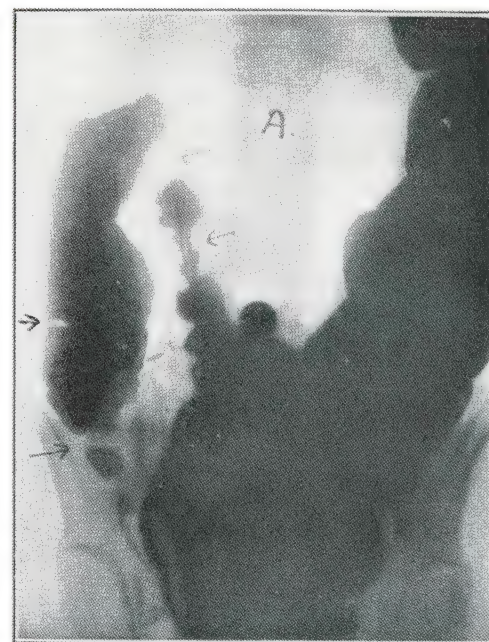
6—Appendix may be fixed and act as suspensory ligament to dilated cecum which may drop into the true pelvis.

An analysis of the preceding clinical symptom-complex in the light of present Roentgen possibilities, results as follows (Fig. 1):

1—If the state of the prolapsed and atonic

cecum is a cause of the symptoms then a bismuth meal would constantly exhibit an atonic cecum and define its position and mobility under fluoroscopic control in the horizontal and vertical positions of the patient and the stasis would manifest itself by the cecal retention of bismuth food beyond normal intervals. If the cecal atonicity had progressed to the relaxation of the muscular fibres maintaining the ileocecal apparatus, we would find bismuth enemas entering the ileum after or even before the distention of the cecum. Further, it might reasonably be

assumed that the tension of the overloaded cecum upon the ileum, which is normally attached by a constant mesentery at the pelvic brim, would provide Roentgen evidence of ileal stasis after bismuth meals. It would be better to feed small amounts of bismuth with each meal for several days and then determine the stasis of the cecum and proximal colon.



FIGS. 4A AND 4B. SPASTIC CHANGES IN ASCENDING COLON.

(a) Arrows point to spastic contractions along proximal colon during the injection of a bismuth enema. Some of these persisted for fifteen minutes (especially along ascending colon) and could easily have been interpreted as gross filling defects.

2—If the hepatic flexure is always high near the costal arch in normal (?) position and is so maintained by adhesions, then the hepatic flexure could be absolutely determined by simple fluoroscopic inspection and the permanency of the attached ascending colon proved by Roentgen inspection after these colonic portions were filled by either bismuth meals or enemas.

3—If the pericolic bands cause constriction of the ascending colon, with possible adhesions to transverse proximal segment, then these bands of adhesions which maintain definite or inflexible colonic position would be easily proved by Roentgen inspection after opaque filling and the constancy of these constricting bands noted.

4—If there is mucous colitis we would expect very definite Roentgen evidence. One will note the overloaded cecum and proximal stasis and the mucus itself in-

(b) Shows the enormous proximal colon and caecum which filled after the release of the spasms.

spissated with bismuth appearing as stringy shadows in the distal colon.

5—If the appendix becomes a suspensory ligament to the dilated, atonic cecum, it can be seen if it becomes filled, is patent or offers retention shadows. Its position and fixation points may be studied and the influence it exerts upon the overloaded cecum easily seen under fluoroscopic palpation, rotation of the patient in the horizontal, lateral and vertical positions. Find the appendix land mark and draw deductions therefrom.

If the symptoms offer confusion with certain lesions of stomach and duodenum, the thorough bismuth examination of the gastro-intestinal tract which should be incidental to the cecal examination offers the opportunity to establish the normality of every part excepting those about the ascending colon and cecum, or it may offer evidence of decided duodenal, gall-bladder or stomach involvement which would lead to the more careful estimation of the import-

ance of other parts in the clinical examination.

POSSIBLE ERRORS OF INTERPRETATION

1—The examination of the colon usually being pursued at the twelve or twenty-four hour interval easily permits the next regular non-opaque meal to produce deformities of the bismuth shadows in the proximal colon. For instance, the patient has been prepared by cathartic and enema for the bismuth examination; the bismuth meal fills the proximal colon and especially do we obtain the cecum loaded with bismuth and dropping down lower than the normal, perhaps dilated. The subsequent non-opaque meal enters the ileo-caecal valve above the cecum and displaces bismuth shadows so that there appear to be adhesions about the ascending colon. (See Fig. 2.) This is an error, possible with either the radiograph or fluoroscope.

2—The patient may be thin, the colon atonic, with the cecum dropping into the true pelvis. If exposures are made with the plate anterior and tube posterior or vice versa, with the patient either prone or supine, the brim of the true pelvis produces a filling defect in the ascending colon which might be interpreted as due to pericolic adhesions. (See Figs. 3a and 3b.)

3—Spasm of the musculature of the ascending colon produces a filling defect leading to erroneous conclusions; for instance, the bismuth enema may traverse the colon to a spastic portion where it is halted by the contraction of the colonic walls. The duration of the spasm is variable; quite obviously, if the examination is with the horizontal fluoroscope there may be the release of the spasm during the course of the examination, which may be promoted by abdominal massage or an increased amount of enema or an atropine injection. The differentiation from circular carcinoma is easy, as there is no trickling through of the bismuth enema and the sudden release of the spasm permits the normal distention of the bowel. (See Figs. 4a and 4b.)

One should remember that any pericolic process (aside from spasm) which produces obstructive symptoms must necessarily be a constant Roentgen finding noticeable at various stages of the bismuth examination of the colon. The preceding errors may also be constant and therefore the repeated Roentgen plate does not eliminate them entirely.

There are two favorite sites upon the ascending colon for pericolic bands: (A) First, just below the hepatic flexure upon the ascending colon. This almost seems to be merely an accentuation of the normal mesenteric attachment. It produces a filling defect in the bismuth filling of an ascending colon which apparently is in normal anatomic position. This defect appears to be produced by a circular constriction of the colon and causes a partial damming back of colonic contents. Under fluoroscopic palpation there is tenderness along this portion of

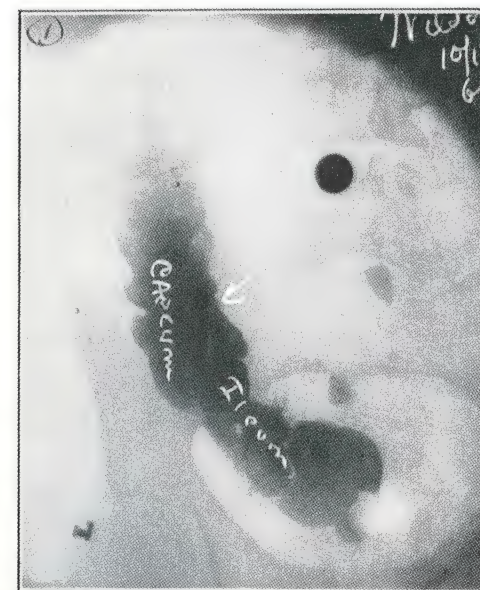
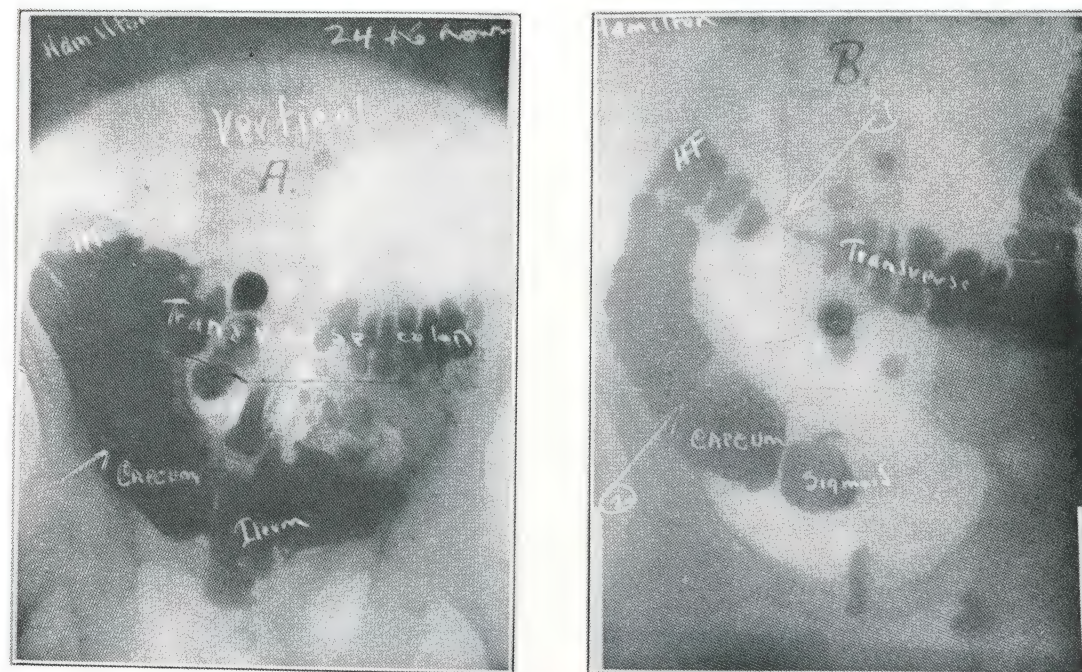


FIG. 5. HERNIAL FINDINGS.

Note the bismuth filled terminal ileum which exhibits stasis, probably because of its position within the hernial sac. An arrow points to the ileo-caecal valve. This finding was made in the course of a complete gastro-intestinal examination which determined a duodenal ulceration.



FIGS. 6A AND 6B.

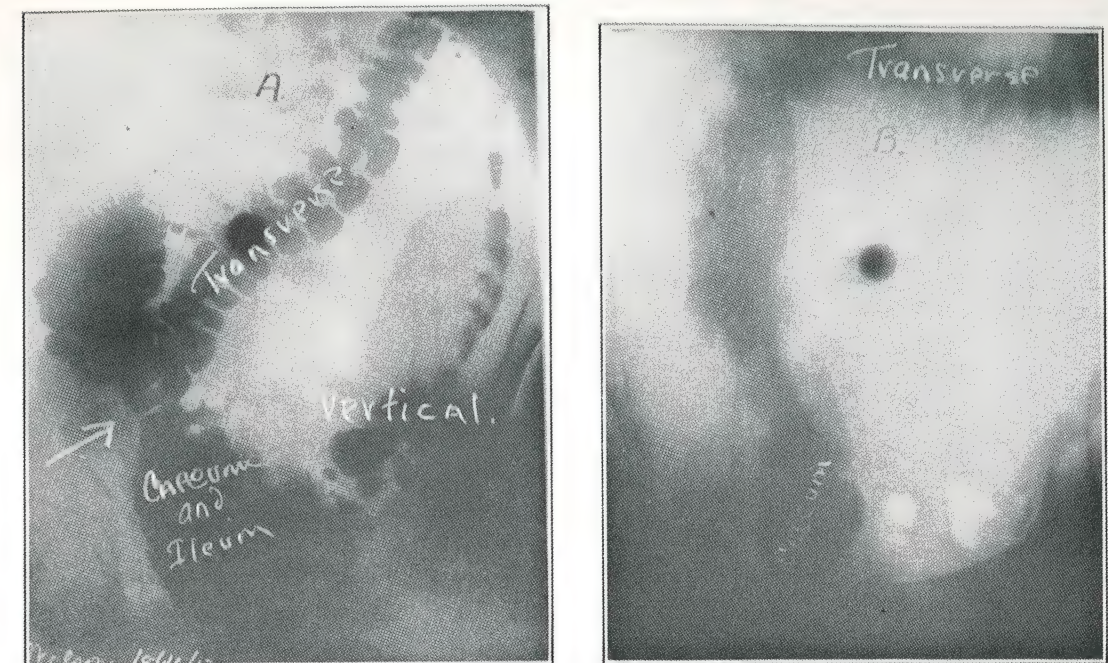
(a) Filling defect in transverse colon from adhesions of the apron of the greater omentum to an old appendiceal inflammation. This is purely a static obstruction of the transverse colon and not actual narrowing of the lumen.

the colon. (B) Second, a frequent pericolic band seems to constrict the ascending colon upon a level with the ileo-cecal valve. It produces a transverse linear filling defect just above the bismuth-filled cecum. Under palpation this is a fixed shadow or defect. This is usually accompanied by ileal adhesions producing stasis in the cases observed so far.

Roentgenograms of the alimentary tract frequently present shadows of sharp peaks at the hepatic and splenic flexures and sometimes at the duodeno-jejunal flexure. These peaks are usually optical illusions. The flexures are rarely pointed at all. The ascending colon lies posteriorly and then turns forward at the flexure into the transverse colon, which lies just beneath the anterior abdominal wall. In the postero-anterior view the shadows of the hepatic flexure are cast

(b) Same case twenty-four hours later. Same filling defect present. Such cases must be differentiated from carcinoma and pericolic processes. The above filling defects are possible in any portion of the colon from the tension of the greater omentum when a portion is involved in appendiceal adhesions.

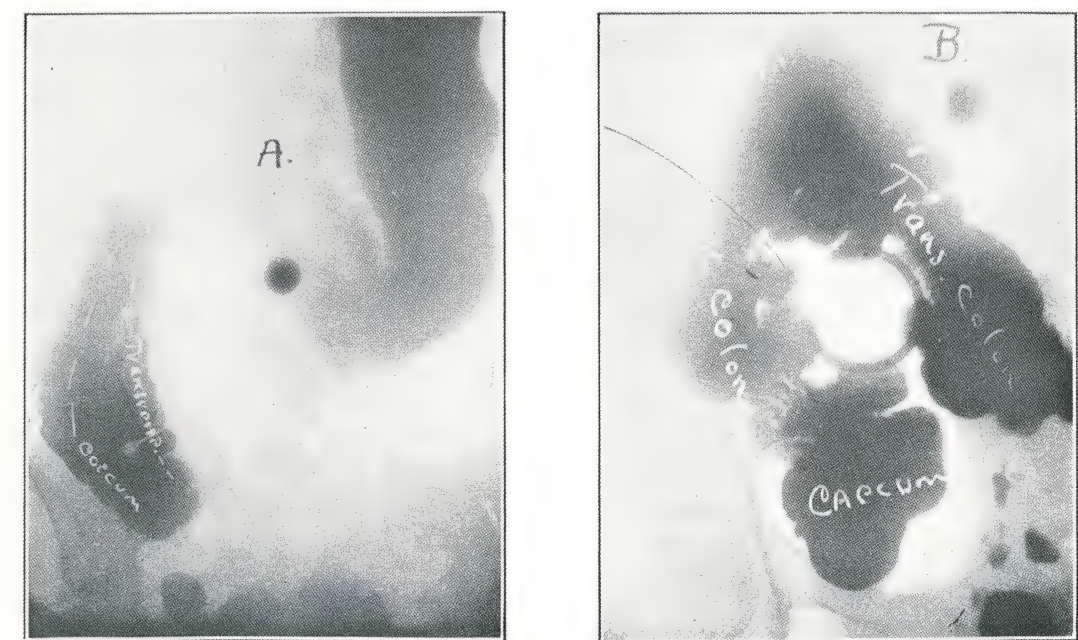
upon the flat Roentgen plate without any idea of the antero-posterior difference to the planes of its component parts, i. e., the ascending colon and first portions of the transverse colon. The hepatic flexure is a curved dome even in the presence of marked colonic ptosis and we see in the roentgenograms a transverse segment of the dome with no idea of its convexity. If one will slightly rotate the patient upon a horizontal fluoroscope, this illusion of a peak is quickly dispelled. In spite of Lane's theory it is extremely doubtful whether these apparent peaks of the flexure are mechanical factors in stasis constipation. Unless there are definite pericolic bands at the flexures, or vicarious mesenteric attachments, the Roentgen examination usually fails to show obstruction in simple ptosis. Atonicity must be differentiated from obstruction.



FIGS. 7A AND 7B.

(a) Negative taken with patient in vertical position. Arrow points to apparent filling defect just above caecal shadow. The single negative or series of negatives in this case might lead to erroneous interpretation of adhesions, etc.

(b) Same case after visualized palpation, showing the proximal colon easily straightened out and revealing no adhesions or filling defects. Plate with patient horizontal.



FIGS. 8A AND 8B.

(a) Negative taken with tube beneath table and cassette upon abdomen. Mass shadow upon the right side could easily have been mistaken for dilated caecum.

(b) Visualized palpation separated the bismuth mass into its component parts.

The disposition to take roentgenograms of the abdominal viscera at their face value is extremely dangerous, as there is probably nothing which lends itself so easily to interpretations of thought. The increasing use of fluoroscopic palpation in both the horizontal and vertical positions will help to eliminate many faulty impressions of single roentgenograms.

In closing a monograph upon Intestinal Stasis, Coffey (2) states that "this is one of the most dangerous fields for surgical abuses that has ever been opened to the surgical confidence man, who needs no other excuse

for performing surgical operations than the consent of the patient," and further, "that while X-ray observation is of inestimable value in the study of these cases, at the same time it becomes the most dangerous agent placed at the disposal of the unscrupulous surgeon, because it is so convincing to the laity, and at the same time so meaningless when considered independently of the history of the case, or improperly interpreted."

1. Jackson: Surg. Gyn. Obs. Vol. 9, p. 280.
2. Coffey: Surg. Gyn. Obs. Vol.

DISCUSSION ON THE PAPERS OF DRS. SKINNER, QUIMBY AND BAINBRIDGE

DR. J. W. HUNTER, Norfolk, Va.: Dr. Skinner spoke of a method of preparation that he put his patients through before he administered the bismuth, that he gave cathartics and washed out the bowel. I wish the doctor would describe his technic in detail, because it is so essential to the whole affair. I have given cathartics and then bismuth meals, but I got very poor results because the bismuth went through the intestinal tract so quickly that I considered the plates useless. Therefore, I would ask Dr. Skinner, after he gives this cathartic and high enema and gets his patient's intestinal tract cleaned out, how long does he wait before he administers his bismuth? Does he give it at once or in a few hours? The peristaltic waves surely continue for quite a little time, and therefore the bismuth is hastened on, so that I should imagine that plates made under such conditions would not show the true picture as it exists. I have always insisted that the patients be given no preparation, though I grant that fecal matter will sometimes fill up the intestine so that the true condition is not obtained. I insist that they eat a small breakfast before the bismuth meal is given, so as to get some idea of the peristalsis that is carried on ordinarily.

DR. GEORGE E. PFAHLER, Philadelphia: All these papers are interesting, and the men who presented them are to be congratulated. I especially want to thank Dr. Bainbridge for the beautiful drawings of the actual conditions found at operation. If we would all compare our results with the surgeon and have a fair surgeon to do it with, we would make better progress than we are making. However, we are all aiming at that result, and trying to get it.

I would like to ask Dr. Skinner just what he considers the definite findings to be that

he interprets as due to a Jackson membrane. I gathered from his paper that it was defects in filling or dilatation of the cecum as the result of a constriction above. I have felt as he did. I would like to have him make that more clear.

Not wishing to criticize Dr. Quimby, I would like to tell him, however, that the mere fact that he has not seen the reverse peristaltic waves does not prove that they do not exist. A number of men have seen them, so that there is not the slightest doubt of the existence of reverse peristalsis. I have seen it in cases where food was given by mouth, and also where enemas have been given, and just as clearly as in the stomach.

DR. LEWIS GREGORY COLE, New York City: It gives me great pleasure to discuss this question, particularly the paper of Dr. Bainbridge. We have discussed this question in private, and more or less in public. I do not believe all that he says, nor do I believe all that Mr. Lane says, although there can be no question but that he has opened up a remarkable field for study. Many things have been said by Lane, by Jordan, and by other men interested in this stasis work, which I cannot believe. Dr. Bainbridge said that there were no illusions in the surgical findings, and one of the first pictures he showed was one where he said the patient was lying down. There was surely some illusion there. We must grant that if this sewer gas business could be relieved by opening the abdomen and repairing the sewer it would be splendid, but the final results must be considered in determining whether this canal can be repaired as the plumber repairs a sewer in the house.

Dr. Quimby's remarkable reports and findings are interesting, but he should have demonstrated the pictures on which he bases these remarkable reports, so that we could

follow them and check them up with his interpretation of the findings.

DR. A. W. CRANE, Kalamazoo, Mich.: I am always interested in the subject of intestinal stasis. It seems to me that the roentgenologists have a great responsibility in advising the surgeon concerning operations on the intestinal tract in conditions which they interpret as stasis. So far as concerns the many kinks which may be demonstrated by the roentgenologists, or even by the surgeon, how are we to know that they are really pathologic?

If we will pay attention to the clinical laboratory and heed the pathology of the gastro-intestinal tract, we can be aided in this respect. Whenever we have a kinking of the intestinal tract which gives rise to auto-intoxication, to the absorption of putrefactive products from the large or small bowel, there may be obtained a definite reaction in the urine known as the indican reaction. The various putrefactive substances combine with the soluble sulphates in the blood, and are excreted in the urine as conjugate sulphates or indican. Whenever the indican reaction is found, we have a condition in the stomach parallel to this, that is, there will be a deficient secretion of hydrochloric acid. The physiologists have of late made comparatively clear the fact that the stomach is not primarily an organ of digestion or absorption. Food material is not completely digested in the stomach. The only true stomach digestion which is carried on is the digestion of proteids. The digestion of proteids is only partially carried on in the stomach, however, by the hydrochloric acid and pepsin. But this is really not so much a process of digestion as it is one of sterilization. It is remarkable that the stomach lining will secrete such a material as hydrochloric acid, but it does so for the purpose of sterilization primarily, and not for digestion. Even water taken into the stomach is not absorbed by the stomach. Likewise, the proteids are not absorbed by it, but by the intes-

tinal canal. One physiologic view of the stomach is that it is a sterilizing chamber, and that the hydrochloric acid is the antiseptic material which accomplishes this result. Now, then, when we have a case of so-called stasis, when indican is found in the urine, and the patient presents evidence of auto-intoxication, what can we do? We do not have to turn that case over to the surgeon unless there is an obstruction which causes dilatation. If we examine that case properly, we will find almost without exception that there is a lack of hydrochloric acid in the stomach, and that if we give hydrochloric acid as part of the treatment of that condition, without disturbing any membranes or any kinks, there will be a disappearance of the auto-intoxication. If, on the contrary, the surgeon has done his best to relieve the constriction caused by the membranes, or if he has done a short-circuiting operation, yet if the deficiency of hydrochloric acid secretion in the stomach is not remedied, the indicanuria will persist; likewise, the auto-intoxication. The patient will thus continue to suffer from the disease for which he has been treated surgically.

It is a matter of internal secretion, a matter of sterilization in the stomach, a process of bacterial activity in the intestines, and not wholly a question of obstruction or stasis. Of course, we must not forget that an obstruction of sufficient degree will cause severe auto-intoxication. If there is a high degree of obstruction, an ileus, there is a tremendous excretion of indican in the urine. That is a positive indication for surgical interference. But I wish to warn the consultant roentgenologists not to advise surgical procedure whenever they find evidence of kinking in the bowel. It is rather a question of how *much* kinking there may be, and whether it be from appendicitis and other inflammatory conditions. The patient may remain in good health, in spite of considerable auto-intoxication.

DR. A. M. COLE, Indianapolis, Ind.: I have had the opportunity of examining recently quite a number of patients who had the short-circuiting operation, and, much to my surprise as well as that of the surgeon, we have found the same stasis existing after the operation as before. Most of the bowel contents go around the same old way, and in thirty-six to seventy-two hours we found the transverse colon still full. I would like to have Dr. Bainbridge explain his theory why these patients improve, and they generally are improved, according to their statement. Is it an actual improvement due to the short-circuiting, or is it a psychic effect?

I think, as roentgenologists, we are apt to read too much in our intestinal plates. I think Dr. Skinner has called attention to some very valuable facts. There are always possibilities of error. I think we have been obsessed by certain ideas since the advent of Mr. Lane. The idea of adhesions, and ptosis, and kinks is not entirely preposterous, because there is no doubt that these things do exist, and that they may require surgical interference. But we must not forget that we do find kinks, ptoses and evidences of membranes in perfectly well persons, who do not need any surgical interference. That brings home to us the fact that function is the important thing. Is the stasis due to organic disturbance, or is it due to the fact that the patient is anemic, atonic and tired? It has been my experience that a great many cases of constipation and stomach disorders do well on proper hygienic treatment. Put these patients out-of-doors for three or six months, let them lead natural lives away from the stress and strain of modern life, give them proper food, and all of their symptoms will rapidly disappear. I believe that many patients who are operated on, and on whom a short-circuiting is done, could be benefited permanently if we could put them out in the wilds, prescribe a vegetable diet, make them lead the simple life, and have a

bowel movement after every meal, as we are told the barbaric tribes do, and which seems to be the normal thing. That can be brought about even in cases of chronic stasis. On the other hand, I do not want to decry the idea that we do have and do find, by means of the Roentgen ray, conditions that require surgical interference; but I wish to emphasize the fact that I believe we read too much in our plates and that we must go over the ground very carefully. We assume a very heavy responsibility when we advise a surgeon to operate because we find evidence of a kink or membrane.

DR. GEORGE C. JOHNSTON, Pittsburg, Pa.: Dr. Bainbridge is a good fighter and he is very enthusiastic. We have watched him take up many new things, and he works each one to the limit. If it is a good thing, it is fortunate to have had it come to his hands, and if not, it was equally fortunate to have had it come to his notice. He is now doing some very excellent work along the lines laid down by Lane. Of course, we must bear in mind that as roentgenologists we have nothing whatever to do with guaranteeing surgical results. The surgeons have to look after that end of the work themselves. We are not surgeons, but it is possible for a competent roentgenologist to show every variation from the normal in the abdominal cavity, if he uses careful technic and spends enough time on the search. I think it is possible to show every variety of abdominal disease, adhesions, ptosis, membranes, bands, veils, and what not. Also, all of these can be removed surgically. It is true that they will return. There will be more adhesions in the abdomen a year after the operation than there were there before, but that does not concern us, as roentgenologists.

The problem involved in this proposition is: What is the cause of all this disturbance? There are, primarily, two causes. One is civilization, eating cooked foods, Battle Creek foods, and prepared foods;

and the other is the fact that we work on our hind legs. So long as we continue to do these two things we cannot expect not to have trouble with our alimentary tract. We must be able to diagnose these conditions when present. We have now shown that we can do it, and that is important. We should not attempt to advise the patient as to what shall be done. You can demonstrate Lane's kink in almost every person you examine, but that does not mean anything, if the kink opens up and the bowel empties itself. The mere existence of ptoses, adhesions, kinks and membranes means nothing unless they interfere with the functional activity of the intestinal tract. The minute that these conditions become pathologic lesions, it is our province to diagnose their existence, refer the patient to the surgeon, or the medical man, and let them do the rest.

DR. JAMES T. CASE, Battle Creek, Mich.: The key-note of the question is function. We cannot beg the question that stasis in the alimentary tract is important and demands our attention. Dr. Bainbridge has shown us some most illuminating slides while he asked what was to be done. We are doctors and we are human. Besides, we are interested in pathology, and, therefore, we cannot help thinking of what therapeutic means are likely to be helpful when we see pathology. The question is not of kink or band, but on the function of the colon as a whole. Jordan was one of the men who insisted that a Roentgen examination must not be confined to the colon or ileum, but that we should examine the entire gastro-intestinal tract, and we have heard that emphasized by the surgeons who have seen these conditions. Again, we must not fail to consider with sufficient sobriety the statement of the man who has seen the inside of people as many times as the surgeon has. Without taking issue with any of the points, with many of which I do not agree in detail, it seems to me that we must agree with the general trend of the paper,

laying emphasis on intestinal stasis, and to try to arrive at a solution of the question of relieving this stasis. Personally, I do not believe that short-circuiting is the solution of the question. I have examined about forty of these patients after operation for constipation, and I am not favorably impressed by the results. I am particularly unfavorably impressed with any operation (partial colectomy, for instance) which leaves a blind end of colon to become a "sink of iniquity." When ileocolostomy is done, the ileum should be implanted into colon as near as possible to the proximal end of surviving colon. After having studied patients after this, that or the other type of operation, I have come to the conclusion that if I must ever undergo an operation for the relief of intestinal stasis, I will have a short-circuiting and a colectomy. That the kinks can be shown has been demonstrated by a number of men, but after all *function* is the thing that must be studied. As roentgenologists we, too, occupy a responsible position, because we must interpret the importance of these kinks. Having found one, the next question is what harm does it do, and inasmuch as the treatment of this condition must be based on such an interpretation, we are compelled to take part, whether we will or not, in solving what must be done. I have assisted at hundreds of operations and followed the cases afterwards, and I assure you that it is quite possible to outline these kinks accurately. I have seen in the operating room dozens of Lane's kinks which did not obstruct, but here, again, the surgeon has struck the key-note that it is the *fixed*, adherent intestine, not the adherent, yet freely movable intestine, which does the mischief. I think ileocecal valve insufficiency is responsible for most cases of ileal stasis, and if indicanuria exists after carefully washing out the intestinal tract, I think we may assume that the trouble is in the terminal ileum and is due to ileal stasis.

DR. EDWARD H. SKINNER, Kansas City, Mo.: My short contribution was merely an attempt to help others to eliminate some of the errors in interpretation. We first make our examination of the patients in their usual alimentary condition without previous catharsis or enemas. If we find that there has been some stasis in the bowel and there is a filling-defect caused possibly by retained non-opaque fecal masses, we then order free catharsis and make a second examination in an endeavor to learn whether there is a real obstruction or not. Another way is to feed an ounce of bismuth or barium with each meal for three or four days, and then you have the entire colonic residue faintly impregnated with bismuth, and you will see where the large brilliantly opaque meal is and also the previous colonic residues. Such methods help to eliminate errors. I recognize the value of and use persistently the fluoroscopic palpation method upon the horizontal Roentgen table. It is extremely important in these cases, especially where we find small filling defects which may be due to some band and if such a band has a fixed point it is more easily determined by fluoroscopic palpation.

I agree with Drs. Johnston and Case that function is the real crux of the situation. I do not believe that any of these cases of intestinal stasis in which you may find bands ever become surgical, unless there is a dilatation of the bowel proximal to the site of obstruction. That is a very important point. If you have pericolic membranes at the hepatic flexure, they must produce obstruction at that point in order to become surgical cases. I also agree with Dr. Johnston that I do not care where my intestinal tract is, so long as it behaves itself. Until these bands produce definite obstruction, or until the omentum is bound down in such a way as to produce obstruction, these cases are not surgical.

DR. SKINNER: Dr. Hunter is mistaken. I first examine the patients in the usual alimentary condition.

DR. A. J. QUIMBY, New York City: As to reverse peristalsis, a proctologist, Dr. Lynch, of New York, told me he has based a method of operating on a belief that there is no such condition as reversed peristalsis.

As to the comparison between the skiagraphs and the illustrations of the operative findings, that will be brought out more fully in the completed paper when published in the Journal. I merely presented slides of characteristic conditions, as I could not give all the plates on the slides as it would mean from 75 to 100 illustrations in these cases and would consume too much space.

Dr. Johnston supports us thoroughly on our stand on the findings, and has expressed himself very kindly.

We must report every departure from the normal to the surgeon; it does not matter how insignificant it may be, so that when the surgeon opens the abdomen, he can find the lesion without an extensive search. If we see a band and he finds a membrane, that does not matter; the point is to direct him to the place where we know something is wrong.

DR. BAINBRIDGE, in closing the discussion, said he did not wish, as some of those present seemed to think, to disparage, in any way, the splendid work of those whose names are attached to the various intra-abdominal bands.

Dr. Cole had misunderstood him; he did not hold that there are no illusions in surgical findings, for there are many. There were surgeons who made mistakes, as well as roentgenologists. Infallibility existed in neither sphere. Dr. Cole wanted end-results; so did all want end-results, but the time had not arrived as yet for a final estimate of the whole subject of stasis. However, Lane had been working on the problems involved since 1900, and others had been following his lead for a number of years, the speaker among them, and it could be taken for granted that the trail would have been abandoned long ago had not the way seemed promising.

Dr. Cole did not like the "sewer gas" idea; neither did the speaker, and for that reason

he had been doing all he could to rid the human plumbing system of the noxious element. In this connection, however, it was well to remember Carrel's *in vitro* experiments with heart muscle and other tissues, which established the fact that tissues may be kept alive indefinitely if they are *fed* and *bathed*. A piece of heart with which Carrel experimented lived for 287 generations of cells, or over two years after the demise of the animal. If this was true of a small group of cells, which could be thus kept alive, how much more true must it be of the body made up of cells, similar and dissimilar. The cells of the body must have not only an external bath, but an internal bath as well, in order to remove all the poisons that are elaborated in the course of the day's work. This brought one back again to the defective plumbing system and the sewer gas.

Dr. Cole did not seem to approve of Dr. Jordan's "propaganda" tour in America. It might be recalled in this connection that Marion Sims and many other distinguished American physicians and surgeons have toured Europe telling of what they believed to be important discoveries for the relief of human suffering. Dr. Jordan, who had watched and studied Lane's work so closely, felt that he had a message to deliver, and he came to America for that purpose.

Dr. Crane did not believe that toxemia is the sole result of intestinal absorption, and called attention to the fact, which Lane and others have so often emphasized,—that

many kinks may exist and yet the subject be well. It was a question of individual resistance.

Whatever the final judgment concerning chronic intestinal stasis might be, there seemed in the subject a field for earnest investigation, and for combined work on the part of surgeons and roentgenologists. Each could help the other in sifting out the whole matter, and there should be no spirit of antagonism one against the other.

In closing, Dr. Bainbridge said: "The man who first directed our attention to the subject of chronic intestinal stasis was the man who first put saline solution into the blood vessels of a human being,—and they nearly hounded him out of the profession at that time. They said he was possessed. He was the first to take out a rib for empyema,—and they nearly took away his F. R. C. S. He was the first to plate a bone and to operate on harelip and cleft palate in a child under three years of age,—and he nearly went to bankruptcy. His record of achievement thus far certainly warrants us in lending an attentive ear to anything that he may say. Many of his claims with reference to chronic intestinal stasis have stood the test of experience and time; others are still being weighed in the balance by himself as well as others. Is it not our duty to give to him and to humanity our unbiased help in clearing up the problems which are yet to be solved in connection with the body drainage scheme and its proper function?"

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EDITORIAL

The successful mid-winter meetings which have been held both in the East and West cause one to wish that arrangements are being made for similar gatherings this year. It is to be hoped that there will be a one-day meeting for the Eastern members and a one-day meeting for the Western members. It is the common verdict of those who attended these meetings that they have been fraught with great interest, possibly even more instructive than the larger meetings in proportion to the time spent.

We have the good fortune in this issue to present some roentgenograms made by Prof. Dr. Alban Köhler. These illustrate very well the work which roentgenologists

across the water are busily engaged with. We have been promised for the next issue a series of roentgenograms which have been made in one of the English base hospitals. A very interesting fact is to be noted that at least four rapid methods for localization of foreign bodies have been developed since the beginning of the European conflict. The roentgenologist in active service must certainly have his ingenuity frequently taxed in solving the perplexing problems of rapid localization, often without the facilities to which he has been accustomed.

Last summer it was feared that there might be a shortage of X-ray tubes in America on account of the fact that the glass bulbs were imported. We, however, had the pleasure of recently learning that one manufacturer at least has been able to secure better American bulbs and at less price than he had been in the habit of importing. We understand, too, that the American chemical houses are taking up the manufacture of hydrochinon, so that the price which prevailed last summer will probably not occur again.

We have been wondering for some time if some enterprising plate manufacturer would not cater to the needs of the roentgenologists in putting upon the market proper sizes of plates. At the present time, the roentgenologist must employ plates which have been designed primarily for portrait and landscape photographers. When one considers that a large percentage of plates are made with a circular diaphragm, one sees that at least fifteen or twenty per cent of his plate bill is sacrificed to the trade tradition of the plate manufacturer. It is time, we think, that an organized protest be made against this useless expense.

A protest should be addressed to the manufacturers of surgical instruments who are still producing steel splints for surgical use. We think that with the well-known superiority of aluminum for splint purposes, some up-to-date manufacturer of surgical apparatus would have pre-empted the market.

BOOK REVIEWS

STEREOROENTGENOGRAPHY OF THE ALIMENTARY CANAL, by James T. Case, M. D. Sections XXXIV. and XXXV. of Dr. Howard A. Kelly's Stereo-Clinic.

These latest sections of Kelly's Stereo-Clinic fully sustain the high reputation of this famous series. Dr. Case is to be congratulated upon both plan and execution.

This work establishes American supremacy in the roentgenology of the alimentary tract. This is fitting because to America belongs the conception of the bismuth method (Hemmeter); the first bismuth studies of the alimentary tract in animals (Cannon); the first delineation of the human stomach by large quantities of bismuth in food (Williams and Cannon); and the first stereoroentgenograms of the stomach and intestines (Leonard). Case himself is the first to use the stereoscopic method after bismuth enemas, and the first "to make the stereoroentgenographic method a routine procedure in the investigation of the stomach and intestines." He does not allow us, however, to think that he relies only upon stereoscopic studies, but pays eloquent tribute to fluoroscopy, of which he is a master.

Dr. Case has utilized unlimited clinical material, both in a great sanitarium and in a great city hospital. He has had at his command the most efficient types of apparatus. He is enabled, therefore, to give us the advantage of carefully selected cases and of a high degree of technical execution.

The first and second parts only of this stereoroentgenographic atlas have appeared. Parts three and four are yet in press. The writer, however, has been privileged to see the original stereoscopic reductions of the plates yet to be published, and knows that

this work is as satisfying in comprehensive scope as it is in the minutiae of each plate.

In every case the roentgenologic findings have been "checked up" at operation or autopsy. A clinical history, often with diagrams, accompanies each stereo set. The first four stereograms illustrate roentgenologic technic. The next nine show the most common oesophageal conditions. Twenty-nine stereos are given of stomach cases, three of duodenal ulcer, three of gall-stones, one of pancreatic cancer, and one of subphrenic abscess. Among the stomach cases are twelve of ulcer and twelve of cancer, which afford a fair insight into the roentgenographic differentiation of these two most serious of gastric diseases.

Three gall-stone stereos show the advantage of the stereoscopic method in identifying these calculi. To one who knows of Dr. Case's unequalled series of gall-stone plates, his inclusion in this work of only three examples shows great restraint and care in the selection of cases.

The text of this Roentgen Clinic gives an incomparable value to the work. We find here a treatise as well as an atlas. It is clear, comprehensive, convincing. The doubts of the surgeon or internist as to the value of the Roentgen ray in the diagnosis of alimentary diseases vanish long before he has reached the concluding pages.

It is safe to say that this work will reach the general profession as no other roentgenological work has yet done. It will thus perform a great service to roentgenology in presenting and interpreting to physician and surgeon alike the practical diagnostic resources which the screen and plate now place at their disposal.

A. W. C.

ABSTRACTS

Hampson, W., M. A., L. M. S. S. A., London, Eng.: Localizing simply and immediately. (Archives of the Roentgen Ray, November, 1914.)

For much of the work that will now be occupying the military hospitals, Hampson says it is desirable that the radiographer should be able to tell the surgeon at once, while they inspect together the image on a fluorescent screen, what is the depth from the surface of the bullet or other foreign body.

Where it is possible to adjust the height of the tube-box or of the couch-top, the following is the procedure:

With the patient on the couch, set the focus at some determinate distance, say fifty centimeters, beneath the screen. Contract the diaphragm opening so as to make it easy to center the foreign body in the field of view. The rays through it will then be vertical, and a small arrow-head, or other mark, of metal, fixed by adhesive plaster on the skin, will localize the selected point of the foreign body in two dimensions—along and across the trunk or limb. For the depth, mark with pencil or ink, on the glass of the screen, the exact situation of a selected point in the shadow of the foreign body. Move the tube-box, and with it the focus, some determinate distance, say ten centimeters, and mark on the glass the new situation of the selected point, opening the diaphragm wider, if necessary. Measure the distance that the shadow of the point has traveled, read this off on the upper side of the scale (Fig. 1), and the corresponding number on the lower side of the scale will be the depth in centimeters of the foreign body beneath the screen.

This scale is the only special apparatus required, and the depth is ascertained immediately. Care must be taken that the

screen is horizontal, parallel to the direction of movement of the tube.

If the part of the patient under examination is concave, and does not touch the screen, this must be allowed for in stating the depth beneath the skin.

If the distance between screen and focus cannot be adjusted, the same result can be obtained with very little trouble and delay. Ascertain by measurement what that distance is, mark the traverse of the shadow as before, and then on a drawing-board work out the result, as follows (Fig. 2):

A B is a line equal to the vertical height from screen to focus.

A C is the horizontal movement of the focus.

B D is the horizontal movement of the shadow on the screen.

Draw a line D C, intersecting A B in E. Then B E is the depth of the foreign body below the screen.

As the correctness of the result depends on the accuracy of the measurements, these ought to be made as few as possible, not merely for the sake of simplicity, but to reduce the number of occasions for inaccuracy. Therefore, instead of measuring the distances, focus to couch-top board, and board to screen, and estimating the thickness of the board, it is better to measure directly the distance from focus level to screen by means of a large pair of calipers. If such cannot readily be found, they may be made by prolonging with stout wire (best soldered on) the arms of an ordinary pair.

If it is desired to work with other distances than fifty centimeter focus distance, and ten centimeter focal traverse, the result can be obtained as last described, and, if desired, a scale can be prepared once for all on the same principle to suit the altered conditions.

For the conditions adopted above (fifty centimeters and ten centimeters) the rela-

tions shown on the scale may be more readily remembered for mental reference when actually screening, if shown, for the commoner cases, in the following form:

½ centimeter traverse on screen means a depth of about $2\frac{1}{3}$ centimeters.

1 centimeter traverse on screen means a depth of about $4\frac{1}{2}$ centimeters.

2 centimeter traverse on screen means a depth of about $8\frac{1}{3}$ centimeters.

3 centimeter traverse on screen means a depth of about $11\frac{1}{2}$ centimeters.

4 centimeter traverse on screen means a depth of about $14\frac{1}{3}$ centimeters.

Skinner, E. H., M. D., Kansas City, Mo.: The Roentgen method in ileocecal diagnosis. (The Journal of the Missouri State Medical Association, November, 1914.)

The Roentgen symptom-complex of pericolicitis dextra (Jackson's membrane) is described by Skinner as follows:

1. Stomach may show slight ptosis, but absolute freedom from organic lesions.

2. Duodenum normal.

3. Stasis of the proximal colon as far as first portion of the transverse colon, which may persist for days.

4. Dilated cecum with possible appreciation of the appendix acting as a suspensory ligament.

5. Fixation of ascending colon with tenderness and pain referred thereto. Frequently there are one of two distinct annular constrictions near the flexure in the ascending colon.

6. Spasticity of descending colon with increased antiperistalsis of colon and mucous shadows indicating colitis.

7. If the condition is of long standing there may be ileocecal patency and general visceroptosis with the exception of the hepatic flexure.

8. The one startling Roentgen finding is the constancy of the shadows in the proximal colon, which remain almost identical for days and do not alter very perceptibly when patient is changed from the horizontal to the vertical position.

Theilhaber, Dr. A., Munich, Germany: Disposition to cancer in old age. (Surgery, Gynecology and Obstetrics, Nov., 1914.)

Speaking of the after-treatment following cancer operations by Roentgen rays, Theilhaber says that the Roentgen rays will have to be used immediately following the operation; it will be necessary to use the rays intermittently for years at definitely timed intervals. Remnants of tissue may be destroyed by the diacutaneous method, if primary union is desirable. Success will be obtained in only a very small number of cases. The probability of success is greater when the rays are applied through an open wound. In such cases, where we do not suture on account of a plastic operation to be undertaken at a later date, or for other reasons, it is advisable to leave the wound open for a longer or shorter time and to expose it intensively to the Roentgen ray. However, Werner, who often used this procedure, reports that it does not positively protect against recurrence. Concerning frequent prophylactic, intermittent Roentgen ray therapy to bring about the immediate destruction of beginning recurrences, Theilhaber does not believe that any great number of successful results can be obtained thereby. He refers to the communications of Heinecke, who investigations were corroborated by Krause, Aubertin, and others, who showed that the blood-forming organs are very much endangered by intensive use of Roentgen rays. The cells of the bone-marrow, spleen, and lymphatic tissues react markedly to Roentgen and radium rays producing a degeneration of the nuclei. The number of the lymphocytes and leucocytes decreases to subnormal, after a transient polynuclear leucocytosis, to recuperate only slowly. The blood-cells cannot be protected by a filter technic, as they are attacked especially by the harder gamma rays passing through the metal filter which we need for applying Roentgen rays. The blood-forming organs undoubtedly recuperate from the disturbances caused by the rays. However, if the rays must be used

again and again, recuperation ultimately ceases.

Considering the great importance a perfect function on the part of the blood-forming organs possesses as a prophylaxis against cancer, it is not probable that by means of the sole use of radiotherapy the percentage of recurrences is markedly decreased. If one wished to destroy with a probable certainty beginning recurrences before they become macroscopically recognizable, then the Roentgen ray must be used several times a month for many years. Experience in "Roentgen-cancer" has shown that the disposition to cancer is directly increased by the too frequent use of the rays. If the rays are used very diligently after operations, the cancer disease is frequently aggravated and a recurrence is probably directly excited. If the rays are not used very frequently, then it must be a coincidence if one does hit a recurrence which is not yet macroscopically recognizable and thus prevent its growth.

The communications so far reported about the frequency of recurrences after Roentgen ray treatment, Theilhaber says, seem to verify the correctness of this evidence, especially for the non-gynecologic cancer. Heidenhain reported, at the tenth congress of the German Roentgen Society at Worms, in 1914, that the prophylactic use of Roentgen rays has not markedly decreased cases of recurrence. Similar reports were made at the meeting of Natural Scientists and Physicians in Vienna in 1913.

Overend, Walker, M. A., M. D., Oxon., St. Leonard's-on-Sea: An aid to the Roentgenotherapy of the pituitary fossa. (The Lancet, October 24, 1914.)

In order to compare the size and appearance of the pituitary fossa in a series of radiograms, the true lateral position of the skull must be chosen in each case. The axis of the tube must lie parallel to the plate and its target immediately beneath the fossa. The instrument devised by Overend consists of a stand carrying a metallic bar, at the free end of which is fixed a leaden ear-piece

resembling that of a binaural stethoscope. Opposite to it, and fixed to the stand, is a second knob. The bar is movable upon the support and may be clamped at the proper height. The ear-knobs lie at the same distance from the pillar and in the same vertical line. Each fits into an auditory meatus. When inserted there is little or no tendency for the patient to alter the position. A piece of lead is then placed at the junction of the middle and outer third of a line running from the outer canthus of the eye to the external meatus, and the target is moved until it strikes the metal. The lead being removed, the diaphragm is opened and a radiogram taken. The determination of the true lateral position by means of radioscopy alone is uncertain and therefore inadequate for exact measurement.

The clip may be used when the tube is above and the plate beneath the head. Also, it may be employed for stereoscopic radiograms of the fossa and orbit, for obtaining accurate lateral views of the face and the sinuses, etc. When the couch has a canvas top it may be preferable to lay upon it a rectangular piece of three-ply wood of suitable width for the support of the head. It may be provided with a spirit-level and with feet to raise the head an inch or more, taking care that the target remains the same distance in all cases. The head may be fixed in a true anteroposterior position by the employment of the same principle and by the suitable modification of the instrument.

Bucholz, C. Hermann, M. D., Boston, Mass.: Roentgen ray examination in scoliosis. (The American Journal of Orthopedic Surgery, July, 1914.)

Speaking of Roentgen ray examination in scoliosis, Bucholz says: The study of the Roentgen ray picture has been an important part in the examination of our cases, but, unfortunately, it has not always helped so much in making a pathological diagnosis. Frequently the interpretation of the Roentgen ray picture has been made to support theories or hypotheses instead of being based on the evidence presented by the radiograph

alone. The lumbo-sacral and sacro-iliac regions present very difficult objects for Roentgen ray interpretation, with their many crossing lines, and their large masses of bone of different structure and density. To the usual difficulties a special point is added in our class of cases; that is, the lateral deviation and the tilting of the pelvis. Bucholz believes that in many pictures certain changes in position and relation of certain bones to each other are caused by the deviation, and are not "the" cause of the deviation. Moreover, the physiological range of motion of the sacro-iliac joints must be considered. We know that this range is considerable, and it has been demonstrated in our clinic that stereoscopic Roentgen ray plates of a normal person in certain positions may show a picture suggestive of a sacro-iliac displacement. Hence, such a diagnosis should not be made from the Roentgen ray picture, unless history and clinical examination favor it. The same is true for the lumbo-sacral and to some extent for the other lumbar articulations. Nevertheless, the Roentgen ray examination is of great importance for the explanation of our cases, and with improved technic and a better understanding of the normal types and their physiological variations much will be gained for the making of a clear diagnosis. The Roentgen ray examination should always be preceded by a careful clinical examination, and one should, as far as possible, study the picture with a definite idea of what it might be expected to show. In all difficult cases the Roentgen ray examination must be very thorough to be complete; that is to say, it must be made on pictures of the whole pelvis and lumbar spine, as well as especially focused pictures of those parts which seem to be most important.

1. STRUCTURAL CHANGES OF VERTEBRAE. Marked changes in the structure in the upper lumbar vertebrae are usually seen with ease. Changes of the last lumbar vertebra may cause great difficulties. A picture with as little inclination as possible is needed. While that is not so difficult in the normal case, it may be very difficult, if

not impossible, in a case with sciatic scoliosis; not only due to the lateral deviation, but also on account of the frequent difficulty of having the patient's legs raised as may be necessary for that purpose. Only in a clear picture of the last lumbar vertebra can one be sure of detecting finer changes in structure and shape which may suggest a minor injury.

2. VARIATIONS OF THE LUMBO-SACRAL VERTEBRAE. It is not necessary in this place, to give an exact enumeration of all the variations which may come in question. Aside from the cases of typical numerical variation with large transverse processes and transverse joints, etc., the condition of the lumbo-sacral joints as well as the joints between the last and the next upper lumbar vertebrae should attract special attention. Goldthwait and Adams' latest studies have thrown much light upon these complicated and variable structures.

3. ARTHRITIC CHANGES. Hypertrophic changes of the lumbar vertebrae are usually detected with ease, although more than one picture may be necessary. It is more difficult and often impossible to find changes in the Roentgen ray picture to confirm a clinical diagnosis of infectious arthritis before actual bony changes have become evident. Hypertrophic alterations of the sacro-iliac joints are not easily seen, unless in form of spicules on the upper and lower aspect. On very clear negatives bony bridges connecting sacrum and ilium may be seen.

4. CHANGES WITHIN THE SOFT TISSUES have not attracted as much attention as they deserve. In a surprisingly great number of his cases he has noticed one or more round shadows within the pelvis or on one or both sides of the lumbar spine. Also shadows, mostly of an irregular shape, between the transverse process of the last lumbar vertebra and the lateral part of the sacrum have been rather frequently found. On several plates of those cases a more or less developed numerical variation was seen, and the shadows were found between the transverse process of the sacralized last lumbar and that of the next upper vertebra.

The probably frequent occurrence of transverse bursae suggests an explanation of such shadows as lime salt deposits in the wall of a bursa. The explanation of such findings is not yet beyond doubt, nor can their importance be accurately estimated, but he believes that all those points must be carefully studied.

Bythell, W. J. S., M. D.: Roentgen radiographic appearances of bone tumors, benign and malignant. (Archives of the Roentgen Ray, October, 1914.)

The three conditions between which we have to distinguish are periostitis of various kinds, myositis ossificans, and periosteal sarcoma, accompanied by rarefaction of the bone caused by the septic process. The essential features of myositis ossificans are (a) a laminated arrangement of flaky shadows parallel to the surface of the bone; and (b) a distinct line of demarcation between the adventitious shadows and the bone itself, showing very clearly that the bone is not involved.

In the later stages of myositis ossificans the shadows tend to become more defined, and usually closely adherent to the bone.

The appearance of smoke arising from a smouldering heap of leaves Bythell considers as absolutely distinctive and diagnostic of periosteal sarcoma.

Cumberbatch, E. P., B. M., M. R. C. P. (Lond.): A plastic Roentgen-ray-proof preparation for use in radiotherapy. (Archives of the Roentgen Ray, October, 1914.)

It is sometimes difficult to shape a shield to protect the surrounding healthy skin when the Roentgen rays are to be applied to a superficial lesion with irregular outline, especially when the surrounding parts are raised or depressed, as in the region around the orbit. It would be then easier to make a shield from a plastic preparation, and mould a central aperture to the outline of the part to be exposed when the shield is in position.

Cumberbatch made several specimens of plastic preparations of different composi-

tion two years ago. The chief difficulty was to secure the permanence of the plasticity. The formula of one of the preparations is given below. This preparation, Cumberbatch says, is opaque to the Roentgen rays, it can be easily moulded, and it does not adhere to the patient's skin. A sample which was made twenty-two months ago has retained its plasticity to the present day.

The preparation is composed of:

Bees' wax	1	} parts by weight.
Vaseline	1	
Resin (finely powdered)	$\frac{1}{4}$	
Lanolin (hydrous)	$\frac{1}{2}$	
Lead oxide (litharge), finely powdered	6	

The first four ingredients must be melted on a boiling water bath, in the order given, and each must be completely melted before the next is added. Then the finely powdered litharge is added, little by little, stirring all the time. When all is added, the vessel is removed from the water bath and allowed to cool. Stirring must be continued till the mixture becomes viscid, otherwise the heavy litharge will sink to the bottom of the vessel and the preparation will have an uneven consistency.

Immediately after it has solidified it tends to adhere to the skin of the operator when it is moulded, but the preparation improves greatly after a few days, especially if it is occasionally moulded.

With regard to its opacity to the Roentgen rays, a layer of about one millimeter thick appears to be perfectly opaque when placed under a screen between it and the source of the rays, and the outlines of a piece of lead one-eighth inch thick are not discernible.

Cumberbatch has found the preparation useful in the Roentgen ray treatment of rodent ulcers of the lower lid, and for a case of keloid of curious shape situated over the side of the face.

Hernaman-Johnson, Francis, M. D.: A simple and rapid method of localizing bullets. (The British Medical Journal, Oct. 31, 1914.)

A method of which Hernaman-Johnson has made considerable use is the following:

Suppose a bullet has lodged somewhere about the middle of the thigh. The patient is placed on an ordinary examination couch having the tube beneath. His feet are placed together, with toes pointing directly upwards. The Roentgen rays are turned on with a widely open diaphragm, and the general position of the bullet ascertained by the fluorescent screen.

The aperture is now gradually narrowed, and the tube moved about so that the image comes into the center of the field, which, if the anticathode has been correctly centered, will be a perfect circle. This process is continued until the illuminated patch is not more than one inch in diameter. The image of the bullet is now vertically above the bullet itself.

The only special device necessary is now used. It consists of a metal ring having an internal diameter of about $\frac{3}{4}$ inch, fixed to the end of a flat wooden handle, one foot in length. The ring is slipped under the screen, and moved until its shadow encircles that of the bullet. A mark is made on the skin with silver nitrate in the center of the ring, the screen being first removed, but care being taken not to displace the "ring-localizer."

Next, the screen is readjusted, and the ring is now slipped between the patient and the couch. The encircling position is again found, and a second mark made, this time on the skin of the lower aspect of the limb. If everything has been carried out properly, this second mark will be found vertically below the first. To ascertain at what distance below the surface the bullet will be found, the patient is rolled over on the side. The original procedure is now repeated, and two other marks are obtained, a line joining these two marks cuts a line joining the first two at right angles. The patient is returned to his former position, and an inspection of the marks will enable one to judge within half an inch the distance at which the bullet lies below the surface. Points essential to the success of the method are: (1) The beam of the rays must be vertical, and the shadow of the bullet must be in the center

of the small illuminated field. (2) The ring-localizer must accurately encircle the bullet shadow. (3) The nitrate of silver mark must be placed at the center of the ring. Make dots for the vertical marks, and crosses for the horizontal. (4) Whenever possible, the patient should be operated on in one or other of the positions in which the localizing was done. (5) Wherever possible, the patient should be taken directly from the examining couch to the operating table, because bullets sometimes alter their position to some extent even in twenty-four hours.

Cole, Lewis Gregory, M. D., New York City: Preliminary report on the therapeutic possibilities of the Coolidge. (Medical Review of Reviews, November, 1914.)

The tube designed by Coolidge, Cole says, removes many of the limitations that have encumbered the development of Roentgenotherapy. The rays emanating from this tube far excel all former possibilities of penetration. The tube may be operated continuously without any fluctuation at a penetration which is beyond the scale of either the Walter penetrometer or the Bauer quantimeter. So great is the potentiality now available that a full erythema dose may be administered to the surface without a filter in thirty seconds, with a three m.m. filter in one minute, and with a ten m.m. filter in three minutes.

Accordingly, it is evident that if the soft and medium rays be filtered out by using different thicknesses of aluminum, a penetration desirable for a lesion of any depth may be obtained, especially by the cross-fire method, using several ports of entry through the skin.

In order to demonstrate the superiority of the Coolidge tube to all other tubes, and to prove that with the Coolidge tube a full erythema dose may be administered to a tumor three inches below the surface without endangering the skin itself or intervening tissues, the following experiments were submitted by Cole, showing:

1. That most of the rays from the ordinary tube, operated at its greatest penetration with a standard exciting apparatus, are absorbed in the first inch of the tissue, if no filter be interposed.

2. That with the ordinary tube, operated to its fullest capacity on such an apparatus, no filter being interposed, eleven and one-half minutes are required for a full dose three inches below the surface, and that sixteen times an erythema dose is meanwhile administered to the skin.

3. That with the Coolidge tube a full erythema dose can be administered to the surface in thirty seconds, if no filter be interposed.

4. That with the Coolidge tube a full erythema dose can be applied to the surface in one minute, through three m.m. aluminum.

5. That with the Coolidge tube a full dose three inches below the surface can be obtained in six minutes through six ports of entry, using a three m.m. filter.

The experiments undertaken in proof of these tenets consisted of the Roentgenization of an area three inches below the surface of a piece of meat six inches thick, a depth of tissue calling for a penetration about equal to that required for treating a cancer of the pylorus. The surface of the meat was six inches from the focal point. The doses were measured by Hampson pastilles, one placed on the surface of the meat, a second imbedded one inch deep, a third located two inches from the surface, and a fourth three inches from the surface.

EXPERIMENT I: The area three inches from the surface of the meat was exposed to rays from seven ordinary tubes, excited to their greatest capacity by a standard transformer with a parallel gap ranging from seven to four inches, according to the table given on the diagram. Eleven and one-

half minutes were required to obtain a full dose at the fourth pastille, the supposed depth from the surface of a cancer of the pylorus. The surface pastille received coincidentally sixteen times an erythema dose, an exposure which would have burned a patient beyond recovery.

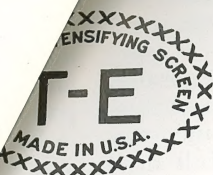
EXPERIMENT II: One Coolidge tube was used, operated at a high penetration by a standard 4 K. W. transformer, according to the table on the diagram. The soft rays were filtered out with three m.m. aluminum. Six exposures of one minute each were sufficient to obtain a full dose three inches below the surface.

The use of six ports of entry eliminates the danger of burning the skin, so that each surface area receives only one erythema dose. The experiment was repeated through ten m.m. aluminum. Fourteen minutes were required for a full dose three inches below the surface, using ten m.a. current, or one hundred and forty m.a. minutes. This exposure is more than twice as long as that required through three mm. aluminum, and yet the curve of absorption of the rays, after passing through the filter, is practically the same. Therefore, if the therapeutic efficiency is in proportion to the rays absorbed, the greatest value will be derived from the rays of about this penetration. Cole warns that the Coolidge tube and cross-fire method should not be used for treating deep lesions to which the ordinary Roentgen ray methods have previously been applied, as it is impossible to determine how much dosage the skin underlying the lesion has received already. Cole believes that the use of the Coolidge tube offers a greater hope for the successful treatment of cancer than anything except surgery, and that when surgery is indicated, the Roentgen rays should be used in conjunction with it as a routine post-operative treatment.

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AMERICAN SCREEN



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The hard surface of the new Screen is not injured by accidental contact with rough plates, etc., and black specks and other foreign bodies that may adhere to the sensitive film of the negative are not forced into the Screen Emulsion as in the past. When soiled, the Screen may also be washed many times without affecting the polished surface.

The new process makes it possible to incorporate a larger percentage of Fluorescent material in the Emulsion—without producing a friable or brittle surface, the layer of Emulsion can also be made deeper and thicker, resulting in greatly improved Radiograms, full of detail, and of admirable clarity.

The new Screens are "seasoned" by a new and improved process whereby the solvents are completely and rapidly eliminated—adding greatly to the long life of the Screens.

A further improvement consists in the removal of all tendency to curl, or twist, when Screens are not in active use—the new "T-E" remaining perfectly flat at all times.

Prompt Shipments

Colleagues may rely upon prompt shipment of all orders for New "T-E" Screens—increased facilities for Screen making having been installed during the summer. "Rush orders" may be sent by wire, and will be given special and immediate attention.

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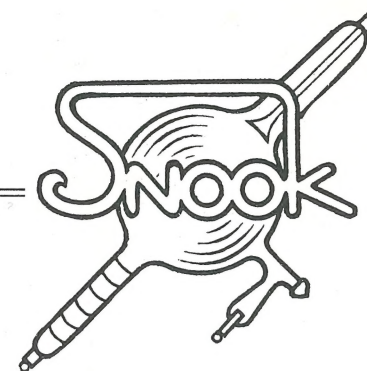
T-E Screens are made in the U. S. A. Consequently production will be in no way affected by the European War, and no increase in the price to consumers is at present contemplated.

For further particulars, samples of the New Improved Screen, circulars on technique and professional references, etc., apply to

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