

The American Journal of Roentgenology

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

VOL. I

New Series

February, 1914

No. 4

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THE AMERICAN JOURNAL OF ROENTGENOLOGY

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

VOL. I

NEW SERIES, FEBRUARY, 1914

No. 4

THE SPEED OF INTENSIFYING SCREENS

By Prof. J. S. SHEARER, Cornell University.

The experiments described in this paper are the first of a series to be carried out in the measurement of various quantities of interest in the applications of Roentgen rays, and about which there are often a great variety of questions. The present paper makes no pretense of determining the best screen for the use of the profession and is confined simply to the relative speeds of some available screens when used with the various plates on the market. Later papers will deal with the matters of detail, contrast, freedom from grain, lag and durability, all of which are essential in the development of the ideal screen.

The measurement of the intensity of the light transmitted by the various portions of the negative calls for a photometer of special design and if possible one in which there is no personal equation and where the eye is not fatigued by use. The photo electric cell may be adapted to this work in a very simple and effective way. When light falls on the surface of metallic potassium or sodium in a vacuum cell, it liberates electrons which are able to carry electric charge from the surface to a fine platinum wire which constitutes the other terminal of the cell. Under suitable conditions, this current varies in accordance with the illumination and thus constitutes a photometer not at all dependent on the fatigue or other accidental condition of the eye.

The general arrangement of the apparatus is as follows:

Light from a mercury vapor lamp is reflected through a narrow horizontal slit, above which the negative to be measured can be moved. The jaws of the slit are nearly in contact with the film so as to avoid any uncertainty in the area measured. All portions of the cell walls were painted a deep black so that the slight illumination of the room would not reach the sensitive surface. The amount of illumination reaching the cell could be controlled by changing the width of the slit for coarse adjustments and by the use of a narrow wedge reducing the amount of light reaching the mirror for final illumination. The slit and wedge were adjusted so that the light passing through the *unexposed* portion of the film gave a reading of 100. In this way any slight chemical fog would have no influence and the readings are percentage transmissions. A Dolezalek electrometer measured the current and readings were made on a scale divided into 100 equal parts.

Samples of the various screens to be tested were cut in strips about one and one-half by three inches and attached to a heavy piece of cardboard which in turn was fastened to the back of the plate-holder. All exposures were made on eight by ten plates so that all the screens were given the same exposures and there could be no difference

due to variation of development. The holder was placed behind a heavy sheet of lead (12 pounds per foot), in which were three parallel slits. These were so spaced that each screen sample was exposed to the rays passing through one of these openings. By sliding the plate-holder along, six different exposures were made in which there could be no doubt that the corresponding exposures on the various screens were identical. The plan is shown in Fig. 1. Working at

exposures and the current was so small (1.9 to 2.2 milliamperes) that a series of plates could be run without any readable variation in the current. It is proposed later to determine in the same way the variation in sensibility to rays of different hardness. The present tube may be regarded as being of average hardness and not far from six Benoist.

Formulation of the results might be made in a great variety of ways according to the

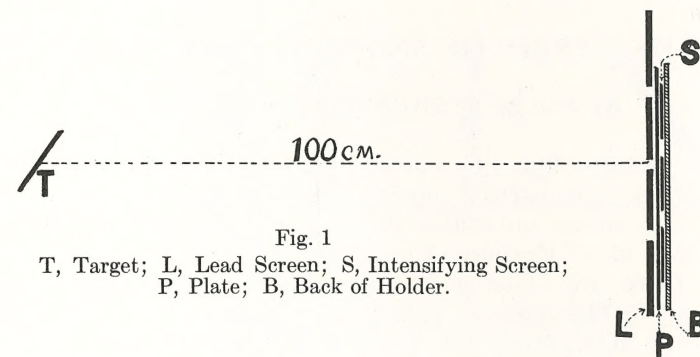


Fig. 1

T, Target; L, Lead Screen; S, Intensifying Screen;
P, Plate; B, Back of Holder.

moderate current values for short times, the tube could be kept constant. A Green and Bauer tube operated by a Kny-Scheerer transformer was used in this work.

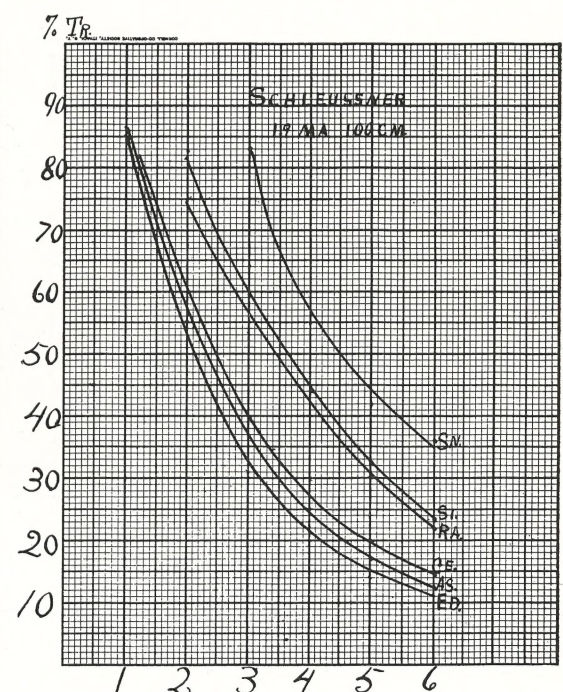
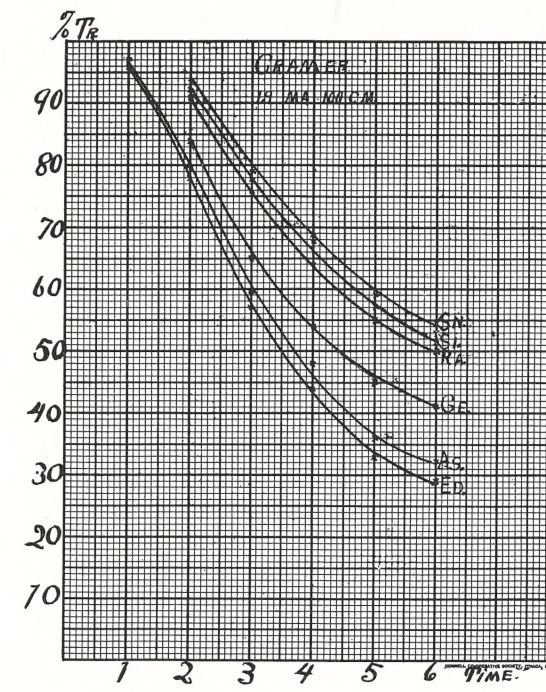
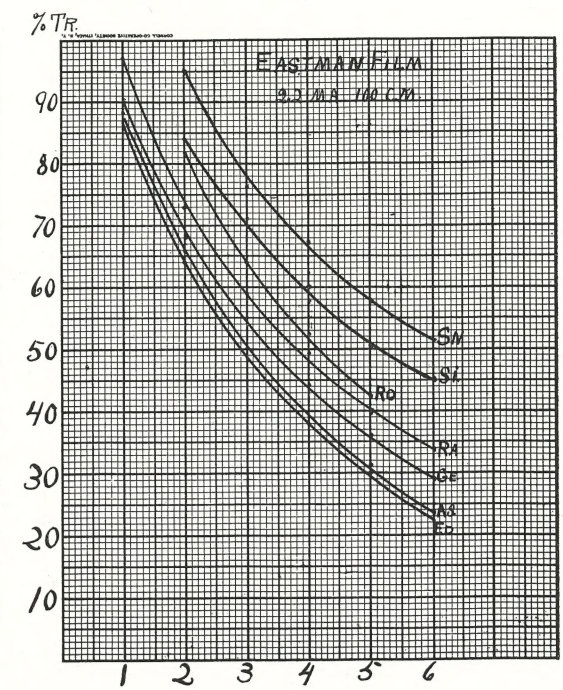
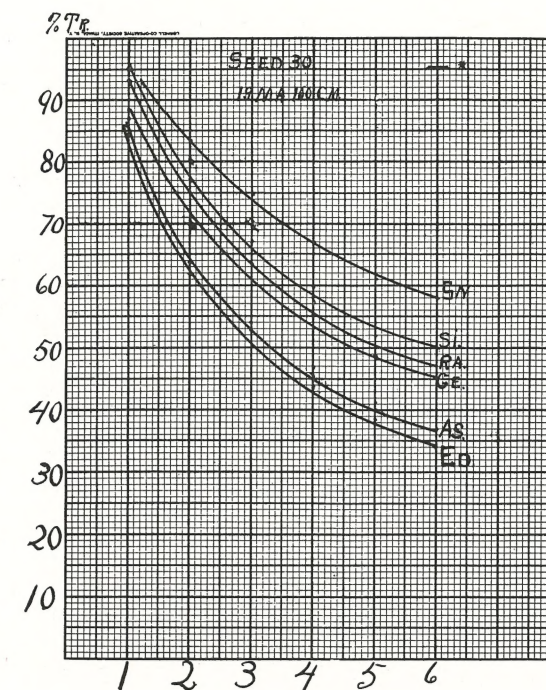
The distance of the plate from the target was forty inches in each case, care being taken to have the rays at as nearly normal incidence as possible. It was found that a series of six exposures ranging from one-quarter to one and one-half seconds gave a suitable distribution for the measurements desired. A time switch was used and while it was not strictly uniform in its operation, variation would not affect the comparison of the various screens. Plates were developed as indicated by the manufacturers, timing the development according to the instructions for the plate in question when such were given.

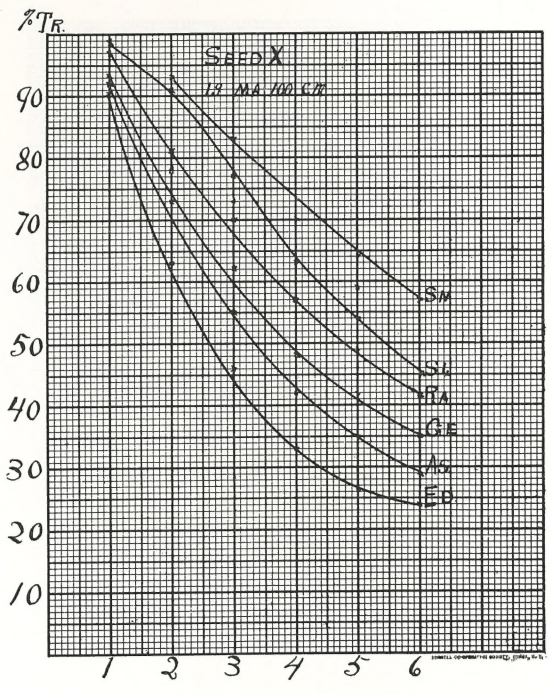
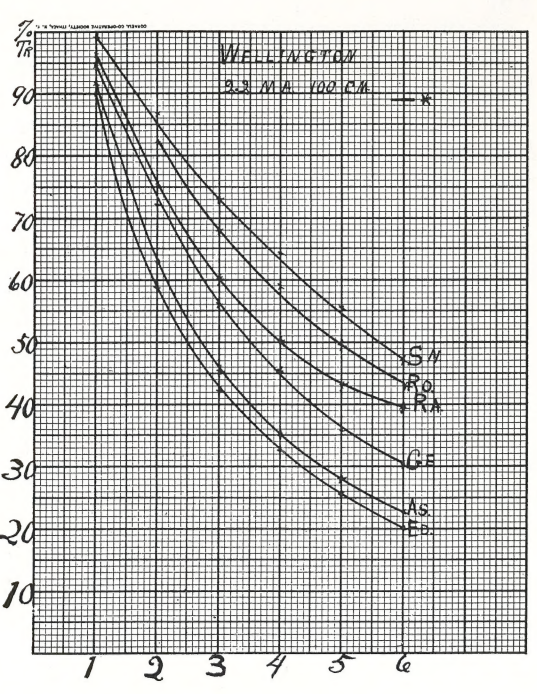
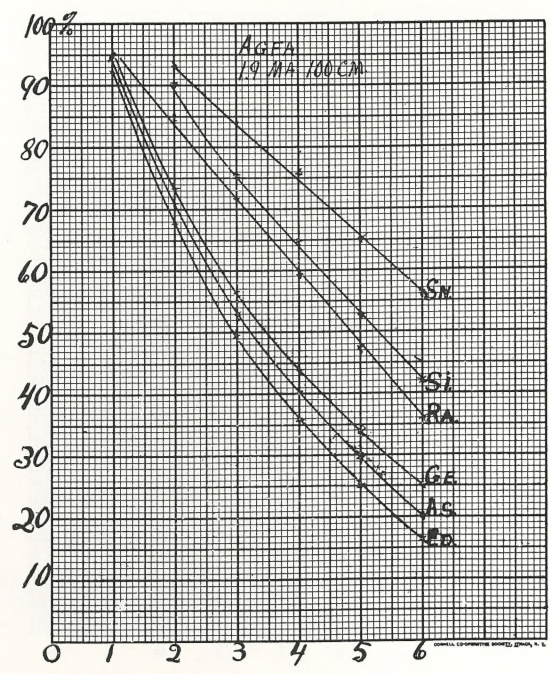
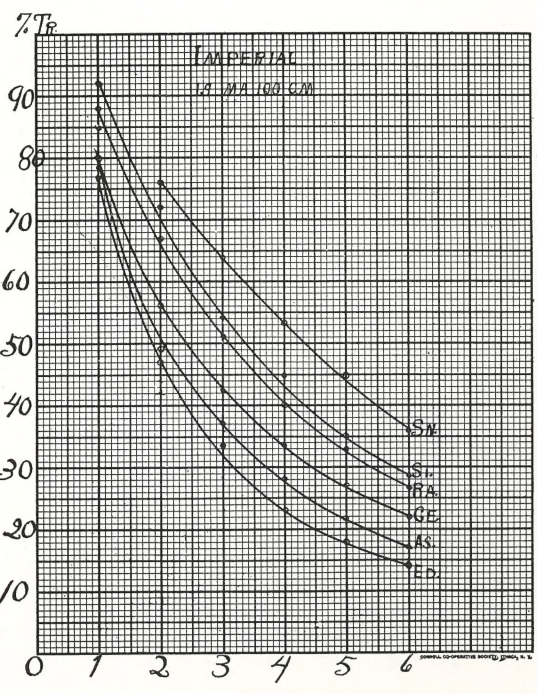
While it was not intended to compare the plates as used without screens in this series, readings on the unscreened portion for the maximum exposure were taken in order to determine the multiplying power of the screens. The same tube was used in all these

purpose or the experience of the observer. The simple transmission curve gives the basis from which to work irrespective of the form in which values are finally expressed. The ratios of the times for equal transmission or opacity would require that the time switch be very accurate and the variation in the one used was approximately 6 per cent.

The common method in the sensitometry of plates is to call the reciprocal of the transmission the opacity of the plate. The logarithm of the opacity measures the density or the amount of silver reduced as the result of the exposure and development. Thus, if 50 per cent of the light is transmitted the opacity is 2 and the density is proportional to 301.

The curves show a surprising uniformity of performance in so far as the relative speed values of the screens on the various plates are concerned. The common notion that a plate of great rapidity for ordinary light would of necessity show superior results as a screen plate is not verified. It





should be borne in mind, however, that the maximum density for normal exposure of a rapid plate designed for regular photography may be too small for this work so that while a plate is fast it may not give a high total density.

Only samples of the curves from many plates taken and measured are shown in this paper, but they are quite characteristic of the general results.

It was noticed that if the screens were arranged in the order of densities for exposures two to six, this order was quite independent of the plate used although the ratios of densities for any given exposure varied with the plate used.

There is of course an exposure time such that no measurable effect has been produced by any screen and for this period all screens have zero speed. Also on over-exposure, the final densities obtained on any plate may be the same for all screens. A study of what is generally regarded as good negatives shows the following percentage transmissions:

Hand—

Taking edge of metacarpal as.....	100
Center of metacarpal transmits.....	98
Flesh next to metacarpal transmits....	78
Thinnest flesh transmits.....	66
Uncovered portion of plate transmits..	10

Ankle—

Edge of tibia taken as.....	100
Flesh near bone.....	30
Thin flesh	26
Tendon	42
Uncovered portion of plate.....	6

It must be remembered that the range and gradation for ordinary photography is quite a different proposition. The eye is concerned with the picture as a whole or with at least large areas as a sort of collective impression, while gradation over small areas is of greatest importance in X-ray work.

The results warrant the conclusion that great care must be taken in the use of screens to avoid over-exposure. Or the skill required in the estimation of exposure and the

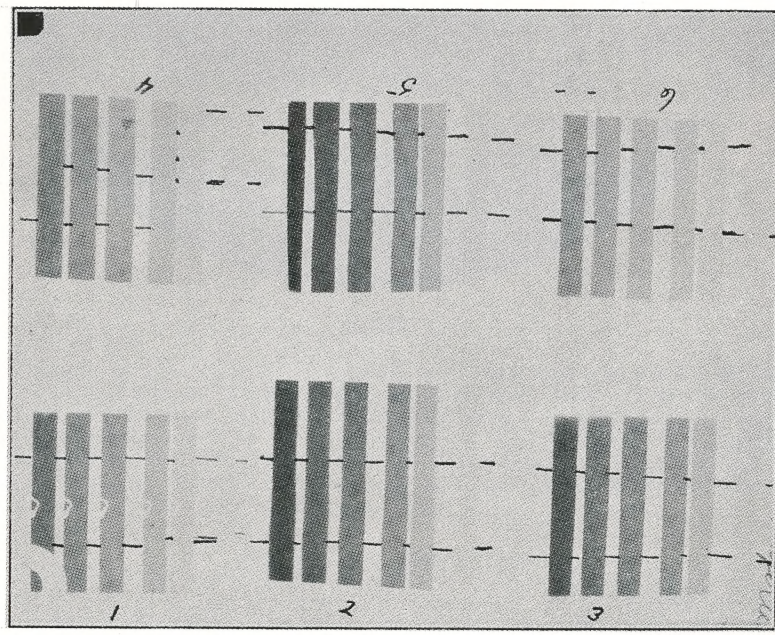


Fig. 2
A specimen plate. 2 M. A. 100 cm.
No. 1 Radiologie
No. 2 Asta
No. 3 Gehler
No. 4 Sinegran
No. 5 Edwards
No. 6 Snook

uniformity of action of switches, tubes and source of power increases very rapidly as the exposure within which good results may be secured is shortened.

For fast screen work, the shortest possible exposures and as soft rays as will give detail of the part desired are essential. The effect of secondary rays on screen pictures is perhaps not fully appreciated. Fig. 1 shows the general arrangement of target, screens and plate as used. Fig. 2 is a reduction from a sample plate. The curves shown are characteristic of all those observed and show the effect on most of the plates in use. Some excellent plates for use without a screen are but little faster with any of the screens tried. The most notable of these is the Paragon, which gives general satisfaction without a screen.

The next paper will deal with the relative speeds of plates used with and without screens and as soon as possible a study of the effect of secondary rays in screen work will be made.

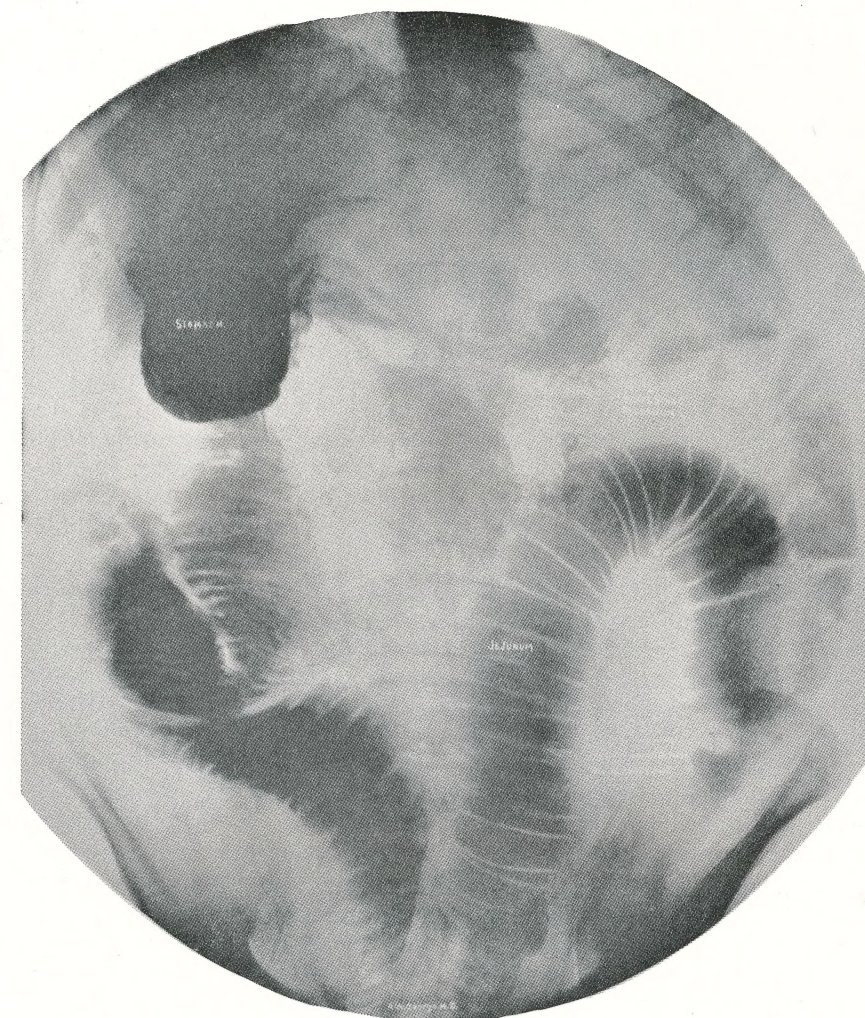
Acknowledgment is due to the Huntington fund for aid in the purchase of supplies and assistance in this investigation, supplementing the department equipment for work in this field.

DENSITY RATIOS.

This table gives the *density ratios* for a series of plates of various makes taking the Snook screen as 1.

Snook.....	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Sinegran.....	1.25	1.35	1.5	1.32	1.12	1.54	1.35	1.4
Radiologie.....	1.50	1.53	1.9	1.41	1.25	1.77	1.88	1.52
Gehler.....	1.75	1.65	2.4	1.75	1.69	2.77	1.12	2.3
Asta.....	2.3	2.03	2.8	1.9	2.12	3.08	2.4	2.4
Edwards.....	2.5	2.18	3.7	2.45	2.25	3.46	2.6	2.6

Feb. 13, 1914.



CASE I.

Man seventy years of age. Clinical diagnosis ten years previous, cancer of the stomach. For the past few years he has gradually lost weight and strength. Again, even the last year, the diagnosis was cancer of the stomach, not only from objective, but subjective symptoms and laboratory findings. The plates made of the stomach show no evidence of a lesion, either of the stomach or of the duodenum. This plate made six hours later after the bismuth meal, showed a stomach in a state of spasm. There is marked and extreme dilatation of the first few feet of the jejunum, it being fixed in the right quadrant at Point I.

ROENTGEN DIAGNOSIS.

The examination of the stomach negative. Obstruction of the jejunum in the region of the right quadrant, probable adhesions. Operation by H. H. Germain of Boston, revealed a marked dilatation with obstruction by three dense fibrous bands, the origin of which was uncertain. The patient did well for four days, and died from pulmonary embolism.

A. W. GEORGE, M. D.
Boston, Mass.

THE RADIOGRAPHY OF THE PITUITARY IN ITS RELATION TO EPILEPSY

By GEO. C. JOHNSTON, M. D.
Jenkins Arcade, Pittsburg, Pa.

Investigations of the pituitary gland have been made postmortem in epileptics by a number of men, but the conclusions have been unsatisfactory and but few changes found in the gland.

It is quite probable that these investigators have been so concerned in the microscopic study of the gland structure that they may have overlooked other things of importance.

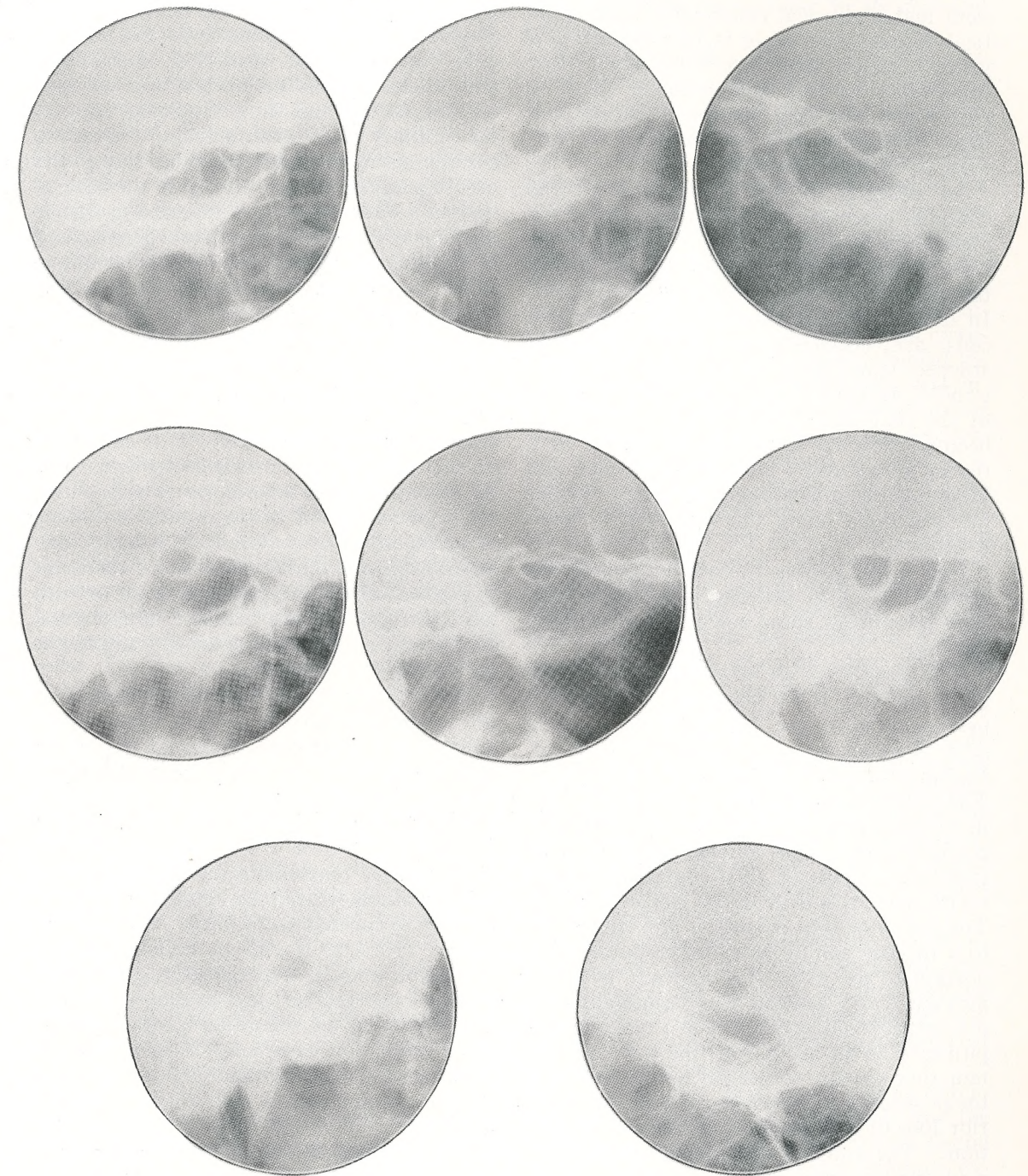
Nature considers the pituitary of such importance in the animal economy that she has located it in a most inaccessible and strongly fortified position, lying in a deep depression in the upper surface of the roof of the sphenoidal sinus in a bony pit roofed over with a strong prolongation of the dura and protected from pressure by the anterior and posterior clinoidal processes. The situation of this gland is unique and arguing from analogy its importance is equal to the care that has been exercised for its protection.

Interest in the brilliant work of Dr. Harvey Cushing, formerly of Johns Hopkins and now of Harvard, and an observance of the few cases of pituitary diseases in which epilepsy was an important part of the symptom complex, stimulated us to an examination of the pituitary region in every case of epilepsy obtainable, especially those in which no symptoms of pressure in the region of the pituitary (as evidenced by changes in the eye-grounds and visual fields) were present.

We were very soon compelled to divide the cases into primary cerebropathes, pituitary tumors and epileptics. In the majority of cases, little if any information was obtainable by radiography of the first class; but there remained a second class of patients who with an uneventful history, no injury, the ordinary children's diseases, previous good health, somewhere between the ages of

15 to 35 began to have attacks of Petit-Mal gradually increasing in severity and frequency.

As our investigations began to include this type of cases, we noticed decided departures from our conception of the normal in the topography of the sella-turcica. These changes were but rarely found in the types of chronic epileptics but were found with a regularity that gave rise to intense interest in the second class of cases above described; namely, those who with previous good histories, between the ages of 15 and 35 began to develop epilepsy. These changes are only appreciated when one has familiarized himself with the ordinary appearance of the pituitary fossa in a normal individual through the examination of a number of laterals of the head made for purposes *other than* the examination of the pituitary itself. The changes consisted for the most part in an overgrowth of the anterior and especially the posterior clinoidal processes, which in addition to an increase in area and length are slowly folded over and down upon the pituitary gland enclosing it within a bony basket. In addition to this process which is evidently one requiring a considerable length of time for its accomplishment, there is very often noticeable a decided difference in the size of the pituitary fossa and therefore of the gland itself. The fossa is thus largely or completely roofed over in some cases, illustrations of which will be shown in which the anterior and posterior clinoidal processes, not only meet but overlap. The frequency with which this condition has been found in this class of cases is quite striking. At first we were inclined to look upon it as a mere interesting anatomical deviation, but when it reached a point where we were almost



Region of sella-turcica in various cases of epilepsy showing changes probably due to local acromegaly.

able to prophesy from the history of the patient and a physical examination, the practical degrees of roofing to be expected in a given case, we were forced to attach some importance to this abnormality. Cushing and others had long previously shown that hypo-pituitarism was accompanied by epilepsy or epileptiform seizures.

In addition to this overgrowth of the clinoidal processes, a large proportion of the cases show distinct increase in density in the bony tissues forming the roof of the orbits, the sphenoidal sinus and the ethmoidal cells. In quite a number of cases, the sphenoidal cells are decidedly blocked with newly formed bony tissue. This condition resembles, to a marked degree, the appearance of the skull in general acromegaly and has been interpreted by us in accordance to a theory advanced by Doctors McKennan and Henninger as a localized acromegaly. Other investigations along this line will be published later.

Our investigations to date total some one hundred cases of epilepsy in which a very high percentage show one or more of these features.

The pituitary with its stalk, the infundibulum, lies within the sella covered over by a prolongation of the dura, the diaphragma sellae through an opening in which the infundibulum connects the gland to the brain. The anterior lobe is large and embraces on its median aspect the smaller posterior or cerebral lobe. The anterior lobe is of a glandular character, histologically, and is surrounded by a thick, loose, fibrous capsule. The posterior lobe is smaller and softer and to it directly comes the infundibulum. This portion of the gland histologically is rather nervous than glandular tissue especially during infancy and youth, but it is not with the pituitary as an adjunct to the nervous system that we are concerned but rather with the possibility of interference with the posterior lobe of this gland in its functional relation. The anterior lobe resembles the thyroid and is rather kidney shaped, receiving its blood vessels and the infundibular stalk in the hilus much as does the kidney. It is said

to increase in size until about the 30th year. Its blood supply is rich and its function in connection with the growth of the body is now, thanks to the researches of Cushing and others, so well understood that we need not discuss it at this time. In some animals, the pituitary stalk persists during life and is continuous with the epithelium lining the mouth passing through a canal in the base of the skull and a condition resembling this is occasionally met with in a man where a canal in the sphenoid leads from the sella-turcica to the base of the skull and contains a prolongation of the hypophysis.

It is thus seen that the pituitary, owing to its peculiar location, may be encroached upon to a considerable degree by any hyperostosis of the posterior or middle clinoidal processes, since the tough dural roof completes its enclosure by bone and it is our belief that the deviations here to be shown whether they are to be considered as anatomical deviations or as the result of a more or less rapid bone deposit due to an inflammation (of the etiology of which we are yet ignorant), or to a local acromegaly, may cause a hypophyseal condition of which the epileptiform attacks are merely the symptoms.

Cushing has shown that interference with the posterior lobe will cause a hyper excitability of the cerebral cortex and we believe that the cases shown belong in this class wholly or in part.

I quote from Cushing on the pituitary as follows:

"One may reassemble the data in regard to the possible relation of hypophyseal insufficiency to epilepsy as follows:

"1. Horsley, it will be recalled, in his first experimental hypophysectomies in the canine, observed no post-operative changes whatsoever in the condition of the animals. They were, however, used subsequently as subjects of cortical stimulation, and he noted that the motor cortex was unusually excitable.

"2. As already stated, we have observed a tendency to epileptiform convulsions in a number of our animals kept for long periods after partial hypophysectomy—animals that

ultimately exhibited symptoms which we attribute to glandular insufficiency.

"3. The study of a series of cases of hypophyseal disease in man has shown that epilepsy—a symptom unobserved in states of hyperpituitarism—is a frequent accompaniment of clinical conditions in which an insufficiency of the gland is manifest. Moreover, that the brain, under these circumstances, is possibly over-excitable, is suggested by the number of individuals in whom gustatory attacks have occurred under the influence presumably of a direct local irritation of the adjacent uncinate cortex by the enlarged gland.

"4. As is well known, epilepsy is a frequent sequel of cranial injuries. In certain types of injury, as the common bursting fractures of the base, the pituitary body is prone to be damaged.

"5. If, as we believe to be the case, the posterior lobe secretion normally enters the cerebrospinal fluid and thus comes to be in solution in a fluid which subsequently bathes the cortex, it is possible that its diminution from hypophyseal disease or injury may unfavorably affect the activity of the cortical cells. On this basis it is conceivable that a local scar which involves, or a tumor which presses upon, a given area of the cortex, may prevent the access to the cells of a substance which is essential to their functional stability.

"6. Many individuals, supposed to be suffering from so-called genuine or essential epilepsy, present manifestations of a nutritional disorder—a tendency to adiposity and a high sugar tolerance, coupled with a lowered temperature and pulse rate—closely akin to the constitutional state which characterizes hypophyseal deficiency. In some of these individuals the administration of hypophyseal extract has served to moderate the seizures from which they previously suffered." (Cushing.)

The pituitary in common with other ductless glands, in order to functionate requires a blood supply. We are justified also in believing that it has periods of activity followed by repose (functionally speaking).

During the periods of activity, it is engorged with blood and an increase in its size and tension occurs.

A pituitary that is not roofed in has a decided advantage over one that is completely encircled and enveloped in a bony cell. Moreover, in some of our cases, it is hard to determine why the gland has not been completely cut off by a slow encroachment of the processes above the gland and in one case where there seems to be a calcareous degeneration of the gland going on, we suspect that this has happened. We believe we are justified in asserting that the gland is handicapped by being encroached upon, its circulation is hampered and its physiological activity mechanically interfered with and diminished, and that the epileptoid seizures are wholly or in part the result of the deprivation of the animal economy of those substances necessary to metabolism and produced within the pituitary. If this hypothesis is founded on any truth or fact, then a patient suffering such epileptoid seizures (due wholly or in part to such deprivation) should be partially or completely relieved and made free from the seizures if it were possible to supply artificially that which is lacking and that of which the patient is deprived, due to the partial or complete failure of normal supply from the pituitary. In other words, if it be possible to supply such a patient with a pituitary extract representing approximately the pituitary secretion in such form that it may be absorbed without destruction or change and enter the blood and other fluids of the body, then the patient should be benefited.

If he is not benefited, either the hypothesis is incorrect, or, the extract employed does not represent the pituitary secretion wholly or largely, or, the patient is incapable of taking up the extract through the method of administration employed.

In practice, Dr. McKennan and Dr. Henninger to whom I am indebted for the greater portion of these patients, have found that the administration of the pituitary extract by the mouth is of distinct value in the specific class of patients under discussion not

to the extent that it permits of the immediate substitution of pituitary extract in lieu of the well tried bromides; but rather that the exhibition of pituitary extract in gradually increasing doses with bromide, followed by a slow withdrawal of bromide and the persistence of pituitary administration is followed by very interesting results. At first it was thought that the proper thing to do was to cease the bromides and substitute therefor, the pituitary extract. Here, however, we were soon taught that the administration of bromide is followed by immediate effect, whereas the administration of pituitary extract requires a considerable length of time before its beneficial effects were manifested. There elapsed, therefore, an interval during which the patient had no bromide and had not yet begun to experience beneficial effects of the extract, during which time, if such time were allowed to elapse, severe epileptic seizures were very likely to occur; therefore, the combined method of administration is the one to employ followed by the slow withdrawal of the bromide to a minimum.

Such a report as this can be considered merely as a preliminary one. The proof of such an hypothesis will require a very much larger number of cases than have yet been examined. The examination of any such case to be of value must show distinctly and clearly the sella-turcica and the processes. If the processes do not show, that in itself, is evidence that the case is probably one of hypo-pituitarism due to hypophyseal struma with enlargement of the gland and pressure atrophy of the processes. Neither, by any means, are all cases of epilepsy developing between the ages of 15, 35, or 40, due to encroachment upon the pituitary. In some of these cases, there will be found, instead, a very small pituitary but not encroached upon.

Dr. Cushing has devised an ingenious method whereby the pituitary region can be reached and removed by a sellar-decompression. Such an operation, however, is employed for the relief of intracranial pressure. What we now wish him to devise is an operation for the removal of one or both clinoidal processes in these cases of choked pituitary. If such an operation can be devised and performed before the process has been too long active and before the gland has suffered long from its imprisonment, it may be that such procedure will be followed by brilliant results. Such an operation, however, will tax the skill and ingenuity of any surgeon.

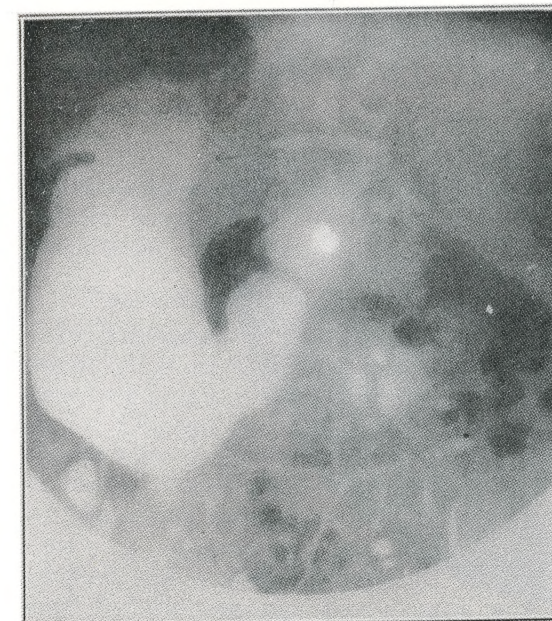
We make no claims for the truth of the hypothesis comprised in this preliminary report since to establish such a claim will require that much more work be done than has been done. We present it with the hope that it may stimulate the interest of the men of this society who alone in this country are capable of carrying on such an investigation. These cases are widely scattered and no one man can hope in a reasonable length of time to see enough of them to make his single opinion of great value. If, however, the members of this society will carefully ray the pituitary fossa of every epileptic, other than those so-called chronic, practically congenital epileptics, keeping a record of the history of the onset of the attacks and the age of the patient, etc., within another year we would have a large number of such cases to report and the truth or otherwise of the matter could be easily established. Personally the thing works out with monotonous regularity due to the fact that Drs. McKennan and Henninger and also Dr. Mayer are trained and experienced neurologists who select the epileptics who are examined.



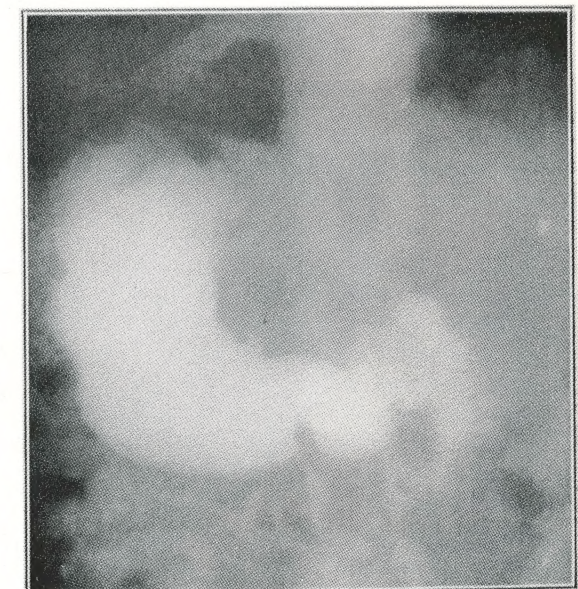
Large papilloma of stomach. Lateral view showed this projected from anterior stomach wall.



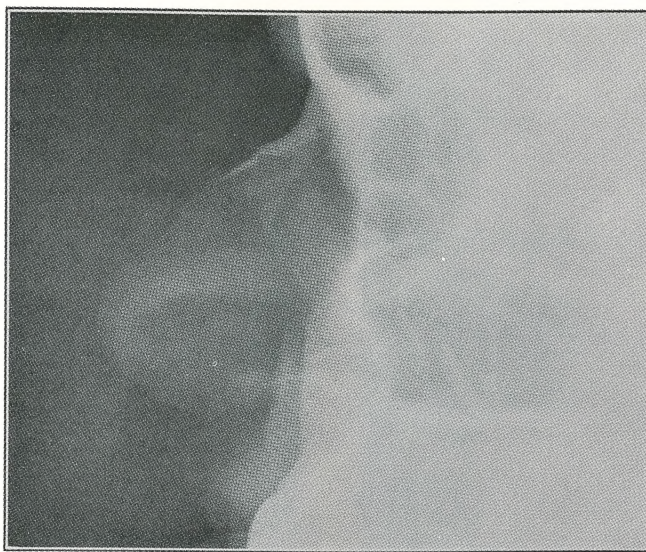
Penetrating ulcer on lesser curvature of stomach into liver. Shows large bubble of air above layers of fluid and bismuth.



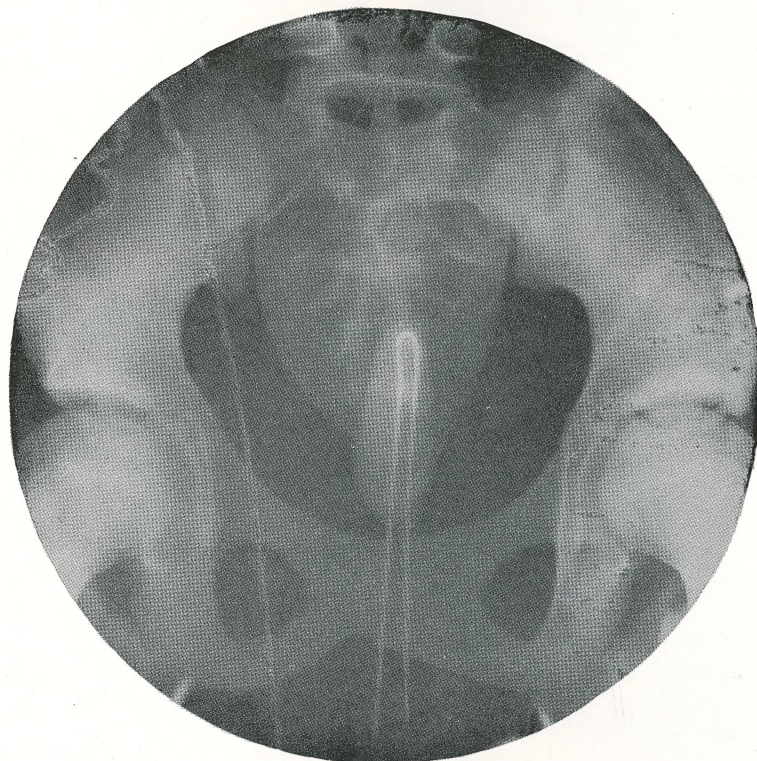
Penetrating ulcer opposite incisura. Operation showed this was carcinomatous. Plate also showed gallstones.



Penetrating ulcer on lesser curvature of stomach.



Fracture of nasal spine of frontal bone.
Dr. Reu, Buffalo, N. Y.



Calculus of bladder formed about hair-pin introduced through urethra
six months before. Removed by suprapubic cystotomy.
Dr. Amédée Granger, New Orleans, La.

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EDITORIAL

On account of the illness of the editor, the present issue of the Journal was delayed publication.

THE CHICAGO ROENTGEN SOCIETY

In November of last year occurred the organization of the Chicago Roentgen Society, composed of the leading X-ray workers of Chicago and vicinity. The officers chosen were as follows: President, Dr. H. E. Potter; Vice-President, Dr. Francis Turley; Secretary and Treasurer, Dr. James T. Case. A constitution and by-laws were adopted and a plan of program was outlined for the meetings which occur once a month during ten months of the year, no meetings being held during the two summer months.

The first scientific meeting was held Friday evening, December 12th, at St. Luke's Hospital, Dr. Potter presiding. Dr. Hickey, of Detroit, presented a paper on "The Roentgen Examination of the Lower Spine," in the course of which he showed a great many very interesting plates of the lower spine and the sacro-lumbar and the sacroiliac joints, including spina bifida, malignancy, sacralization, fractures, tuberculosis, osteoarthritis and osteomyelitis. Special importance was laid on the necessity of obtaining stereoscopic plates in studies of the lower spine. While lateral plates of the dorsal and upper lumbar spine are possible, in the sacroiliac region it is impossible to make lateral plates; hence stereoscopic plates are absolutely necessary. The technic of making the roentgenograms of this region was carefully described and its practicability attested by the beautiful roentgenograms exhibited by the essayist.

Dr. E. H. Skinner, of Kansas City, read a paper on "The Medico-Legal Aspects of Lesions of the Lower Spine."

Case reports and slides were presented by various members, including Dr. Paul Eisen, Dr. Potter, Dr. Hartung, Dr. Case and Dr. VanHorn.

In planning for future meetings, the society adopted the plan of having some set paper at each meeting, followed by case reports and reports on abstracts from the current roentgenological literature.

The regular meetings are held the second Friday evening in each month, usually at the office of the President, 1410 Peoples Gas Building. Out of town members of the American Roentgen Ray Society, who are not already members of the Chicago Roentgen Society, are invited to attend these meetings, should they happen to be in Chicago the evening of the second Friday of the month. By telephoning the President, Dr. Potter, at his office, or by communication with the Secretary, Dr. Case, at St. Luke's Hospital, on Fridays, exact news concerning the future meetings and future programs may be obtained.

The Plate Exhibit at Cleveland

The Committee report a large interest in the exhibit by the members, and already so many have asked for space that an unusual exhibit is assured.

Entries will positively not be received after July 1st.

Exhibits will be limited to one frame for each applicant. This will hold

	Placed Vertically	Placed Horizontally
8 x 10	16 plates	12 plates
10 x 12	9 "	6 "
11 x 14	6 "	6 "
14 x 17	4 "	4 "

8 x 10 reductions, placed vertically, are strongly urged. Four 4 x 5 reductions, mounted on one 8 x 10 glass, form an ideal plan.

Members desiring to exhibit a large number of lantern slides in their own frames will be afforded all possible assistance, but such exhibits will not be catalogued. Such exhibits will be given space in the order in which requests are received, until all available space has been assigned. Such requests must state all dimensions of proposed frame; whether to stand on the floor, hang on the wall or be suspended from the ceiling; and how many lamps of what watt rating. Such exhibits must be wired complete and fitted with Edison plug.

Limited space will probably preclude the exhibition, independently, of any other than lantern slide frames,—ie., the exhibition of plates will be limited to the regular frames.

The catalog, which will be printed this year in pocket form, is intended, first, for plates which illustrate papers read at the meeting; second, for the publication of valuable plates, not published elsewhere.

Requests for entry cards and further instruction should be addressed to DR. DAVID R. BOWEN, 922 So. Saint Bernard Street, Philadelphia, Pa.

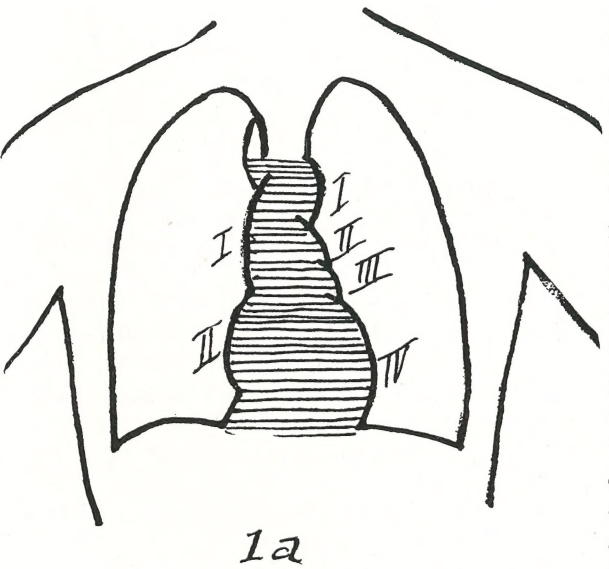
The Committee will be pleased to receive any suggestions for the improvement of the exhibit.

ROLAND HAMMOND, M. D.
H. W. VAN ALLEN, M. D.
DAVID R. BOWEN, M. D.

ABSTRACTS

Groedel (Frankfort o/M.): The Picture of the Thorax in Central (Sagittal, Frontal and Oblique) and Eccentric Projection (Das Thoraxbild beizentrischer (sagittaler, frontaler, schraeger) und exzentrischer Roentgenprojection). Fortschr. a. d. Geb. d. Roentgenstrahlen, 1913, XX., 541-554. [Illustrated.]

Groedel describes the roentgenograms of the thorax in various projections and positions of the patient which are illustrated.



1 a. The shadow of heart and vessels in dorsoventral sagittal projection.

The patient leans with the chest against the plate, the tube stands 60cm. before the middle of the screen in about the height of the lower scapular angle centered upon the median line of the body. The rays thus penetrate the body from the back to the chest, the central ray running corresponding to the sagittal suture of the skull.

Almost perpendicular through the middle of the thorax picture runs a shadow—the median shadow—so that we get a right and

a left field of the lungs. The median shadow is caused by the spinal column and the sternum, by the heart and the large vessels and by the mediastinal organs. The heart and the vessels have the greatest breadth and their shadow reaches over that of the other pictures. The borders of the median shadow are therefore those of the heart and vessels; they do not run in a straight line, but in curves, which correspond to certain parts of the heart and the vessels. There are two curves on the right and four on the left side. The curves of the right shadow are the lower or right vestibular arch and the upper or vascular arch. The right vestibule is sometimes divided in the middle, mostly in congestive conditions. The upper part corresponds probably to the right auricle and the lower to the right vestibule. The vascular arch represents mostly the aorta ascendens. Above it we see the large vessels as a lighter shadow. On the left side we see the aortic arch on top; in its upper portion it represents the arcus, which runs more or less parallel to the direction of the rays and gives therefore an especially dark shadow. The aorta descendens can be recognized as a lighter shadow, and further down, through the shadow of the heart as a darker strip of shadow. Adjoining the aortic arch is the pulmonary arch which is more prominent in younger individuals than in adults. There follows a lighter triangular shadow which fills the angle between the pulmonary arch and the lowest left curve and generally represents the left auricle of the heart, though it may also be caused by the left vestibule, as found in autopsies. The lowest left curve IV represents the left ventricle when the heart is normal; in thin persons and if the stomach is filled with gases we can follow it below the shadow of the diaphragm to the apex of the heart; the right vestibule can ex-

ceptionally be recognized to the lower end of the right vestibular arch.

To the right at the lower end of the shadow of the heart and the vessels—especially with emphysema and with deep inspiration—we see a shadow which runs obliquely to the right outwards of the right lower curve to the diaphragm and which has a nearly straight border line; this represents the vena cava inferior. Also on the left side we see a narrow shadow running from the left lower curve obliquely and outwards to the diaphragm, representing the pericardium which is frequently adherent to the diaphragm.

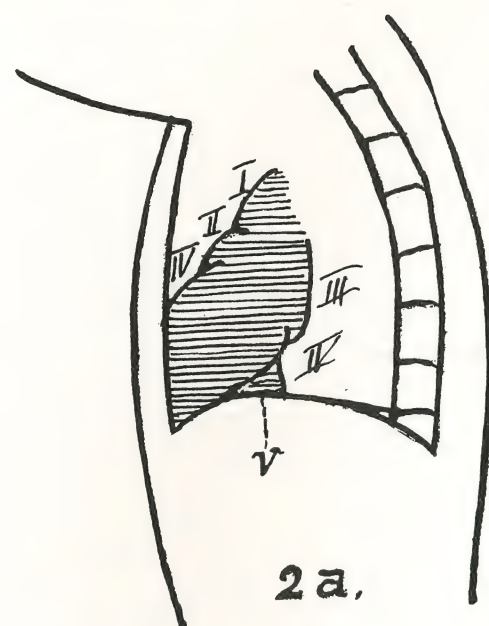
On both sides from the upper curve we see shadows like ribbons running perpendicularly upwards, more frequently on the right than on the left side and better visible in old people and in pathologic cases; this shadow represents the large vessels branching off from the aorta and vena cava superior.

1 b. The shadow of heart and vessels in ventro dorsal sagittal projection.

The patient leans with his back against the plate. Position of plate and tube same as in 1 a. This projection is not much different from the dorso-ventral. The heart is a little further away from the plate and therefore its shadow appears larger and lighter than in 1 a. In this projection the aorta descendens becomes distinctly visible in cases of sclerosis of the aorta.

2 a. The shadow of heart and vessels in dextro sinistral frontal projection.

The position of tube and plate is the same as in 1 a; the patient leans with the left side of the body against the screen and has his arms folded over the head. The rays pervade the body transversely from the right to the left side of the body, and the central ray runs parallel to the frontal suture of the skull. The picture is thus divided by the heart into two parts so that we can differentiate the retrosternal and the retrocardial field of the lungs. The shadow of the heart runs between these two lung fields from above behind to the front downwards with



its lower pointed end between the anterior wall of the thorax and the diaphragm. On the upper border of the shadow we see three arches, from the top the aortic arch (I), below it the pulmonar arch (II) and the arch of the ventricle (IV). On the lower side are two curves, the arch of the left vestibule (III) and the arch of the ventricle which is not always visible (IV); below that appears the shadow of the vena cava inferior (V).

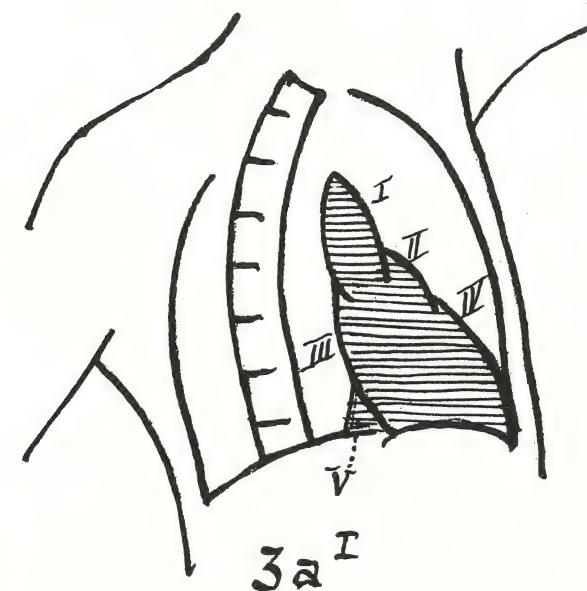
2 b. The shadow of heart and vessels in sinistro-frontal projection.

The patient stands with the right side against the plate, so that the rays pervade the body from the left to the right frontally. This position is less favorable because the organs which are to be reproduced are farther away from the projection surface and appear less distinctly.

3 a. The shadow of heart and vessels with projection in dorso ventral first oblique diameter:

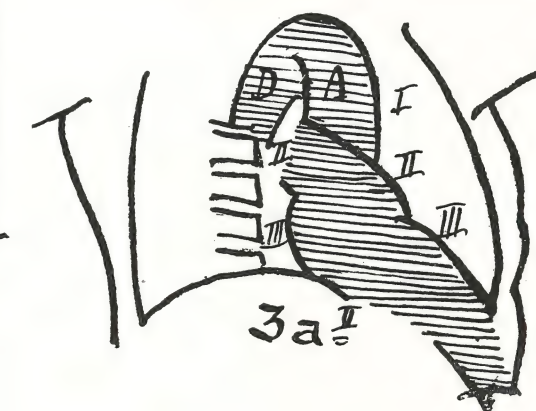
The patient takes the same position as for dorso ventral sagittal projection, then places the left arm around his head, turns slowly 45°, placing the right arm around the cassette and leaning with the shoulder

against the latter whilst the left shoulder nears the tube. In this way the central ray pervades the body from the left behind to the right in front. The spinal column, oesophagus, and aorta descendens appear now in the middle and to the right we see the three fields of the lung, a right and a left and a median or rather retrocardial field. The left field is separated from the retrocardial field by the vessel shadows

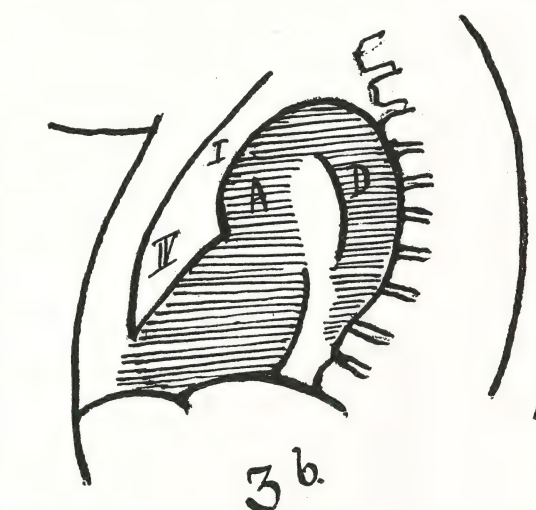


(3 a, I). The border line of the latter shows three arches to the left: the arch of the ventricle is lowest (IV), then follows the pulmonar arch (II) and on top the arch of the aorta ascendens (I). Towards the median field we see also three curves: the right arch of the vestibule (III), the pulmonar arch and the arch of the aorta ascendens, and mostly also the vena cava inferior (IV). The normal aorta descendens cannot be seen in the sagittal projection, or it is only indicated. With irradiation in the first oblique diameter it deviates very far from the projection surface and its shadow disappears completely. The image of the ascendens ends therefore most abruptly in the image of the lungs, sometimes pointed, sometimes club-shaped. In older emaciated carcinoma

patients, and sometimes in cases of severe sclerosis, the arcus and the aorta descendens may be seen shortened in projection 3 a.

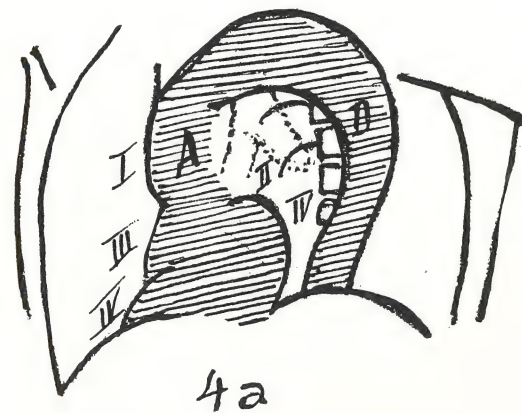


In the illustration (3 a, II) which represents such pathologic case we see the mentioned arches on the border; on the left the aortic arch (I), the pulmonar arch (II) and the ventricular arch (IV); on the right the vestibular and pulmonar arch and above, as a pathologic symptom, the aorta ascendens.



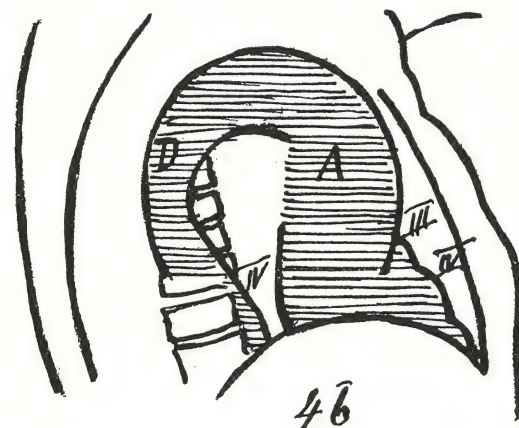
3 b. The shadow of heart and vessels with projection in the ventro dorsal first oblique diameter. The rays run from the right in front backwards to the left. The roentgenogram shows the same forms as in

the corresponding dorso ventral position, but they are less distinct. In normal conditions the aorta descendens would not be visible.



4 a. The shadow of heart and vessels with projection in second dorsoventral diameter.

The position of plate and tube is the same as in 3 a. The left arm is placed around the cassette, the right arm placed around the head and the right shoulder turned towards the tube, so that the rays pervade the body from the right in the back to the left in front. We see again the three lung fields, the middle one being small. On the left side we see the ventricular arch (IV) only indicated; the pulmonar arch does not show in most cases, but the vestibular arch (III) and the aortic arch (I) are as a rule



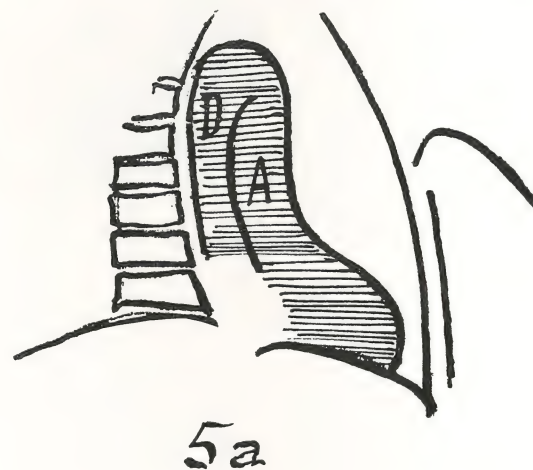
more distinctly visible. On the right side the right ventricle shows a border, and the pulmonary branching is distinctly visible. The tracheal branching is shown in a dotted line, and the pathologic aorta can be seen completely.

4 b. The shadow of heart and vessels projected in second oblique ventrodorsal diameter.

The position of the body is here the opposite of 4 a. The roentgenogram shows the same conditions as the dorsoventral position only from the opposite side.

5 a. The shadow of heart and vessels in dorsoventral left eccentric projection.

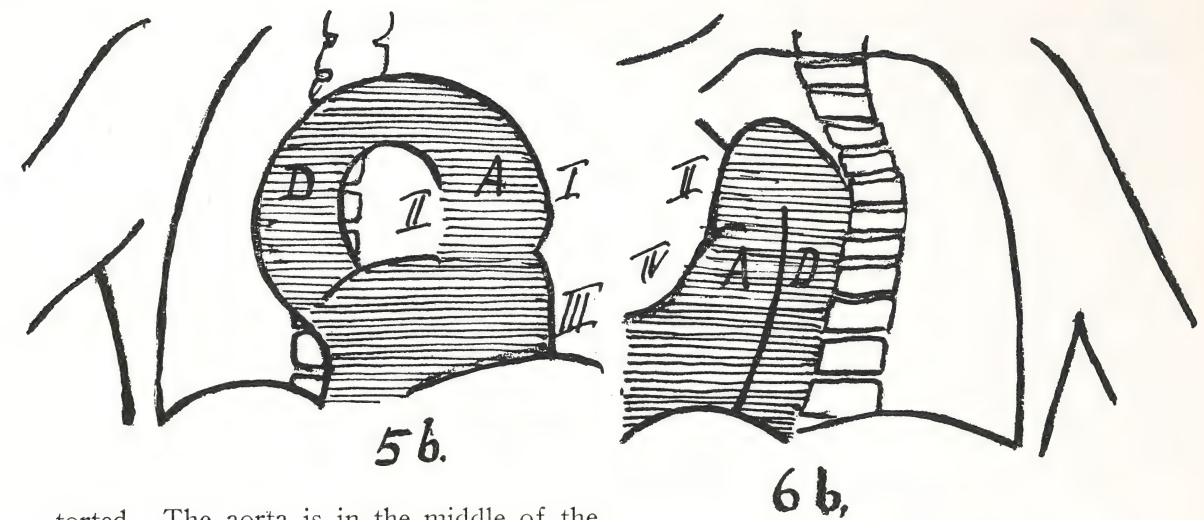
The patient leans with the chest against the plate, the tube is centered upon the middle of the plate at a distance of 60 cm. and



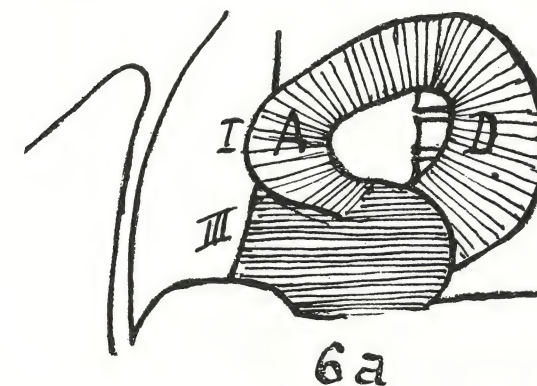
then shifted in a circle one-eighth to the left, so that the central ray goes from the left shoulder to the middle of the chest. The picture is similar to that in dorsoventral projection in the first oblique diameter.

5 b. The shadow of heart and vessels in ventrodorsal left eccentric projection.

The tube and plate stand in the same way as in 5 a. The patient stands with his back against the cassette so that the central ray runs from the left shoulder to the spinal column. Only two lung fields can be seen; the curves of the heart are mostly much dis-



torted. The aorta is in the middle of the plate and very distinct.



6 a. The shadow of heart and vessels in right eccentric dorsoventral projection. Position same as in 5 a, only the tube is shifted one-eighth of a circle to the right from the median line, so that the central ray runs from the right shoulder to the sternum. The right vestibule (III) and the aorta ascendens (I) can distinctly be seen.

6 b. The same in ventrodorsal projection. The position is the same as in 6 a, only the patient stands with his back against the plate so that the central ray runs from the right shoulder to the spinal column. The roentgenogram is similar to that of 5 a.

The study of the eccentric projections promises valuable results.

Engelhorn: Present Status of Roentgentherapy in Gynecology. (Ueber den derzeitigen Stand der Strahlentherapie in der Gynaekologie.) Strahlentherapie, 1913, III, 216-225.

After reviewing the reports given at the gynecological congress at Halle May, 1913, Engelhorn draws the following conclusions:

The intensive irradiation of carcinoma of the uterus with Roentgen rays, together with mesothorium, effects a necrosis of the carcinomatous cells on the surface of the carcinoma. This necrosis reaches a certain depth of the tissue; deeper portions are apparently not affected by the rays.

Only few specimens have been obtained so far and it is not yet possible to decide whether the effect of the rays on the carcinomatous cells is specific. It is ascertained that also sarcomata, spleen, bone marrow, blood, lymph and other glands are affected by mesothorium.

The irradiation should be performed with strong screens only, and with them the strength of the rays may be increased considerably.

The effect of the irradiation is seen in the quick disappearance of the clinical symptoms, in the cessation of suppurations and hemorrhages and in the improvement of the general conditions.

The time of observation has been too short to decide whether the cases which were clinically cured are also free from carcinoma in the anatomical sense.

All inoperable cases of carcinoma should be treated with radiotherapy, as in such cases a decided improvement and even a cure in the clinical sense can be effected.

Immediately following an operation all surgically treated cases of carcinoma should receive an irradiating treatment because it is very likely that in such manner relapses may be prevented. The effect of irradiation seems doubtful in cases where relapses have already taken place, though even in such relapses good results have been reported.

Operable carcinomata should always be treated surgically because we have yet no definite results as to the lasting effect of radiotherapy, whilst surgical procedure gave permanent results in 25% of the cases. A pre-operative irradiation is advisable also in operative cases because the cessation of suppuration lessens the danger of the operation and furthermore the examination of previously irradiated carcinoma specimens, which were obtained through operations or through p. m. autopsies permit us to draw definite conclusions about the effect of the rays upon the tissue.

A permanent cure cannot be guaranteed with roentgentherapy, the results, however, which have been obtained, especially in inoperable carcinomata warrant this therapy.

Seeligmann: Results of Combined Chemo- and Radio- Therapy for Malignant Tumors (Ueber Erfolge der kombinierten Chemo- und Strahlen- Therapie bei boesartigen Geschwuelsten). Wien. med. Wchnschr., 1913, LXIII, 2860-2861.

For about a year Seeligmann has employed the combined treatment of intravenous injections of certain medicaments in connection with local application of roentgen rays and radium for the cure of malignant tumors, carcinoma and sarcoma and has had satisfactory results. Two and a

half years ago he removed a ten pound sarcoma of the ovary in a girl 24 years of age and treated her in the above manner with the result that in spite of returning severe symptoms the patient could always by renewed treatment be restored to health in a short time so that she was able to work. Also in many other cases of recurrent carcinoma of the uterus after operative removal of the tumor he has had good results with this combination treatment. The pains resulting from induration of the operation scars, ischias, etc., disappeared and the general condition improved. Seeligmann expects that with his method a permanent cure of malignant tumors may be effected, because it affects the focus of the disease locally, heals the deeper seated metastases and improves the general condition.

Scherer & Kelen: Combined Roentgen and Radium Therapy for Cancer of the Uterus (Ueber die kombinierte Behandlung des Uteruskrebses mit Roentgen und Radiumstrahlen). Wien. med. Wchnschr., 1913, LXIII, 2919-2920.

The authors give a detailed description of the technic of irradiation for cancer of the uterus as practised by the I. Universitaets Frauenklinik in Budapest. 218 cases of carcinoma were treated; since the beginning of Feb. 1910 with roentgen rays and since May 28th, 1911 with a combination of roentgen and radium rays. In group I. "prophylactic" irradiation was employed against relapses in cases which had been operated on. Definite data of the results of later examinations are given in 55 cases out of 77. The rest did not come back after the first or second sitting. Ten of the 58 cases died, 5 are without relapse for 3 years, 15 for two years, 20 for one year and 8 for half a year. Group II. Roentgenization alone for inoperable carcinoma of the uterus since beginning of 1910 in 103 cases and in 8 cases of ovarian tumors. 1) 24 cases which are under treatment since one year and a half to two years show a definite disappearance of the local and

general symptoms. 2) In three cases relapse nodules have disappeared completely. 3) Three cases may be considered as cured as they have been under observation for more than three years. 4) Two apparently inoperable cases became operable after roentgenization. Group III. Combined treatment with roentgen rays and radium (strong filters and prolonged application): In four cases of inoperable carcinoma portionis a decrease of the tumor and an obvious improvement of the general condition was obtained. Besides these there was one case of carcinoma of the vagina and one case of ulcus tuberculosum portionis treated with good result.

The authors come to the following conclusions: For malignant tumors roentgen and radium therapy should be employed combined. If there be a palpable cancerous knot radium with contact effect should be applied. The roentgen rays affect the infiltration and continuity of metastases which are deeper seated and upon which radium has no influence. If the proper thickness of filters is used in the individual case, good results may be obtained with even very small quantities of radium, and that is of great importance considering the enormous cost of radium and even its substitute, the mesothorium. There have no comparing experiments been made as to the effect of radium in comparison to mesothorium but the authors prefer radium because the mesothorium rays are softer than those of radium and the energy of mesothorium is of much shorter life than of radium.

Von Graff: Roentgen Treatment of Non-Climacteric Metromenorrhagies (Ueber die Roentgenbehandlung der nichtklimakterischen Metromenorrhagien). Berlin. klin. Wchnschr., 1913, L, 2211.

Von Graff reports 40 cases of nonclimacteric metromenorrhagies treated with the Roentgen ray. A primary good result was effected in 31 cases of 36 (4 cases being too recent under treatment); in six cases recurrence took place after three to six

months and renewed treatment was necessary, so that a permanent result was effected in about 70 per cent. of the cases. With diseases of the heart and vascular system often protracted and irregular menorrhagies are encountered, and in these causal therapy and not roentgen should be applied. Metrorrhagies in lues hereditaria are scarce, but roentgen rays are here of no use; one such case is reported. Metrorrhagies at the beginning or in the course of Basedow's disease are probably caused by a decrease of function of the ovaries and roentgenization which is directed towards the destruction of the generative organs is of course contraindicated. If metrorrhagia is caused by changes in the endometrium itself, as for example in endometritis post-abortum no roentgen treatment should be given. Also in hemorrhages with inflammatory changes of the adnexa, which according to Menge are exceedingly favorably influenced by roentgenization, should be excluded from this therapy, because as a rule the same good results can be obtained with a few days of bed rest and conservative measures in a simpler and much cheaper way. Other contraindications for roentgen therapy will probably be added in the course of time and there are still cases where we cannot account for the cause of the bad results of this therapy. In those cases we may have to deal with women in whom the cause for the hemorrhage is not a functional disturbance in the generative glands, at least not those which could be affected by a damage of the follicle apparatus. Concerning the technic of roentgenization it would seem that the results depend in no way from the quantity of the applied X. Author had good results with small doses of 20-30 X and, on the other hand, has looked in vain for results after the application of 800 to 1000 X. Further experience will show whether high doses may prevent recurrence and whether the roentgenization of younger individuals may involve danger from a possible fecundation of the damaged ova.

Haudeck: Roentgendiagnosis of Carcinoma of the Digestive Tract (Zur Roentgendiagnose des Carcinoms der Verdauungswege). 85th Versammlung deutscher Naturf. u. Aerzte, Wien, 1913. Berlin. klin. Wchnschr., 1913, LX, 2117.

The characteristic morphologic findings show two types corresponding to the different types of carcinoma. 1. Scirrhus of the esophagus: Stasis of Bismuth water or paste and formation of a funnel-shaped effusion above the stenosis caused by the tumor. The roentgenograms resemble those of strictures, caused by slight cauterization, ulcers, etc. Short duration of the disturbances and steady increase of same, emaciation, etc., are deciding for the diagnosis of carcinoma.

2. Medullary carcinoma of the esophagus: Engorgement of the Bismuth as a result of stenosis. The effusion has the shape of a fork with the two prongs pointing downwards. The roentgenogram corresponds to the negative of the upper surface of the tumor. Its dented irregular contours are characteristic for the medullary form of carcinoma. The observation of the visible passing of food gives such good results that stenosis of a very slight degree can be recognized. Examination of the function of the esophagus with fluids, paste or capsules of different size allows an accurate estimate of the degree of the stenosis. With bismuth water stenosis has been ascertained frequently and led to the diagnosis of cancer of the uterus, though the stomach tube could be easily introduced into the stomach. Not only increase of the emptying of the stomach as a result of insufficiency of the esophagus and slight decrease of same as a result of stenosis can be discovered in the stomach, but also anomalies of peristalsis, abnormally deep or back running waves and tonus and may facilitate the diagnosis. If, with carcinoma clinically suspected the roentgen findings are negative and if no other causes of the disturbances can be discovered, roentgenography should be repeated in intervals of two to three weeks until the case is cleared

up. In older people with stomach trouble early roentgen examination is advocated; mostly the disease has advanced so far when it comes under roentgen examination that the prognosis for operation is favorable in hardly more than 30 per cent. of the cases.

Kreuzfuchs: Roentgentherapy in gynecology (Roentgentherapie in der Gynaekologie). Wien. med. Wchnschr., 1913, LXIII, 2922.

Kreuzfuchs reports excellent results of roentgenization for myomata and metrorrhagies which he performed at the "Charite" in Vienna which institution is fitted out with only very moderate means and he emphasizes the social importance of the low cost of running their Roentgen laboratory which permits the poorest the benefit of roentgen treatment. An old inductor with gas interruptor was used and proved very satisfactory. The irradiation was performed per abdomen exclusively. Author uses a screen tube of 6 cm. diameter and 8 cm. height with a bottom of aluminum of 3 mm. thickness. Lately he employs a cooling blend for anemization of the skin and six field irradiation on six successive days, applying 8-10 filtered X per field. The series are repeated after two weeks. Cure was effected after five to six series and frequently after only four series. The maximal total dose was 360 X. Of 29 cases in which the treatment was finished 26 were cured. The cases with tumors of the adnexa got worse, and Kreuzfuchs says such cases should not be treated with roentgen rays. Of the 26 cured cases 18 became amenorrhoeic. In nearly all cases of myomata the uterus grew smaller, sometimes in a surprisingly short time. The age of the patients was between 32 and 52 years. In cases of metrorrhagia excellent results were obtained in a very short time. In one case with very large myoma in a woman who had been two years in the menopause improvement and regress of the compression symptoms was effected. Pains in the breast were observed in five

cases during the treatment. Two cases of myomata were cured though the treatment had been given up after three series.

Reifferscheid: Roentgentherapy in Gynecology (Zur Roentgentherapie in der Gynaekologie). Berlin. klin. Wchnschr., 1913, L, 2211.

Reifferscheid reports 121 gynecologic cases treated with the roentgen ray. In 49 cases of myomata and 42 of menorrhagia the results were excellent. Good results were also effected in two cases of tuberculosis and by roentgenization as after treatment after operative removal of malignant tumors. Hardly any results were obtained in dysmenorrhea, pruritis and osteomalacia. Roentgenization is the best treatment for myomata and menorrhagia in women over forty years of age. Polypous, submucous myomata, putrid and degenerated tumors are an exception. For young women roentgentherapy is the method of choice especially where operative procedure is contraindicated. In other cases operation with preservation of the ovaries is preferable, especially if an enucleation promises relief. For climateric hemorrhages roentgenization is the best therapy. Reifferscheid had in his cases no injury to the skin. Burning of the skin must and can be absolutely avoided. With 3 mm. aluminium filter no more than 10 X should be given to the same area; the quantity of the rays must be carefully measured. Up to October 1912 Reifferscheid followed Albers-Schoenberg's technique. With the inductor apparatus Reiniger, Gebbert & Scholl he effected a cure in myoma cases within 6 to 8 months and a total dose of 140 X. As the treatment took too much time the veifa reform apparatus was used after Oct. 1912, and 80 X were given at every sitting from 8 fields and the dose repeated after 3 weeks. The treatment was thus abbreviated four months and the total dose increased to 430 X. Reifferscheid warns from giving too large doses as required for intensive treatment (1480 X) on account of bad after effects. His method has the advantage that the function

of the ovaries is only slowly destroyed and the symptoms of abolition of function are but mild, and the cure is just as certain as with intensive therapy and the cost is considerably less.

Fraenkel: The Effect of the Roentgen Ray in Pulmonary Tuberculosis (Ueber die Wirkung der Roentgenstrahlen bei Lungentuberkulose). Berlin. klin. Wchnschr., 1913, L, 2300.

Fraenkel reports his observations with roentgen treatment in 80 cases of tuberculosis of the lungs, the success of which during the last 2½ years allows the following conclusions:

1. Certain cases of clinically diagnosed tuberculosis of the lungs show a marked improvement and a favorable change in the pathologic findings. The time of observation is yet too short to speak of a cure in the clinical sense.

2. Of 80 cases the treatment was a failure in 16, in the remaining 64 the result was positive.

3. Subjective improvement: Improvement of the general condition, increase of appetite and weight after a few irradiations. Disappearing of the darting pains in the lungs, of the tormenting dyspnoea, freer breathing and quick decrease of the cough.

4. Objective improvement: The quantity of expectorate decreases after some irradiations and less tubercle bacilli are found in the sputum. In 57 cases the effect of the treatment was such that no bacilli were found, when the treatment was finished. The pathologic breathing disappears especially at the apex of the lungs. In 15 cases of affection of the apex the foci were visibly cleared up after irradiation.

5. General observations: Rising temperature at the beginning of the roentgenization is a favorable sign of the influence of the rays, as must be conceived as the beginning of the elimination of toxins from the body and of a process of immunisation, upon which defabrication soon follows. The diminution of the size of the hilus

glands frees the organ from pressure and explains the freer breathing and the stopping of the cough.

6. Tuberculous lung tissue is far more radiosensitive than the normal tissue. Tuberculous glands respond to roentgenization similarly as the ovaries; new formation of connective tissue, cicatrized shriveling and decapsulation of the tubercles is the result. The same process is found in the tuberculous granulation tissue; after irradiation small caverns show distinctly a thickening of the connective tissue covering, as a reactive inflammatory process of the surroundings which ends in development of connective tissue. Larger caverns were not affected.

7. In three cases of tubercular pleurisy a lysis of the induration of the connective tissue was manifest after irradiation. In one case of bilateral tuberculosis the focus on the left side healed promptly so that an artificial pneumothorax was made on the other side with good result.

8. Three cases which were refractory against tuberculin were much improved by tuberculin and roentgen therapy combined.

9. Further observations will show, whether the resistability of the body against reinfection is increased by roentgenization.

10. A special technique is employed in the irradiation with high doses and is divided in exposure of the individual foci and in general roentgenization of the thorax from all sides.

11. Experiments with animals verified the correctness of the above conclusions.

12. Animal experiments to produce a special tuberculin by irradiation are under way.

Fraenkel does not expect that roentgenization will ever become the general therapy for tuberculosis but he considers it as an important factor in the fight against the white plague. Three of his cases were perfectly healed.

Loewenthal: Radiotherapy of Tumors (Zur Strahlentherapie der Geschwulste). Berlin. klin. Wchnschr., 1913, L, 2260-2261.

In answer to an earlier article on this subject by Keetmann, Loewenthal ventilates the question, whether the hard roentgen tube really gives such quantities of hardest rays that it may be compared with an effective radium or thorium preparation and gives the following conclusions:

1. The electrometric method of measuring roentgen rays and comparing them with a radium preparation of a known value is the only serviceable one and absolutely reliable for hardest rays.

2. Measured with calorimeter the total energy of the beta and gamma rays of radium and the mesothorium is nearly equally great. The radiation which proceeds from a filter of 4 mm. lead possesses only 1 per cent. of the total energy of the beta and gamma rays.

3. The hardest roentgen rays are less penetrating than the gamma rays. For intensive or deep therapy not only the hardest gamma rays but also the soft gamma and hard beta rays come principally into consideration and therefore also the roentgen rays.

4. Keetmann's opinion, that the beta rays penetrate only 7 mm. into the tissue, is not at all proved and stands in contradiction to all hitherto published opinions.

5. The thickness of the filter of 1 mm. silver or lead as indicated by Keetmann for the practically complete absorption of beta rays is by no means sufficient to avoid injuries and has to vary in the individual case.

6. The tabulation in milligramm hours is sufficiently accurate if the thickness of the filter and the tube distance is also given. The concentration of radioactive substances is of relatively little influence upon the effect within certain limits.

At the present date we cannot definitely say whether in the product "milligramm-hour" may be changed ad libitum in order

to obtain the same results; for the treatment of malignant tumors it becomes more and more likely that the duration of the exposure is of far more importance than the quantity of energy.

Wartjen: The Effect of Radium and Roentgen Rays Upon Inoperable Malignant Tumors and Their Metastases (Ueber die Einwirkung der Roentgen- und Radiumstrahlen bei inoperablen boesartigen Tumoren und ihren Metastasen). Berlin, klin. Wchnschr., 1913, L, 2307.

At the November meeting of the Freiburger medizinische Gesellschaft 1913, Waetjen reported six cases of different malignant tumors which were treated partly at the medical and partly at the gynecologic clinic but which in their course were not visibly influenced by the roentgen or radium treatment and on which post mortem autopsy was performed. Only in one case a regress of the disease could be found. All cases came for treatment at the very last stage of the disease and therefore only very small doses of radium and roentgen rays could be applied. At the dissection it was found in all cases that the tumor had become necrosed in some parts, or showed regressive metamorphosis. On other parts, especially on the metastases, sometimes increased proliferation and renewed proliferation could be demonstrated. The author explains this partly from insufficient irradiation, which could hardly reach some of the affected areas. He thinks further that the quality of the rays, by penetrating through the tumor parts, undergoes such changes as to have an irritating rather than a necrosing effect. Special attention was given to the examination of the sound parts and organs for possible damage done by the irradiation, but such was not found. It is remarked that the intestinal mucosa, though very sensitive, was found perfectly intact after the irradiation of intra-abdominal tumors.

In the discussion of the paper Knepperle and Aschoff pronounce their preference for roentgentherapy for malignant tumors.

Blumenthal: Apparently Successful Treatment of Cancer by a Combination of Atoxyl and Roentgentherapy (Scheinbarer Erfolg bei einer Krebsgeschwulst durch Kombination der Atoxyl- und Strahlen-therapie). Strahlentherapie, 1913, III, 522-526.

Blumenthal reports a case of ulcerating gangrenous basal cell carcinoma of the size of an apple on the right upper eyelid in a 69 year old woman. The tumor had been roentgenized two or three times weekly in a prominent institution, and twelve sittings had been held in all with the result that the tumor grew larger and evil smelling secretion started. Considering that under the circumstances nothing could be lost, a combined treatment of roentgenization and arsenic therapy was employed in the following manner:

Atoxyl 0,2 gram and arsenic acid 0,004 gram were injected intravenously, and five days later roentgen rays, $\frac{3}{4}$ dose Sabouraud-Noire, 7-8 Wehnelt were applied. The injections were repeated in intervals of six to seven days until 14 were given in all; then the injections were interrupted for one month and three injections given on three successive days; 22 intravenous injections were given in all. The roentgenization was repeated at intervals of three weeks and from December 1912 to July 1913 eleven sittings were held. After the fourth injection the ulceration began to lessen and epithelisation started from the borders of the tumor which latter was steadily decreasing in size. At the end of July 1913 the treatment was interrupted because no trace of the tumor can be palpated through the fine new-formed epidermis. On the days after an injection and after a roentgenization the tumor always began to bleed slightly.

Loewenthal had no results in cases of carcinoma of the mamma, liver, stomach and uterus with atoxyl therapy alone and without roentgenization. The combined treatment was successfully applied also by Levy-Dorn (Berlin, klin. Wchnschr., 1912) and Seeligmann (Muench. med. Wchnschr., 1913.)

The author advocates the intravenous injection of aromatic arsenicalies, as atoxyl, arsacetin and salvarsan, but does not give any definite decisions as to dosage and duration of the treatment. In the reported case 4.4 gram atoxyl were used in 7 months and 0.088 gram arsenic acid was applied in 22 injections.

Ritter: The Effect of Roentgen Rays Upon Carcinoma Cells (Zur Einwirkung der Roentgenstrahlen auf Carcinomazellen). Aertzl. Verein Hamburg, Berlin. klin. Wchnschr., 1913, L, 2406.

Ritter reports experiments which he performed together with Lewandowsky in a case of cutaneous carcinoma: A 24-year old woman was operated on for left ovarian cystoma and half a year later for a right cystadenoma, which on microscopic examination proved to be carcinomatous. Shortly after the operation an exanthema appeared which proved to be an infarct of the lymph tract. The various blotches were then exposed to different doses of partly filtered and partly unfiltered roentgen rays. A histologic post mortem examination showed that the nodules which had not been roentgenized did not show any difference to those which were examined at different times intra vitam. A focus which had been exposed to a small dose of rays showed a strong increase of tumor cells and eruption which proves the irritating effect of such small doses beyond doubt. Larger doses of soft as well as of hard rays caused regularly a distinct atrophy of the rete Malpighii, whilst the deleterious effect upon the tumor cells was so much stronger, the higher the filtration was, and it was strongest with aluminium filters of 2 mm. thickness. In a practical consideration Ritter comes to the conclusion, that the hard rays are superior, especially for deep irradiation, theoretically, however, he denies the existence of effect of roentgen rays in the distance, because this was strictly confined to the areas which had been exposed to the irradiation and he thinks that the effect of the secondary rays has not been proved, especi-

ally as this would stand in contradiction to the sharp demarcation between the areas that had been exposed to the rays and those that had not.

Rost: Sensibilisation of Animal Tissue for Roentgenization by Thorium X (Sensibilisierung von tierischen Gewebe fuer Roentgenstrahlen durch Thorium X). Berlin. klin. Wchnschr., 1913, L, 2405.

Rost, in collaboration with Krueger had made experiments to render animal tissue sensitive to roentgen rays by applying thorium X. The male and female generative organs of rabbits were used for the experiments because they are organs with increased cell proliferation and thus permit the best observation. He found that thorium X alone has no influence upon testicles or ovaries, but that with thorium X and roentgen rays combined a very distinct result was effected. Repeated experiments proved that a dosis of roentgen rays which in itself alone had no effect, and a dosis of thorium X, which alone was also ineffective, caused a complete destruction of the semen producing cells on the tubuli contorti seminiferi of the testicles when applied combined, whilst the other cell elements remained completely intact. An effect upon the ovarian follicles could not be proved.

Petersen, O. H.: Permanent Cures of Sarcoma by Roentgen Rays (Zur Frage der Dauerheilung von Sarkomen durch Roentgenstrahlen. Strahlentherapie, 1913, III, 490-506.

Roentgen rays have a very varying effect upon sarcomata. Carcinomata are generally equally influenced and the effect is so much better the nearer the tumors are to the surface. In sarcomata, however, we see variations in the effect from absolutely refractory reaction and even increase of the growth to a really astonishing sensitiveness to the rays, so that some tumors "melt away like the snow before the sun." This does not depend from the accessibility of the rays, but on the radiosensitiveness of the tumors. Hitherto it has not been pos-

sible to establish the definite relationship between the histologic construction and the radiosensitiveness. The great difference which prevails amongst roentgenologists in dosimetry, dosage, quality of rays, focus-skin distance, filtration, etc., prevents conclusions from comparisons between the different cases of the different authors as to construction and radiosensitiveness of the sarcomata and failure or success of the treatment.

As to permanent cures of sarcomata by roentgen rays, the sum total of the published cases may allow conclusions, and the author reports the detailed histories of 45 cases of sarcomata which he could find in the literature recorded as cured. Johnson—3 cases, Shoemaker—1, Judd—1, McMaster—1, Pusey—4, Walker—1, Krogus—1, Chrysospathes—1, Albers-Schoenberg—1, Sjogren—1, Clopatt—1, Kienboeck—1, Wetterer—1, Cohn—3, Fischer—1, Goebel—1, Price—1, Skinner—1, Gocht—1, Levy-Dorn—2, Nicolaysen—1, Lassen—1, Haenisch—1, Pfahler—10 and Mueller-Immenstadt—5 cases.

From these cases must be eliminated those which according to the present standard cannot be classed as real sarcomata, those where the diagnosis has not been ascertained by histologic examination, and those that have been without relapse for less than one year.

There remain then 3 cases of Pfahler about one year without relapse; longer than one year without relapse 2 cases of Pfahler, 1 of Judd, and 1 of Price; more than 2 years the cases of McMaster, Fischer and Mueller-Immenstadt.

The cases without relapse for more than three years are:

Johnson: 42 year old woman. Inoperable fibrosarcoma. 40 sittings within 5 months. No recurrence after 3½ years.

Shoemaker: 36 year old woman with large tumor in lower abdominal wall, bladder and intestines, inoperable and histologically recognized as fibrosarcoma. 49 ir-

radiations within 9 months. No relapse three years after end of the treatment.

Krogus: 40 year old skipper operated for tumor of the occiput; radical removal not possible; relapse and 2nd operation 8 months later on occiput and forehead. Again relapse 4 months later, a 6 cm tumor on occiput and numerous small nodules on parietal and frontal bones, which are microscopically round cell sarcoma with medium-sized polymorphous cells and giant cells. Roentgenization each day for ten minutes with hard and soft rays. After 14 days the tumor on the forehead disappears and after 70 days the patient is dismissed as cured. No recurrence after more than three years.

Albers-Schoenberg: 44 year old man with large tumor over the ear and several small tumors on the head, microscopically round cell sarcoma. 18 roentgenizations with medium soft watercooling tubes for twelve minutes, after which the patient did not return for several weeks. Then 18 irradiations of 6 minutes each for tumor over the ear and 10 irradiations of the other tumors. Two relapses disappeared promptly after a few sittings and since then the patient has been well for over three years.

Sjogren's case of a 48 year old man with spindle-cell sarcoma of the right naris was cured in 36 sittings of 10 minutes each. No recurrence after four years.

Wetterer's case of idiopathic sarcoma near the head of the femur was without relapse for over 6 years.

Goebel removed a rapidly growing spindle-cell sarcoma from the right thigh of a three weeks old child and as radical removal was not possible several roentgenizations at various intervals were performed with the result that the child has been without relapse for the last six years and is perfectly well.

Skinner's patient, a 39 year old school teacher, had a fibro sarcoma of the abdominal wall and was given 46 irradiations during 4 months, after which the treatment was interrupted for some time and resumed

again at several intervals. The treatment lasted two years and three months and 136 roentgenizations were given. There has been no relapse for eight years and the patient is well and able to attend to her teaching.

Gocht's case of melosarcoma of the eye has been without relapse for four years. Small doses were given daily until erythema appeared, then interrupted and taken up again and so on until the patient was cured.

Pfahler's two cases are published in detail in the New York Medical Journal, 1907, p. 1153, and had been without relapse for 3 and 4 years.

From these reports it may be seen that the percentage of permanent cures of sarcoma with roentgentherapy is yet very small.

Hamm: Technique and Results of Radiotherapy (Technik und Resultate der Strahlentherapie). Berlin. klin. Wchnschr., 1913, L, 2306.

Author reports the results which were obtained with roentgen and radium therapy at the Frauenklinik in Strassburg. Only a few cases of carcinoma of the uterus and the vagina were treated, they remained, however, stationary or showed only very slight improvement; a cure cannot be reported. As secondary symptoms after the application of radium he found fatigue, fever and diarrhea. Excellent was the result and the effect upon metrorrhagia which stopped. Twelve myomata were roentgenized and six of these are reported as cured. The best results were obtained in climacteric hemorrhages with roentgenization of the ovaries. The roentgentherapy is so very expensive because it puts such a great strain on the tubes.

A New Radiometer for Use with Sabouraud's Pastilles, by Dudley Corbett, M. A., M. D. Oxon Senior Assistant in the Skin and X-Ray Therapeutic Departments, St. Thomas's Hospital. The Lancet, Feb. 21, 1914.

This instrument is the result of an inquiry into the color changes occurring in the Sabouraud-Noire pastille when exposed to

X-rays. It was undertaken with the hope of fixing an absolute standard for tint B which should be capable of being reproduced to any extent without variation. The paper standards at present obtainable are not all similar in tint, and one wonders what means are taken to ensure their accuracy; irregularity in the printing is obvious when one examines a large sheet. I have had the opportunity of examining a number of tints obtainable several years ago; they vary to an extraordinary degree not only in depth of tint but also in color composition, so much so that it is impossible to make a pastille match some of them whatever exposure is given. We are told on the Sabouraud card that the tint there represented is the limit to which one can possibly go with safety, beyond this lie dermatitis and permanent alopecia. It is, however, fairly well known that there is roughly a 20 per cent. margin on either side of many specimens of tint B, while on the other hand some represent the limit of safety or 1.2 B and some are only 4/5 B. One specimen sent over specially by Sabouraud himself as "Teinte B vraie" was only 4/5 B. The ideal tint B, then, is one which will allow an error of about 20 per cent. on either side as a maximum. This tint I have now obtained and standardized in such a way that its exact color composition has been correlated with clinical results in tinea work, and further being composed of tinted glasses standardized spectroscopically can always be reproduced in any quantity.

In a previous paper¹ the method by which this tint was obtained was described. Recent investigation has led me to modify certain statements and figures. Therefore, as it appears that many people have felt the want of such a standard, I will again briefly outline the method adopted whereby any fraction or multiple of the full pastille dose has been standardized. Two or three well-seasoned X-ray tubes were used for the experiments in conjunction with a dipper break and tachymeter. The number of current interruptions required for the full epila-

¹ British Journal of Dermatology, August, 1913.

tion dose was noted for each tube; in this one was guided by a paper standard known to be a safe one. Every care was taken to keep the milliamperemeter and qualimeter (Bauer) readings constant for each tube and each series of experiments. The pastille was fixed in the halfway position. The number of interruptions required for epilation in practice were then given and the pastille was removed and examined by means of a Lovibond's tintometer. This instrument consists of a finely graded series of glasses dyed with the three primary colors—red, blue, yellow, each unit being standardized spectroscopically. In a suitable viewing tube these can be so combined as to match by transmitted light against a pure white background the color sensation transmitted by reflected light from any given substance.

The average of a very large number of observations gave the color composition of a B tint which allowed a fair margin for error on either side. The standard Lovibond glasses used in combination to match this tint are yellow 13.0, red 1.5 units, which means that the color sensation transmitted is a yellow-orange composed of yellow 11.5, orange 1.5 units. These figures differ very slightly from those first stated by me. The number of interruptions required to produce this tint being known, it was quite easy to measure the color of any fractional dose, to plot a curve showing the color developed by the pastille from the unexposed state to the full B tint, and to continue this curve up to the point where further exposure to X-rays produced no more change of color. I am not yet certain where this point lies. Beyond 2 B the orange curves flatten out and it becomes more difficult to appreciate finer fractions.

The fixed points on the daylight curves having been finally determined by taking the average of a large number of observations, another series of experiments were done under the light of an 8 c.p. carbon filament electric lamp, the pastille being situated about 8 inches from the lamp. The results obtained could be checked in daylight. It

was considered that this form of lamp was likely to be the most convenient for general use. Results very similar to daylight were obtained by using a small 4-volt Osram lamp with accumulator, and fair results were got with a Price's standard candle in a modified form of Solly's hæmoglobinometer case, but both of these were abandoned as being too inconvenient.

There are, then, two separate sets of standards for day and electric light. The manner in which they correspond is best seen by plotting curves where the ordinates are the color units and the abscissa markings current interruptions or time. It is then seen that the yellow-green color of the pastille loses its green constituent rapidly in electric light and more slowly in daylight. As soon as the green is lost, orange develops, but beginning earlier reaches a higher mark at tint B under electric light than it does under daylight. It is thus obvious that to attempt to use the same standard with artificial light as well as daylight is to court trouble. The finer differences are rather easier to read at first under daylight, but with a little practice one can be equally accurate with either. The following is a description.

METHOD OF USE.

The apparatus consists of a tube or oblong viewing box divided into two by a vertical partition so that on looking through the eyepiece against the background one sees two small white circles. At the distant end of the box are frames provided for the insertion of the glass standards; on the right for the color tints and on the left for a neutral tint if required. The use of the latter will be explained below. The background is composed of pure white standard paper. In the background support is cut a shallow groove or a hole for the pastille holder depending on the type used, so that the pastille can be examined without removal from its holder. The tint of the pastille is thus compared with the standard inserted. It is possible to get such an exact match in tint that one could not say on which side the pastille was situated.

NEUTRAL TINT.

When measuring the unexposed pastille and the $1/4$ and $1/3$ B in bright daylight it was found that although it was possible to match the pastille in tint, it was always brighter than standard. This brightness, which is due to the white light reflected from the pastille, is dulled if necessary by the interposition of a standard neutral tint composed of a fraction or multiple of one unit of each of the red, blue, and yellow glasses combined, which absorbs the white light. For example, the color sensation transmitted from the unexposed pastille in daylight is: yellow, 11.5; green, 1.5; light, 1.5; for 1.5 of neutral tint was required to absorb all the white light transmitted. Similarly for $1/4$ and $1/3$ B under bright daylight 0.5 and 0.2 neutral tint were required respectively.

The following precautions should be taken when using the radiometer:—

In daylight: 1. This should be diffused and as white as possible. On no account should measurements be made near sunlight. 2. Keep the instrument vertical, avoiding shadows.

Using electric light: 1. Use an 8 c.p. carbon filament lamp with frosted glass so arranged with a shade that the eyes are protected from the light. The shade should be black, not colored. Those used for microscopes do very well. The lamp should be in good condition. 2. Keep the instrument vertical, the pastille being about 8 inches away from the lamp.

In both cases: 1. Examine as quickly as possible, for the pastille fades even in electric light. 2. The standard white background must always be used and kept clean.

THE STANDARDS.

1. $1/4$ B. This will be useful to those people who work with the pastille on the skin in tinea. If used in this way without any other control a new pastille should always be exposed. In daylight 0.4 neutral tint is required on the pastille side to absorb the white light. Both this standard and the $1/2$ B can be used in treatment of deep-lying

tissues with filtered rays when it is required to bring the tube as close as possible to the skin. 2. $1/3$ B is the dose employed in the treatment of various skin affections. 0.2 of neutral tint is sometimes needed. 3. $1/2$ B is a useful standard: (a) It is employed in the treatment of certain diseases of the skin; (b) it can be used in tinea by those who use the "1/2 time distance" method. If the usual anticathode skin distance is 15 cm., and this is reduced by $1/4$ to 11.25 cm., $1/2$ B at the original half-way position 7.5 cm. from the anticathode will mean that the scalp will receive $1/4$ B. I have not at present had any experience of this method as recommended by Hampson and further modified by Batten,² but in view of the readiness with which this tint can be appreciated in the radiometer, the procedure should be rendered easier. Further at a point on the curve just below $1/2$ B—namely $4/10$ B—the color is a yellow with a trace of blue. Using this standard, which can be supplied if required, one would be able to give the equivalent of $4/5$ B in the true half-way position, although, of course, the margin for error is smaller.

THE EPILATION DOSES.

4. $4/5$ B usually produces epilation without erythema, but cannot always be relied upon for this purpose. It is frequently insufficient for the top patch in tinea and for very stiff beards; for these the full dose should be given. 5. $1/1$ B always produces epilation. There is usually some transitory erythema at about 18 days, better marked on the skin near the ears and at the back of the neck if unprotected. 6. 1.2 B is the highest dose I have ever employed in tinea. Epilation of course results, and is always accompanied by erythema and sometimes by transient dermatitis on the unprotected skin. If any septic foci are present on the scalp there is a smart inflammatory reaction around them. This form of dermatitis starts as an erythema and is followed by a slight desquamation, but the whole process

² Brit. Med. Jour., Oct. 11th, 1913.

clears up in a week under soothing applications. In the few cases where this dose was reached the re-growth of the hair, though slower than after the smaller doses, was quite satisfactory. I should imagine that this point was very nearly the limit consistent with safety in tinea. I have given it with success as an unscreened dose for rodent ulcer, allowing a full month to elapse between the first and second dose.

Standards for higher doses up to 4 B can be easily made, but as these doses would of course only be given with a filter, there is not much object in using such standards, as it is becoming the general practice to measure the dose with pastille under the filter.

Where very accurate doses are required new pastilles should be used. The exposed pastille never returns exactly to its original tint; there is less green even after thorough bleaching. This fact makes very little difference to the orange part of the curve—that is to say, tint B is not reached appreciably quicker provided that the pastille has not been used more than three times at most.

This instrument has been in daily use in the X-ray Therapeutic Department of St. Thomas's Hospital for some months, and the results in tinea work have been most satisfactory. During 1913, the first year of the department, about 200 cases of tinea were treated. At first we were always in doubt

with regard to any dose below the full B, and several cases had to be done a second time. Since these standards have been employed there has only been one case which has needed a second sitting. In this there was incomplete epilation after a full dose over an area occupied by a large known nævoid patch on the scalp. We use $4/5$ or $9/10$ B for all except the top patch, which receives the full dose. There have been no cases of permanent baldness and none of dermatitis except the transitory form with 1.2 B already mentioned.

The advantages of this radiometer over others where Sabouraud's pastille is employed are:—

1. The color standards are constant and invariable in tint, easily kept clear, and do not fade. The smaller differences between the fractional doses are readily appreciated.

2. They have all been verified experimentally in tinea work, and any fractional or multiple dose can be standardized.

3. There is provision of a separate series for daylight and standard artificial light. A series could be worked out for any constant source of light if required.

The pastille should be examined in its holder if possible. The instrument can be adapted to any form of pastille holder. The makers are Tintometer Limited, The Colour Laboratory, Salisbury.

RECENT BIBLIOGRAPHY OF ROENTGENOLOGIC LITERATURE

- ADAM: Stereoscopic roentgenograms of the cavity of the eye and its content (Stereoskopische Roentgenphotographien der Augenhöhle und ihres Inhaltes). Muench. med. Wchnschr., 1913, No. 27.
- ALBERS-SCHOENBERG: The fight about the roentgentherapy in the public general hospitals (Der Kampf um die Roentgentherapie in den allgemeinen Krankenhaeusern). Fortschr. a. d. Geb. d. Roentgenstr., 1913, XX, 576.
- BUMM, E.: Results of Roentgen and mesothorium treatment of carcinoma of the uterus (Ueber Erfolge der Roentgen und Mesothorium behandlung beim Uteruskarzinom). Zentralbl. f. Roentgenstr., 1913, IV, 395-396.
- BECLERC & BECLERC: Roentgentherapy in leucaemia (La radiotherapie dans les leucamies). Arch. d'electricite med., 1913, XXI, 225-231.
- BERDEZ: Roentgentherapy of myomata (Ueber die Roentgentherapie der Myoma). Fortschr. a. d. Geb. d. Roentgenstr., 1913, XX, 393-397.
- BECLERE: Roentgentherapy for fibromata of the uterus (La roentgentherapie des fibromes uterines). Arch. d'electricite med., 1913, XXI, 353-361.
- DE COURMELLES, FOVEAU: Roentgen rays in gynecology (Les rayons X en gynecologie). Arch. d'electricite med., 1913, XXI, 201-219.
- Also: Jour. de physiother., 1913, No. 129.
- CHRISTEN: The physical fundaments for dosage of the Roentgen Rays (Die physikalischen Grundlagen fuer die Dosierung der Roentgenstrahlen). Strahlenther., 1913, III, 162-165.
- DOHAN: Gynecologic roentgenization (Zur Frage der gynaekologischen Roentgenbestrahlung). Fortschr. a. d. Geb. d. Roentgenstr., 1913, XX, 390-392.
- DEMOULINS: Technique of roentgenologic explorations of urinary calculi (Technique de l'exploration des calculs urinaires par la radiographie). Arch. d'electricite med., 1913, XXI, 189.
- DESSAUER: Experiments with the hard roentgen rays (Versuche ueber die harten Roentgenstrahlen). Fortschr. a. d. Geb. d. Roentgenstr., 1913, XXX, 586-589.
- ENGELHORN: Today's standard of radiotherapy in gynecology (Ueber den heutigen Stand der Strahlentherapie in der Gynaekologie). Strahlentherapie, 1913, III, 216-225.
- FRAENKEL & BUDDE: Histologic, cytologic and serologic examinations of roentgenized guinea-pigs (Histologisch zytologische, und serologische Untersuchungen bei Roentgenbestrahlten Meerschweinchen). Fortschr. a. d. Geb. d. Roentgenstr., 1913, XX, 355-363.
- GUILLEMINOT: Physics which are necessary for the interpretation of the results in roentgentherapy (Les donnees physiques necessaires a l'interpretation des resultats dans la radiotherapie). Arch. d'electricite med., 1913, XXI, 292.
- GROEDEL: The picture of the thorax in centric and eccentric projection (Das Thoraxbild bei centrischer sagittaler, frontaler, schraeger und Exzentrischer Roentgenprojektion) Illustr. Fortschr. a. d. Geb. d. Roentgenstr., 1913, XX, 541-554.
- HAENISCH: My experience, results, and technique with roentgentherapy in gynecology (Meine Erfahrungen, Resultate und Technik in der gynaekologische Roentgentherapie). Fortschr. a. d. Geb. d. Roentgenstr., 1913, XX, 18-33.
- HIRSCH: Roentgen treatment for myomata and fibrosis uteri (Die Roentgenbehandlung bei Myomen and Fibrosis uteri). Fortschr. a. d. Geb. d. Roentgenstr., 1913, XX, 373-389.
- HOLZBACH: Theory and practice in intensive roentgentherapy (Theoretisches und Praktisches zur Roentgentherapie). Strahlentherapie, 1913, III, 279-286.
- HEIMANN: Intensive Roentgentherapy (Zur Roentgentiefentherapie). Strahlenther., 1913, III, 276-278.
- HAENDLY: The effect of mesothorium and Roentgenrays upon carcinoma, the uterus and the ovaries (Die Wirkung der Mesothorium und Roentgenstrahlen auf das Karzinom, den Uterus und die Ovarien). Strahlentherapie, 1913, III, 300-307.
- HARET: Treatment of hypertrophy of the prostata with Roentgenrays (Traitement de l'hypertrophie de la prostate par la radiotherapie). Arch. d'electricite med., 1913, XXI, 362-365.
- JAUGEAS: Roentgentherapy of uterine fibromata (Quelques considerations sur la radiotherapie des fibromes uterines). Arch. d'electricite med., 1913, XXI, 221-224.
- KELIN: Results of roentgentherapy for carcinoma of the uterus, mamma and ovaries (Erfolg der Roentgentherapie bei Karzinom des Uterus, der Mamma und der Ovarien). Strahlentherapie, 1913, III, 260-271.
- KLIENEBERGER: The treatment of leukemia (Die Behandlung der Leukaemie). Fortschr. a. d. Geb. d. Roentgenstr., 1913, XX, 533-540.
- KIENBOECK: Roentgentherapy of malignant disease (Radiotherapie des affections malignes). Arch. d'electricite med., 1913, XXI, 190-194.

- Arch. d'electricite med., 1913, XXI, 190-194.
- KIRCHBERG: Injuries from Roentgen rays and judicial decisions (Roentgenbeschädigung und ihre rechtliche Beurteilung). Strahlenther., 1913, III, 121-161.
- LADOUX-LEBARD: Systematic pre-operative roentgenoscopy (Sur la radioscopie preoperative systematique). Arch. d'electricite med., 1913, XXI, p. 183.
- LANGES: Roentgentherapy of myoma and metropathy (Erfahrungen mit der Roentgenbehandlung bei Myomen und Metropathien). Strahlentherapie, 1913, III, 287-299.
- LIPPMANN: Interesting Roentgen findings in clubbed fingers (Ueber einen interessanten Roentgenbefund bei Trommelschlagelfingern). III. Fortschr. a. d. Geb. d. Roentgenstrahlen, 1913, XX, 402-404. Also Arch. Roentg. R.
- MIROSLAW VON CACKOVIC: Roentgenologic examinations of the topography and function of the normal alimentary organs and the localization of foreign bodies in them. Lijecnicki scijesnik, 1913, XXXV, 3-5. Ref: Zentralbl. f. Roentgenstr., 1913, IV, 322-324.
- MEYER, FRITZ M.: Roentgen treatment for carcinoma of the female genitalies (Zur Frage der Roentgenbehandlung des Karzinoms der weiblichen Genutalien). Zentralbl. f. Roentgenstr., 1913, IV, 355-369.
- NOVE-JOSSERAND: Roentgenography of the bones and articulations. Its value in orthopedic surgery (La radiographie des os et des articulations. La valeur dans la chirurgie orthopedique). Arch. d'electricite med., 1913, XXI, 182.
- NOGIER: The determination of the time of exposure in roentgenography and the indicators of the time of the exposure (La determination du temps du pose en radiographie et les indicateurs de temps de pose). Arch. d'electricite med., 1913, XXI, 368-374.

D'OELSNITZ & PASCHETTA: A rare form of pulmonary tuberculosis, not diagnosed during life (Forme rare de tuberculose pulmonaire non diagnostique pendant la vie).

Arch. d'electricite med., 1913, XXI, 292.

D'OELSNITZ & PASCHETTA: The value of roentgenologic examination of the thorax for the diagnosis of respiratory affections of infants (Valeur de l'exploration radiologique du thorax pour la diagnostic des affection respiratoires de l'enfance).

Arch. d'electricite med., 1913, XXI, 184.

PATEAU & BELOT: Roentgenography in a case of calculus of the ureter (Radiographie clinique d'un cas de calcul de l'uretere).

Arch. d'electricite med., 1913, XXI, 292.

POTOCKI, DELHERM & LAQUERRIERE: Roentgenoscopy of the foetus "in utero" (La radiographie du foetus "in utero").

Arch. d'electricite med., 1913, XXI, 188-189.

REJAUD & NOGIER: The effect of high doses of roentgenrays upon the skin, etc.

(Les effets produits sur la peau par les hautes doses des rayon X, selectionnes par filtration a travers 3-4 mm. d'aluminium. Application a la roentgentherapie).

Arch. d'electricite med., 1913, No. 350, p. 49-56.

REDARD: Roentgenography of the articulations and the bones: Its value in surgery (La radiographie des os et des articulations. La valeur in chirurgie orthopedique).

Arch. d'electricite med., 1913, XXI, 182.

SPEDER: Roentgenrays in hypertrichosis (Roentgenbehandlung der Hypertrichosis).

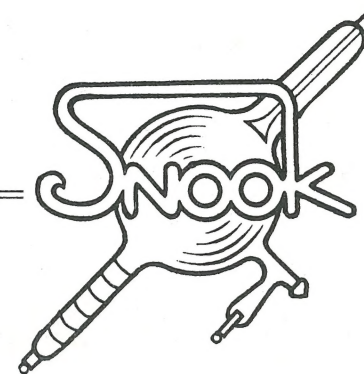
Strahlentherapie, 1913, III, 313-332.

VON SEUFFERT: Roentgentherapy in gynecology (Sur la radiotherapie en gynecologie).

Arch. d'electricite med., 1913, XXI, 375-388.

WEITZEL: Experience with intensive Roentgentherapy (Erfahrungen mit der Roentgentiefentherapie).

Strahlentherapie, 1913, III, 272-275.



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