

If much inflammation has taken place about a stone or an infected portion of the ureter, there may be considerable periureteral infiltration that in a measure obscures the ureter, and gives the signs simply of a cellulitis at that side of the uterus and extending toward the bladder. A cellulitis associated with persistent bladder symptoms should be carefully investigated, with the idea that it may come from the ureter. Determine whether the induration runs into the region of the ureter and whether there is tenderness farther up along the ureter or in the kidney.

In cases where pelvic neuralgia or neuritis is suspected, palpate the pelvic nerve trunks (Fig. 244). Sometimes the pelvic tenderness, which at first seems widespread, may be localized in its greatest intensity along the nerve trunks of one or both sides. These may be reached by deep palpation per vaginam or per rectum.

Trained Touch

The authors desire to emphasize the importance of training the fingers to appreciate differences in the feel of tissues and training the mind to interpret the diagnostic significance of the differences felt. The multiplication of instruments and laboratory aids to diagnosis has to some extent obscured the importance of the educated touch. Though these aids are helpful, and necessary in many conditions, they cannot substitute for trained palpation in deep-seated pelvic disease.

The beginner must learn to read the conditions first by learning the separate letters, so to speak, and then learning what certain groupings of letters mean. The separate items that must be recognized in this examination are the **position, size, shape, consistency, tenderness, mobility, and attachments** of the organs. This takes much time and patience and well-directed efforts through many examinations. It cannot be learned from lectures. It cannot be learned by seeing someone make examinations and applications. It can be learned only through repeated bimanual examinations by the student himself, under competent instruction. Hence the importance of the clinical portion of a gynecologic course.

Though it takes considerable time to learn to recognize normal conditions, the time is well spent, for no real progress is possible without this knowledge. The **normal must be known** before the abnormal can be appreciated. This is self-evident and yet how many students at graduation, and physicians long after graduation, find it difficult to feel more than the vaginal walls and cervix.

In the recognition of pathologic masses, the same points must be considered (position, size, shape, consistency, tenderness, mobility, and attachments), and this information, supplemented by the history and other aids, determines the diagnosis.

SPECULUM EXAMINATION

By means of certain instruments the vaginal walls may be spread apart so that those walls and the cervix uteri may be seen. Information of much value in some cases may be obtained in this way.

Instruments for Regular Speculum Examination

The instruments needed for this examination are shown in Fig. 245. They are as follows:

A speculum for separating the vaginal walls.

A long dressing forceps for sponging out the vagina, usually called "Uterine Dressing Forceps."

A tenaculum forceps, or "Volsellum," for catching the cervix and bringing it better into view.

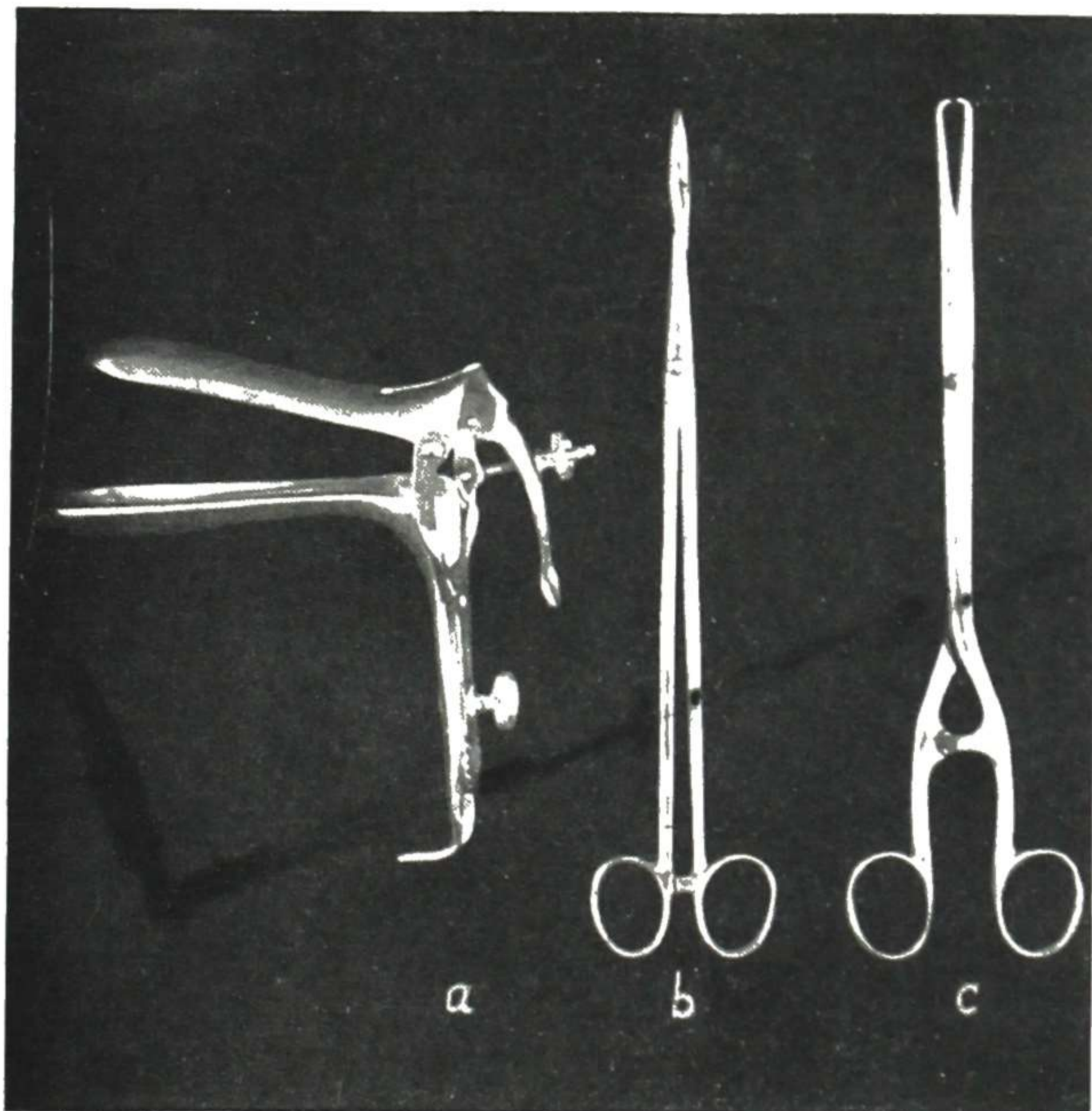


Fig. 245.



Fig. 246.

Fig. 245.—Instruments for the speculum examination. *a.* Bivalve speculum, of which it is well to have three sizes—large, medium, and small. *b.* Dressing forceps for swabbing out vagina. *c.* Tenaculum forceps for catching cervix to bring it well into view.

Fig. 246.—Introducing the bivalve speculum. First step—depressing the perineum to give room for the speculum to be introduced.

Vaginal Speculum.—The **bivalve speculum** (Fig. 245, *a*) is the kind most frequently used in ordinary office work. It consists of two blades, which are introduced closed and then opened by a mechanism at the handle. The vaginal walls are thus held apart and a very good view of the walls and cervix may be obtained. The bivalve speculum is convenient and gives good exposure of the cervix in most cases.

There are many different modifications of the blades and also of the mechanism for separating the blades. The most satisfactory form that the authors have found is shown in the illustration. It is called the Graves speculum and has the advantage that it can be easily and quickly transformed into a fairly satisfactory Sims' speculum, which is a decided convenience in office work. **Three sizes** are useful—small (virgin), medium, and large. The cervix is easier exposed in most cases if the anterior blade of the speculum is somewhat shorter than the posterior.

Some specula are made with three blades, instead of two, constituting a trivalve speculum. They are made on the same general principles as the bivalve but the mechanism is more complicated and, usually, without corresponding benefit.

The bivalve speculum is used with the patient in the dorsal posture.

The **Uterine Dressing Forceps** (Fig. 245, b) is a long strong forceps for sponging out the vagina and for making vaginal applications. It may be straight or curved as preferred. The authors find the forceps with a straight shank and a slight curve near the end more convenient than the much curved instrument. A vaginal depressor for pushing the vaginal wall out of the way is usually mentioned in an examining set, but it is generally not necessary, as the vaginal wall may be pushed aside sufficiently with the dressing forceps.

The **Uterine Tenaculum Forceps** may be needed for catching the cervix to bring all parts of it into view. It should be light but strong, especially about the lock, where it is likely to work loose (Fig. 245, c).



Fig. 247.

Fig. 247.—Introducing speculum. It has been carried part way in. Notice the oblique position, which prevents painful pressure on the urethra.

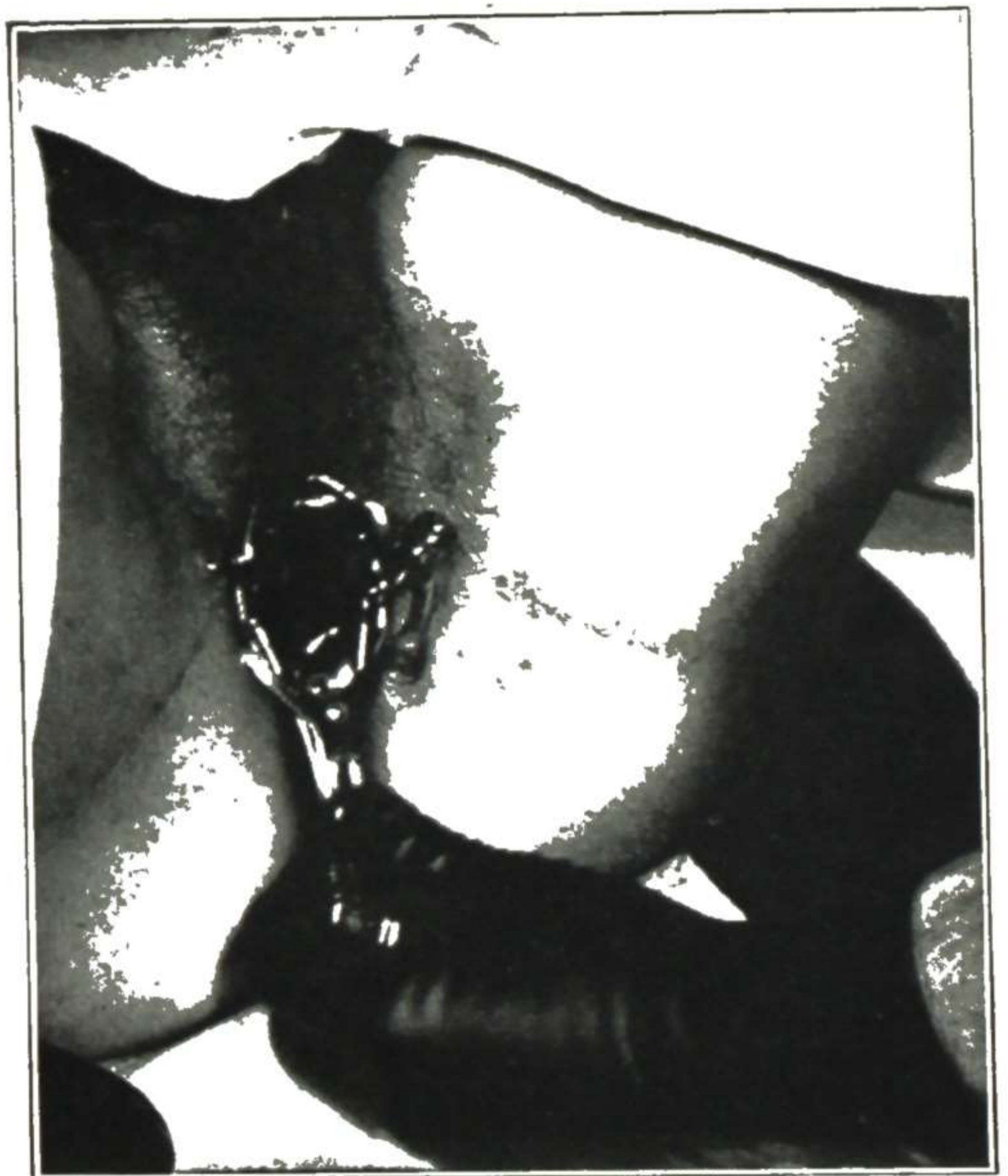


Fig. 248.

Fig. 248.—The speculum carried all the way in and turned into position for opening.

Steps in the Regular Speculum Examination

Introducing the Speculum.—The blades of the speculum are closed and the outer surfaces lubricated and the speculum held in the right hand, while with the other hand the labia are separated and the perineum depressed somewhat with one finger (Fig. 246). The speculum is then introduced and carried all the way to the upper end of the vagina without being opened. In most cases the speculum passes the vaginal entrance most easily when held with its width almost vertical, the edge being held just far enough to one side to **miss the urethra** (Fig. 247). When well within the vagina, it is turned transversely and carried in as far as it will go (Fig. 248).

Exposing the Cervix.—After the blades have been introduced well up to the top of the vagina, they are opened and the cervix and vaginal walls exposed (Fig. 249). By turning the speculum in various directions, all parts of the cervix and upper end of the vagina may be seen. If the cervix does not come well into view, it may be caught with a tenaculum forceps and brought downward somewhat and turned from side to side, exposing all portions of it and of the vaginal vault.

Information Obtained in the Speculum Examination

The information sought in the speculum examination is obtained by inspection of the following structures:

Vaginal Walls—Color, Discharge, Redundancy.

Cervix Uteri—Position, Color, Size and Shape, Lacerations, Deviation of Axis, Eversion, Erosion, Hypertrophy, Cystic Change, Ulcer.

External Os—Size and Shape, Color of Edges, Discharge, Polypi.



Fig. 249.—Bivalve speculum in place. Sectional view, showing relations of speculum and exposure of the cervix and vaginal vault by opening the blades.

Vaginal Discharge

If there is discharge, determine whether it comes from the uterus or originates in the vagina. If from the uterus and of a stringy mucous character, it comes largely from the cervix. Discharge from higher in the uterus (endometrium) lacks the tenacious character of the cervical mucus.

Normally the mucosa of the cervical canal secretes a small amount of clear mucus which blocks the canal and protects the vulnerable endometrium above from bacterial invasion. This clear mucus coming into the vagina mixes with the exfoliated epithelial cells, forming the small amount of whitish *mucopithelial discharge* which constitutes the normal vaginal contents. This normal discharge occupying the vaginal canal is distinctly protective, in that it halts spontaneous invasion by pathologic organisms from outside and even when such organisms are carried into the vagina it discourages their growth. In-

vestigations as to the cause of this protective quality of the normal vaginal contents brought some interesting facts, as follows:

a. The normal vaginal discharge contains large nonpathogenic bacilli (Doederlein bacilli) which live on the glycogen contents of the exfoliated epithelial cells, and in so doing form acid which maintains the normal acidity.

b. Any considerable diminution of the normal vaginal acidity favors the growth of pathogenic bacteria and protozoa which flourish in alkaline or less acid media. The resulting inflammation gives rise to various types of pathologic discharge, even causing blood-tinged discharge at times. The growth of pathologic organisms diminishes the glycogen contents of the epithelial cells, which in turn checks the growth of the normal protective bacilli (both by diminishing the glycogen on which they feed and decreasing the acidity, which discourages their growth). When this vicious circle is once established, it is likely to continue with increasing disturbance until nature's efforts at restoration are aided by appropriate treatment.

c. Effective treatment restores normal vaginal acidity and normal epithelial cells (glycogen) and Doederlein bacilli, and eliminates the pathogenic organisms. This is accomplished by washing out the mass of invading organisms with a douche, which may contain acidifying material, and supplying in good quantity some form of sugar on which the normal bacilli may feed until they again become numerous enough to split sufficient cell glycogen for maintaining normal acidity. The details of such treatment are given under Vaginitis, in Chapter IV.

d. The factors in the origin of vaginitis and in its cure vary greatly in different cases, the variations involving different organisms, relative virulence, and the state of the patient's physiological activities. On the last point it is interesting to note that the maintenance of glycogen in the epithelial cells depends on an adequate supply of ovarian hormones.

e. The intractable character of vaginitis in children and in the aged is due largely to the absence of ovarian activity and ovarian hormones at those periods of life. When this was discovered and suitable endocrine medication given, the resistant character of the vaginitis disappeared. Lowering of general nutrition and metabolism in various ways may be a factor in the onset or persistence of pathological conditions here as elsewhere.

f. The reaction of the vaginal contents, as to acidity or tendency toward alkalinity, may be taken as a fair index as to normal or pathological character, and as a rule the greater the progress toward alkalinity the more marked the pathological disturbance. Progress toward alkalinity is measured in terms of the chemical symbol pH, which signifies a certain hydrogen ion concentration, and increasing pH means increasing alkalinity, as indicated by the increasing stippling on the scale in Fig. 250. Extensive studies have shown that with normal contents the range of reaction is pH 3.8 to 4.4. Beyond that the discharge becomes pathological, different levels favoring the growth of different organisms as shown in the illustration.

Ways have been devised of measuring the pH of the vaginal contents (mixed contents and also at upper and middle and lower portions of vagina). Some of these methods will be given later under special examination measures, to be used when needed in refractory cases or for other investigative work.

While measuring the pH accurately was essential to the important investigations which established the relations illustrated, the establishment of those facts enables diagnosis and effective treatment in most cases without the necessity of pH measurements. In fact, the matter has been so well worked out that the reading of the chart may be turned around—that is, the clinical establishment of trichomonas vaginitis (symptoms, character of discharge, smear showing trichomonads) indicates about pH 5-6, loaded streptococcic or staphylococcic fields about pH 6-7, and active gonorrhoea about pH 7-8. In this connection it must be kept in mind that the cervical mucus is alkaline and must be acidified by the vaginal physiological activity before the mixed contents present the normal pH reading. This makes clear that in accurate investigative work involving the pH it should be registered at different parts of the vagina.

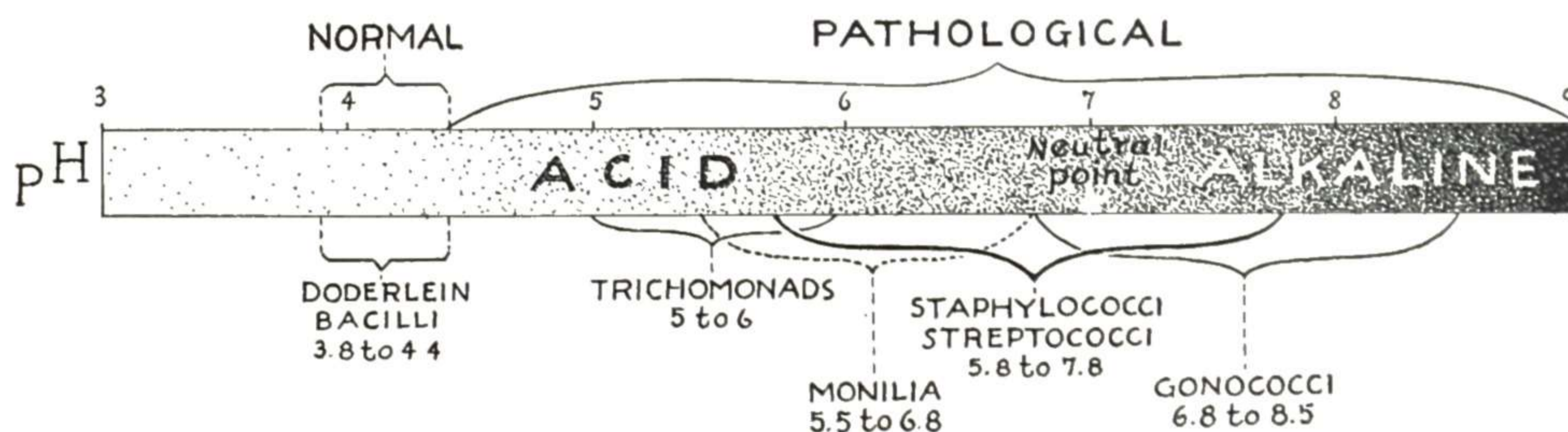


Fig. 250.—Diagram indicating the variations in the pH of the vaginal contents, and also the pathogenic organisms which flourish at different stages of alkalinity. (Modified from G. D. Searle & Company.)

Microscopic Features

The microscopic examination of the vaginal discharge serves to identify the predominating type of cells present and also in most cases the pathogenic organism if any.

Preparing the Slides. A small drop of warm water is placed on a slide near one end, a little of the discharge is mixed with it and it is then covered with a coverglass. This fresh or live slide is for examination for trichomonads. Incidentally, the reduced light used to bring out the outlines of the protozoon brings out the outlines of epithelial cells and cell nuclei and also of branches (mycelium) and buds or spores of yeast and other fungi.

Slides for staining may be made at the same time, if such are desired. A small amount of discharge is placed on a slide near one end, the end of a second slide is placed on it, and then the two are drawn apart, leaving on each a film or smear. This maneuver gives a thin film, which is better than a thick one for a stained specimen, and it gives two films of the same portion of discharge, which is advantageous when examination of the blue-stained smear shows forms suspicious of gonorrhoea and it is desired to make gram decolorization of a similar smear and compare.

Examining the Slides. The "warm" slide or live slide is all ready to be placed on the microscope stage for examination. It is examined first with the low power, for focusing and picking out special fields, and then the nose-piece is turned to the medium high power for study of individual epithelial cells and

protozoa and fungi. The light-diaphragm is stopped down sufficiently to show the outlines of clear bodies, such as epithelial cells and trichomonads.

Cellular Elements. The normal cellular elements in the age of active ovarian functioning (between puberty and the menopause) are quite different from those before puberty and after the climacteric decline of ovarian function. The various normal types are described and illustrated under Physiology in Chapter I.

Estrogen deficiency is indicated in the accompanying illustrations, the gradual loss of ovarian function being well shown by the changes in the vaginal contents. Contrasting the normal estrogen picture (Fig. 251) with starting estrogen deficiency (Fig. 252) modification of the large epithelial cells is seen. In Fig. 253 the large epithelial cells divide the field with the smaller "atrophy" cells, while in Fig. 254 "atrophy" cells and leucocytes have taken the field.



Fig. 251.

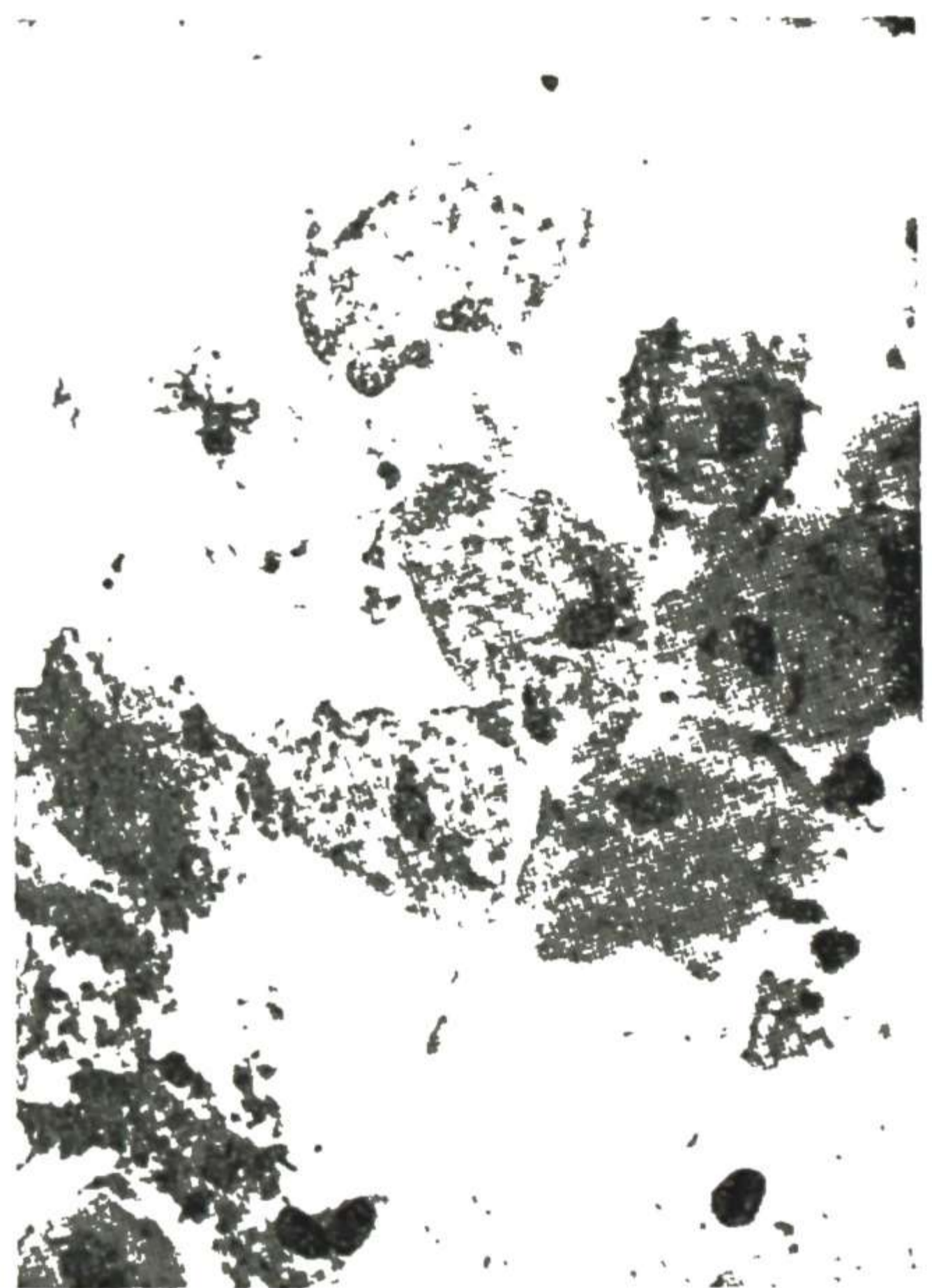


Fig. 252.

Fig. 251.—This type of vaginal smear indicates normal estrogen effect. The cells are large and flat, the edges are clean cut and the nuclei are small (pyknotic). No "atrophy" cells are present. Smear taken on eighteenth day of cycle from young woman, aged twenty-three years, with normal, regular menstrual cycles.

Fig. 252.—Beginning estrogen deficiency. Smear taken from patient aged forty-three years, ten months after spontaneous menopause. The cells are somewhat smaller than those in Fig. 251, less regular in shape, less flattened, margins not so clean cut, and nuclei are larger—that is, the cells are less advanced in the process of cornification, flattening of cell and shrinking of the nucleus, which mark the normal exfoliation of full estrogen effect. (Geist and Salmon—*Am. J. Obst. & Gynec.*)

If inflammation be present at any age, pus cells (dead leucocytes) are massed in the microscopic picture, the extent of the massing of pus cells depending on the intensity of the pathologic process. In addition, protozoa (usually trichomonads) or fungi (mainly monilia) may be found. The distinguishing features of each are described in detail under that disease in Chapter IV.

With fresh or live smears a coverglass is used to slow evaporation, thus preserving cell forms and trichomonad activity as required for ordinary exami-

nation. When longer study of the organisms is required, as in special investigations, evaporation may be still further slowed by employing the hanging drop.

Bacterial Elements. Staining the Slide. When abundant, bacteria may be dimly seen in the plain slide by the refracted light used in outlining the larger cellular elements, but for bacterial examination it is necessary that the slide be stained. The film is first allowed to dry. Then the slide is passed two or three times through a flame (Bunsen gas flame or alcohol lamp) to fix the film on the slide so it will not wash off. The film may be stained by flooding for fifteen seconds with a weak solution of any of the commonly used aniline dyes. A 1 per cent solution of methylene blue is the one usually employed. Enough is dropped on to cover the film and, after the required time, is washed off in running water, and the excess water is removed gently with blotting paper. The

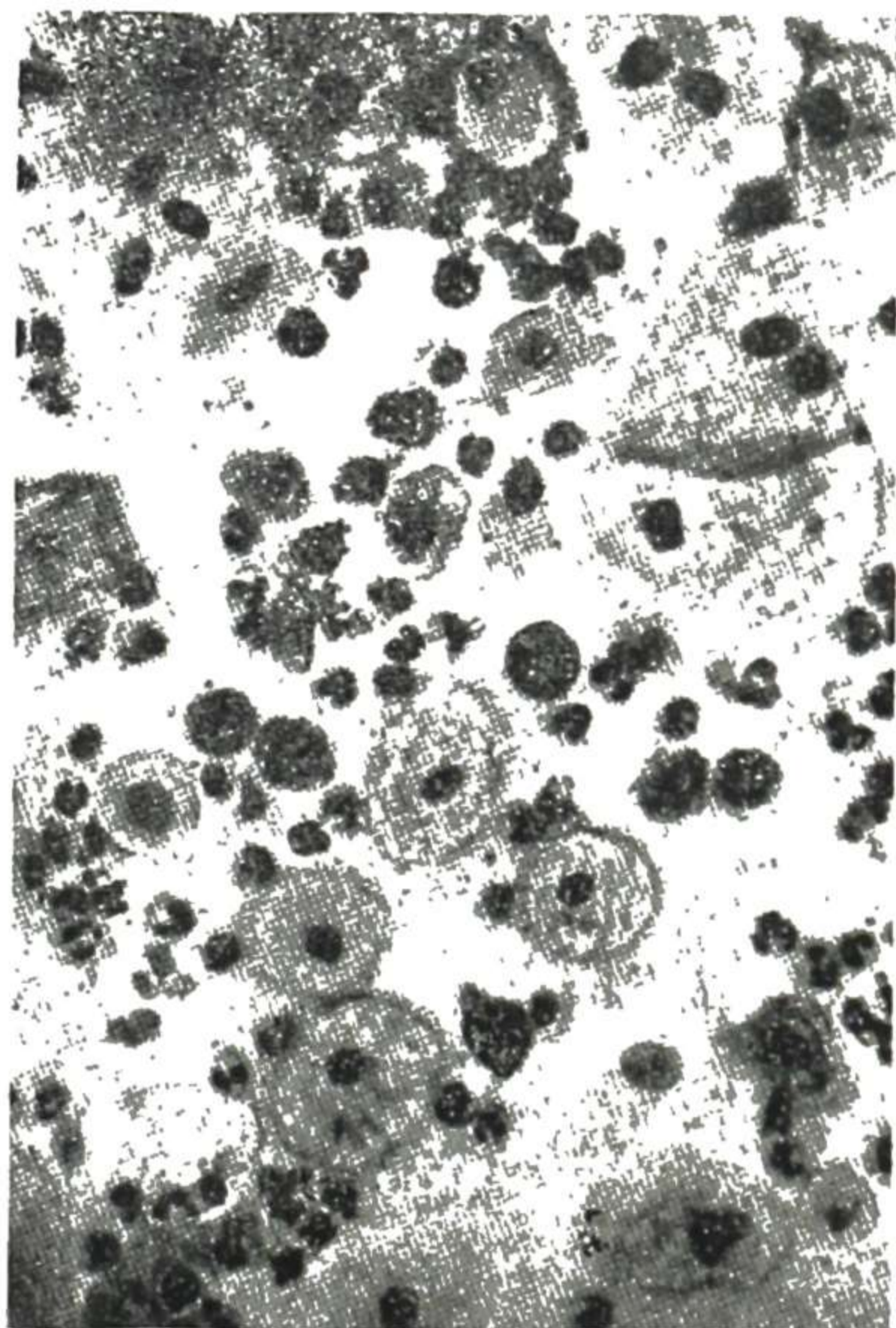


Fig. 253.



Fig. 254.

Fig. 253.—Moderate estrogen deficiency. Smear from patient aged forty-eight years, four years after bilateral ovariectomy. Note the appearance of small epithelial cells ("atrophy" cells), which divide the field with the large cells of the preceding slide.

Fig. 254.—Advanced estrogen deficiency. Smear from patient aged fifty-nine years, nine years after the menopause. "Atrophy" cells and leucocytes have taken the field. There are none of the large epithelial cells characteristic of estrogen effect. (Geist and Salmon—*Am. J. Obst. & Gynec.*)

film is allowed to dry, and is then ready for the microscope. Examination may be made first with a medium high power objective for general orientation, and then a drop of oil is placed on the film and more detailed examination is made with the oil immersion objective. No coverglass is needed, and if one be used it may prove too thick to allow proper focusing of the oil immersion lens.

Vaginal Walls.—Are the walls of normal color or is there congestion? If congestion, is it active or passive? If the walls are bright red, that means active or arterial congestion and is due to inflammation or irritation. If the walls have a bluish tinge, that means passive or venous congestion and indicates either pregnancy or some interference with the circulation, as by a pelvic tumor or exudate or by failure in compensation in heart disease.

Small punctate bleeding areas on the vagina, without large ulceration, are due usually to severe inflammation of the trichomonas or monilia type, or in older women to atrophic (senile) vaginitis.

Cervix Uteri.—Is the cervix in low position, so that it is easily exposed when the speculum is in but a short distance, or is it higher than normal, so that it cannot be well exposed with the speculum of ordinary length? Is the color normal or is there congestion, either active or passive? Here, as in the vaginal wall, active congestion means inflammation or irritation, and passive congestion indicates either pregnancy or obstruction of the circulation. A bright red area extending a considerable distance out from the os is usually due to eversion or erosion.

Is the axis of the cervix directed **ACROSS** the vagina, as it should be normally, or **ALONG** the vagina, as in retrodisplacement of uterus or anteflexion of cervix?

External Os.—The size and shape show whether or not there has been laceration and consequently are of considerable medicolegal importance in certain cases, because they furnish strong evidence for or against a previous childbirth.

Different appearances of the normal cervix are shown in Figs. 255 to 258. Fig. 259 shows cervicitis with free discharge of tenacious mucus. The cervix in Fig. 260 shows laceration and erosion in addition to discharge. Laceration, erosion, and cyst formation are shown in Fig. 261. Types of lacerated cervix, with the various shapes resulting, are shown in Figs. 262 to 269. There is normally a clear, sticky, tenacious mucus in the cervix and about the external os. The first effect of inflammation is to make this more abundant and later it becomes mixed with pus. As long as the cervical inflammation is a prominent part of the process, the tenacious, stringy quality will be a prominent feature of the discharge. If there is any suspicion of gonorrhea, make a spread of the discharge for microscopic examination. If desired, discharge in the uterine canal may be withdrawn for diagnostic or therapeutic purpose with a suction bulb and tube.

Occasionally a polypus will be seen presenting at the external os or hanging by a pedicle.

Difficulties in Speculum Examination

Poor Light.—If the light is so poor that the cervix and upper portion of the vagina cannot be seen, an ordinary flashlight is helpful or, if that is not available, a head mirror may be used to reflect light from any source into the vagina. Also, there are now available small electric lights to use in the speculum, and even specula with lights incorporated.

Painful Abrasions.—If there are painful abrasions or fissures about the vaginal orifice which interfere with the examination, the sensitiveness may be diminished by the application of a small piece of absorbent cotton soaked in a 10 per cent cocaine solution. Leave this in place for from three to five minutes, then remove it and proceed with the examination.

Redundant Vaginal Walls.—When the vaginal walls are very lax and redundant, as sometimes occurs because of subinvolution following labor, they collapse about the speculum in such a way as to hide the cervix. This

difficulty may in some cases be overcome by using a longer speculum. When this does not expose the cervix satisfactorily, the redundant walls may be held out of the way by the use of a rubber sleeve over the speculum, as shown in Fig. 270. Another method of overcoming the difficulty is to put the patient in the Sims posture and use the Sims speculum.



Fig. 255.



Fig. 256.



Fig. 257.

Figs. 255 and 256.—Varieties of normal cervix in the virgin. Fig. 257. Cervix of multipara. (Norris, after Heitzmann—*American Text-Book of Obstetrics*.)



Fig. 258.

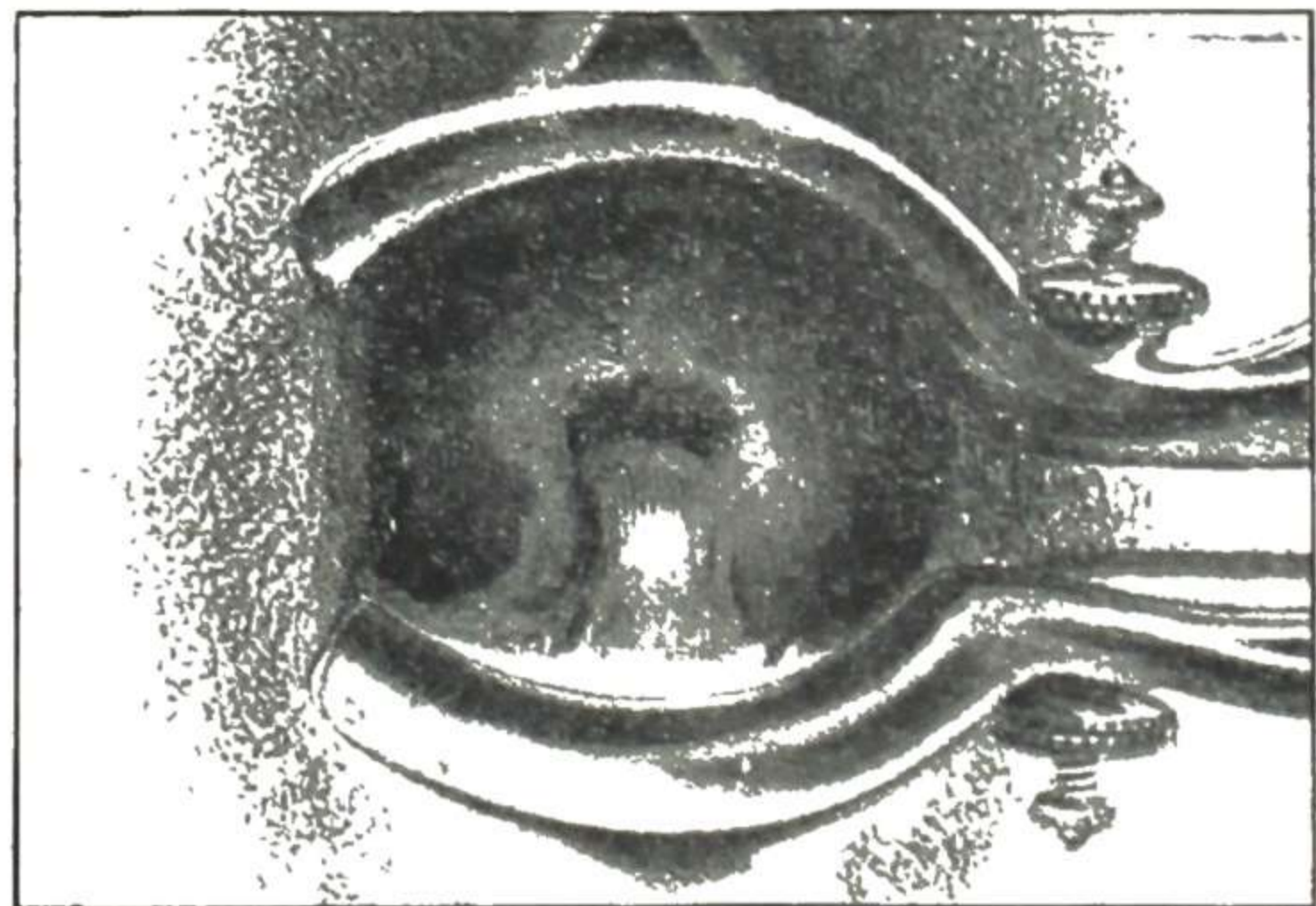


Fig. 259.

Fig. 258.—A senile cervix, with upper part of vagina. (Edgar—*Practice of Obstetrics*.)

Fig. 259.—Discharge from the cervix uteri, as seen through the speculum. (Massey—*Conservative Gynecology*.)

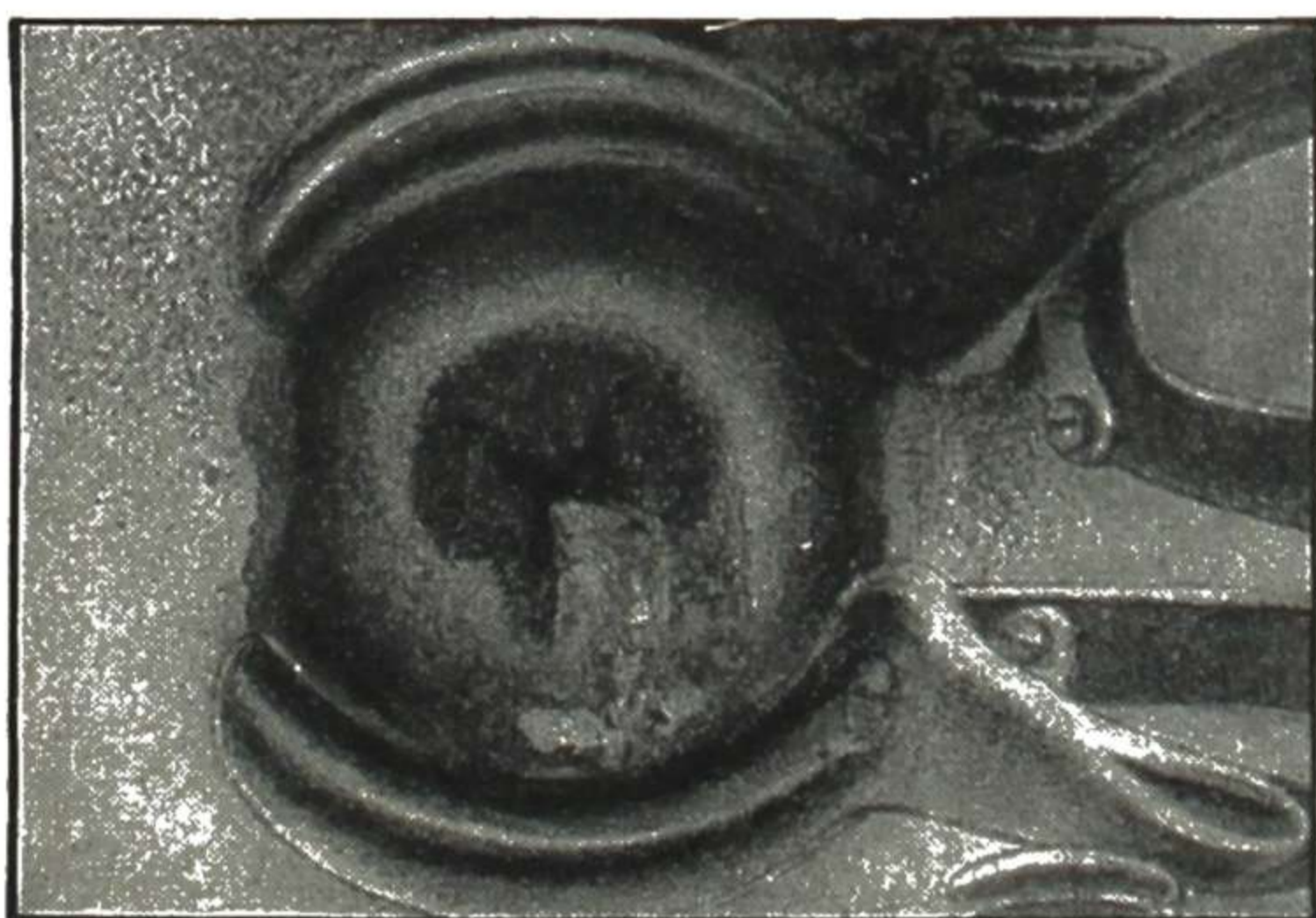


Fig. 260.

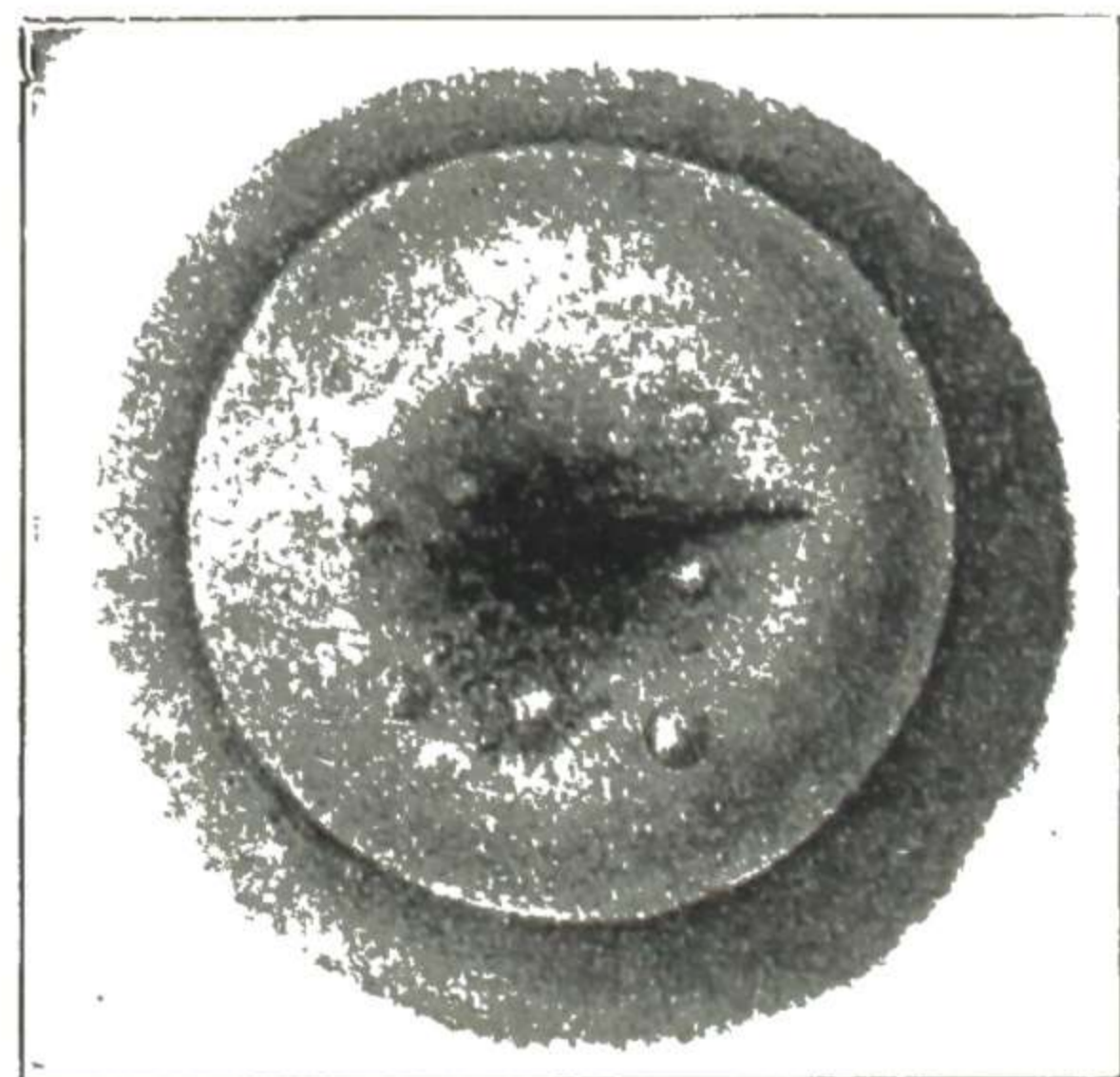


Fig. 261.

Fig. 260.—Discharge, with laceration and erosion of the cervix. (Massey—*Conservative Gynecology*.)

Fig. 261.—Erosion of the cervix, with a few scattered cysts. (H. MacNaughton-Jones—*Diseases of Women*.)

Examination With Cylindrical Speculum

The cylindrical speculum consists simply of a tube with the outer end flaring and the inner end cut obliquely. It may be made of metal or hard rubber or glass. The cylindrical speculum is useful in certain forms of treat-



Fig. 262.



Fig. 263.

Figs. 262 and 263.—Side and front views of a simple bilateral laceration, requiring no treatment.

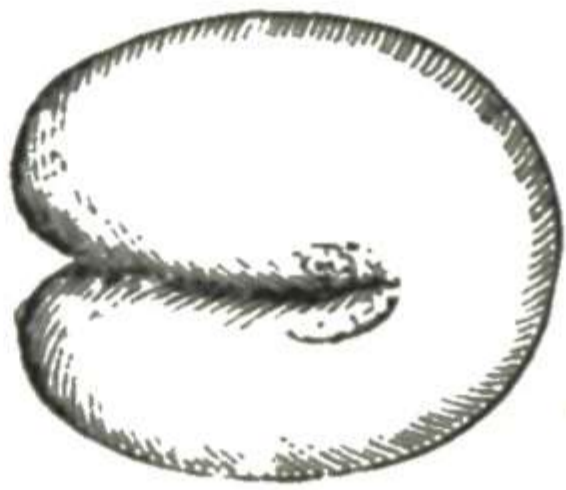


Fig. 264.

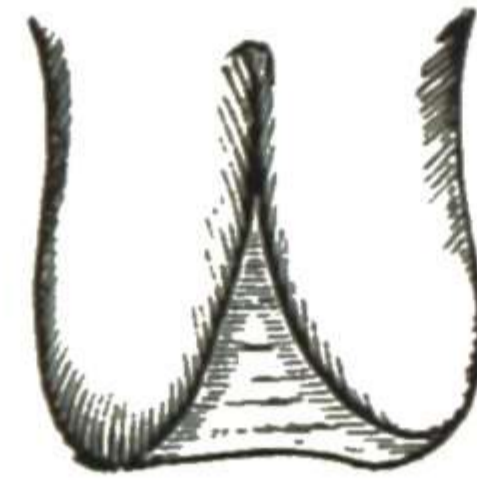


Fig. 265.

Fig. 264.—Front view of a unilateral laceration requiring no treatment.

Fig. 265.—Side view of a unilateral laceration. Such a laceration may cause abortion in the early months of pregnancy.

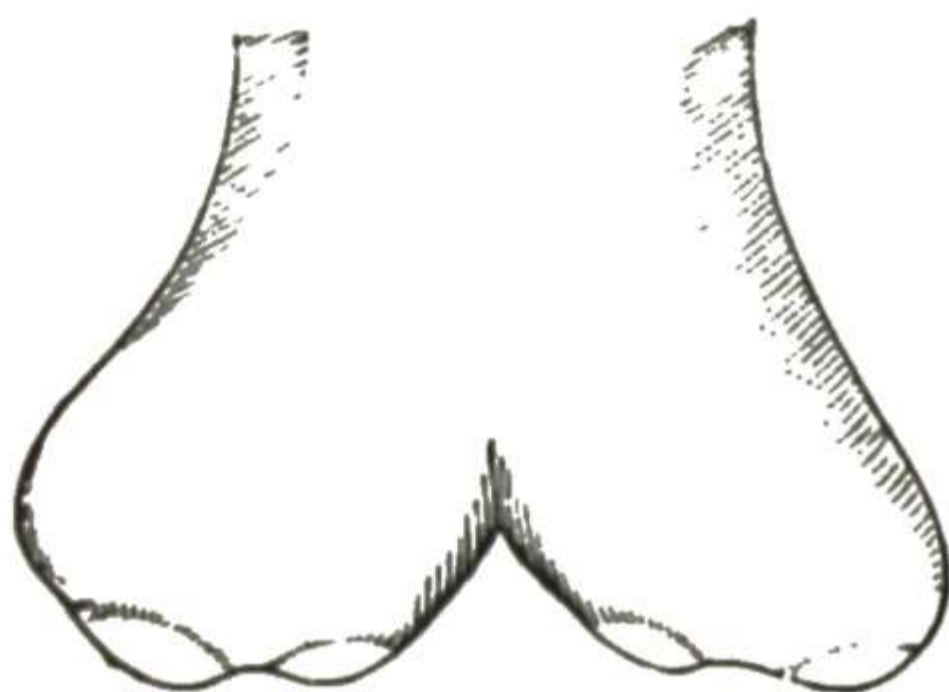


Fig. 266.

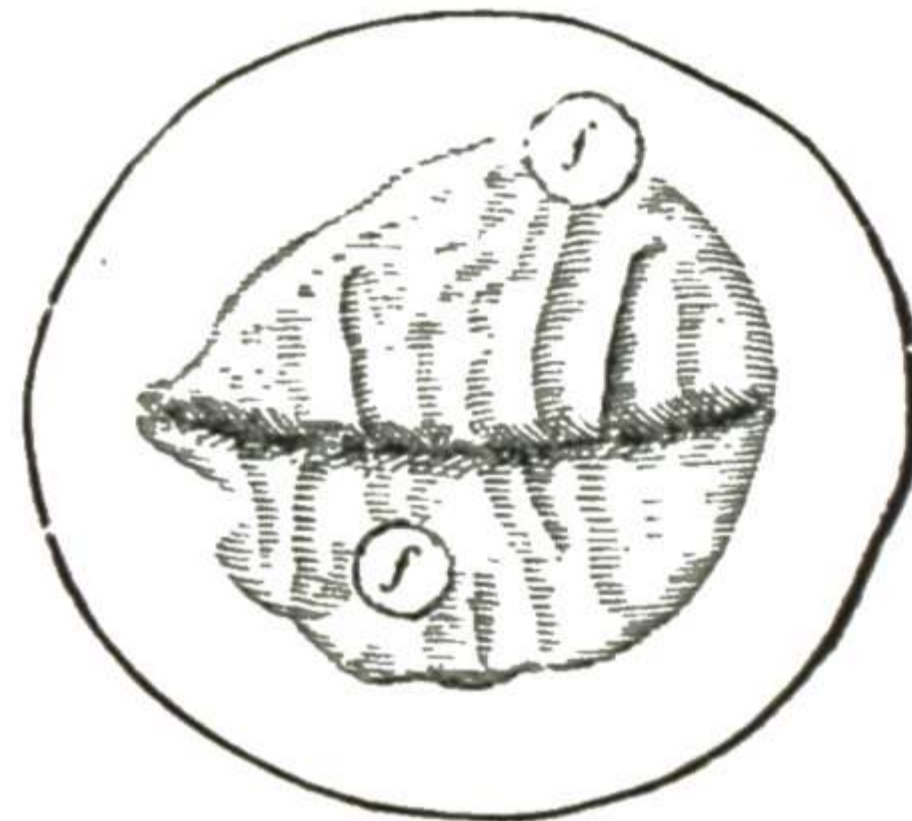


Fig. 267.

Fig. 266.—Side view of a bilateral laceration, requiring treatment. The lips are everted, and the Nabothian follicles stand out as small hard lumps.

Fig. 267.—Front view of a bilateral laceration, showing eroded area and Nabothian follicles.

Figs. 262 to 267.—LACERATIONS OF THE CERVIX UTERI. (Baldy—*American Textbook of Gynecology.*)

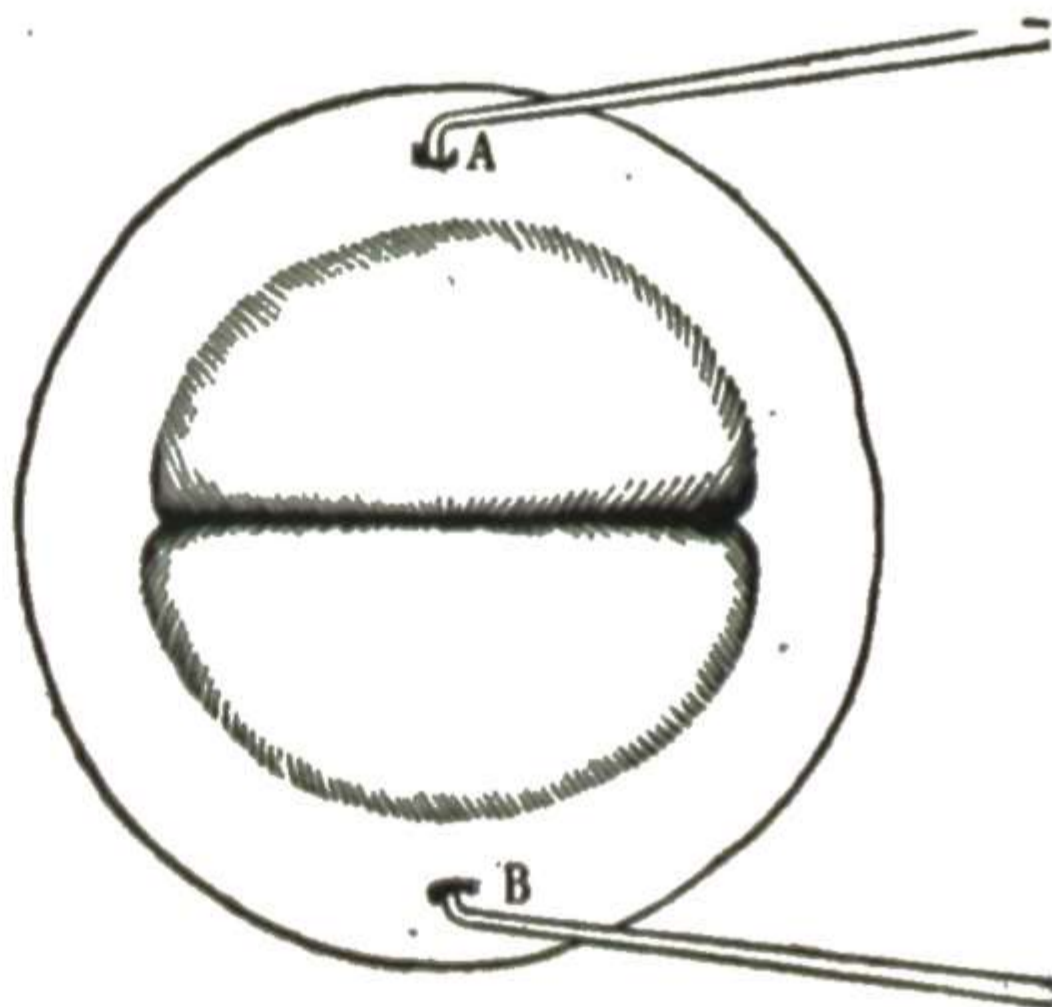


Fig. 268.

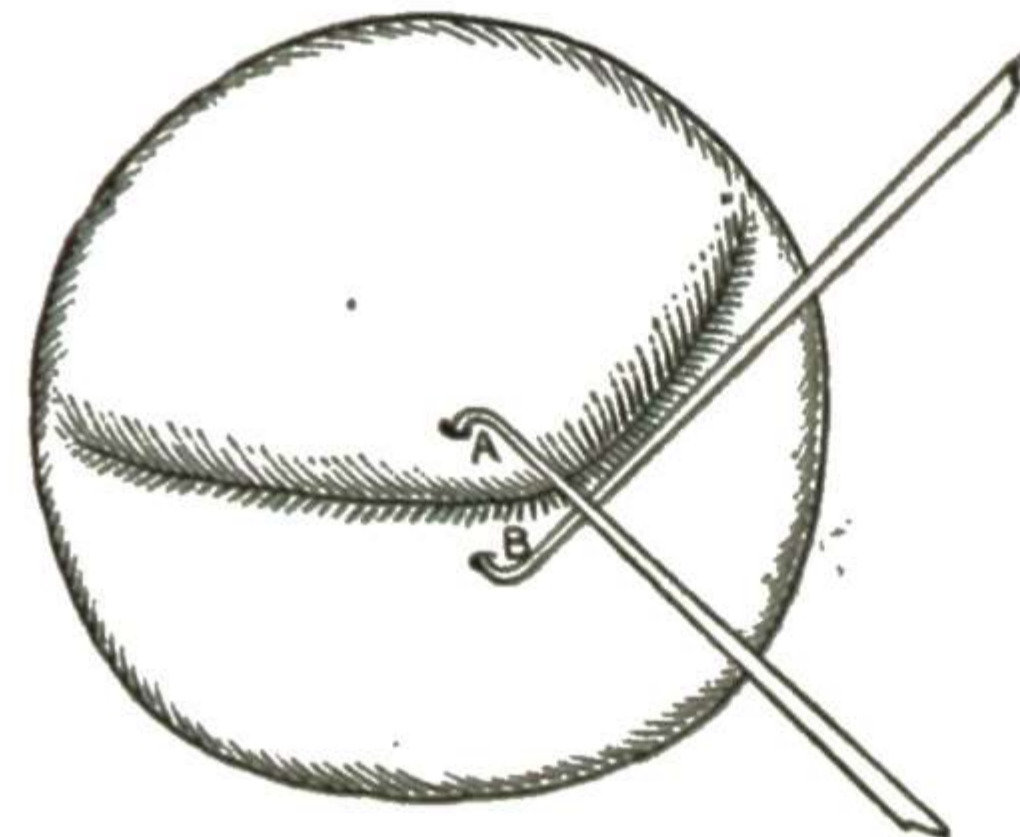


Fig. 269.

Figs. 268 and 269.—Testing for the extent of the tear, in cases where the cervix has the appearance of a ball. The center of the anterior lip (A, Fig. 268) and of the posterior lip (B) are each caught with a tenaculum and brought together, as indicated in Fig. 269. (Baldy—*American Textbook of Gynecology.*)

ment, particularly when it is desired to apply to the cervix medicines from which the vaginal walls should be protected, but it is not much used in examination work.

When in the examination of a girl it is necessary to inspect the cervix, this may be accomplished without disturbing the hymen by use of a small cylindrical speculum for which Kelly's cystoscopic tubes do very well. Light may be furnished by a flashlight or a head mirror or a miniature electric light in the speculum.

Examination With the Sims Speculum

The Sims speculum is a perineal retractor, and for use requires the patient to be put in the Sims posture. Like any other retractor, it must be held in place either by an assistant or by a mechanism (speculum holder), of which there are several varieties.

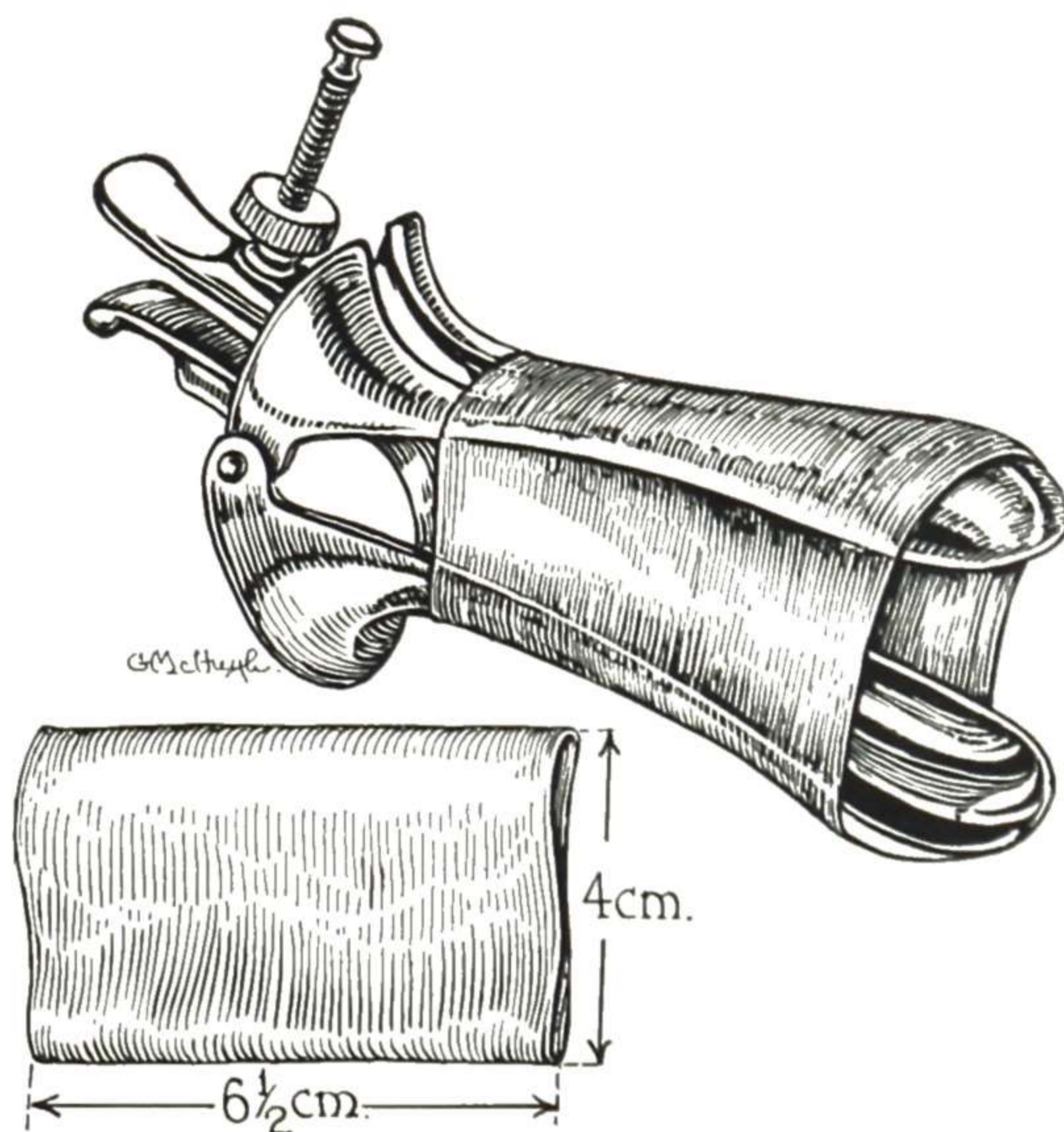


Fig. 270.—Device to improve specular examinations, consisting of bivalve vaginal speculum with a section of Penrose drain used as a sleeve. (Tucker—*J. A. M. A.*)

The **Sims Speculum** consists of a blade, somewhat resembling a duck's bill, and a handle. As usually made, two blades are placed on one handle, a large blade at one end and a small blade at the other (Fig. 271). A further improvement is a flange near the larger blade (Fig. 272). This flange holds the fleshy part of the right buttock up out of the way. The Graves bivalve speculum, mentioned above, is easily and quickly changed into a satisfactory Sims speculum (Fig. 273), so it is not usually necessary to buy a special Sims speculum.

The Sims Posture.—The principal points about the Sims posture, called also "left lateral posture" and the "semiprone posture," are as follows:

1. All constriction must be removed from around the waist.
2. The patient lies on her left side, with left arm and hand behind her and the front of the chest turned toward the table as far as possible without discomfort. When in proper position, the upper part of the body rests on the left breast.

3. The hips rest near the lower left corner of the table and the body extends diagonally across the table toward the right side.

4. The left thigh is drawn up so that it forms an acute angle with the body, and the right thigh is drawn up still more, and allowed to drop over the lower one. This puts the patient in the position shown in Figs. 274 and 275, and it permits the abdominal wall and the intestines and uterus to fall forward.

Use of Sims Speculum.—To introduce the speculum, the right labia are raised, thus exposing the vaginal opening, and then the speculum point, well lubricated, is carefully worked into the opening. At the same time, the perineum is pulled somewhat backward with the speculum point, in order to give more room for the point to slip in (Fig. 276). The blade is then carried all the way in. The speculum is then grasped firmly and pulled backward, thus retracting the perineum and exposing the interior of the vagina (Fig. 277).

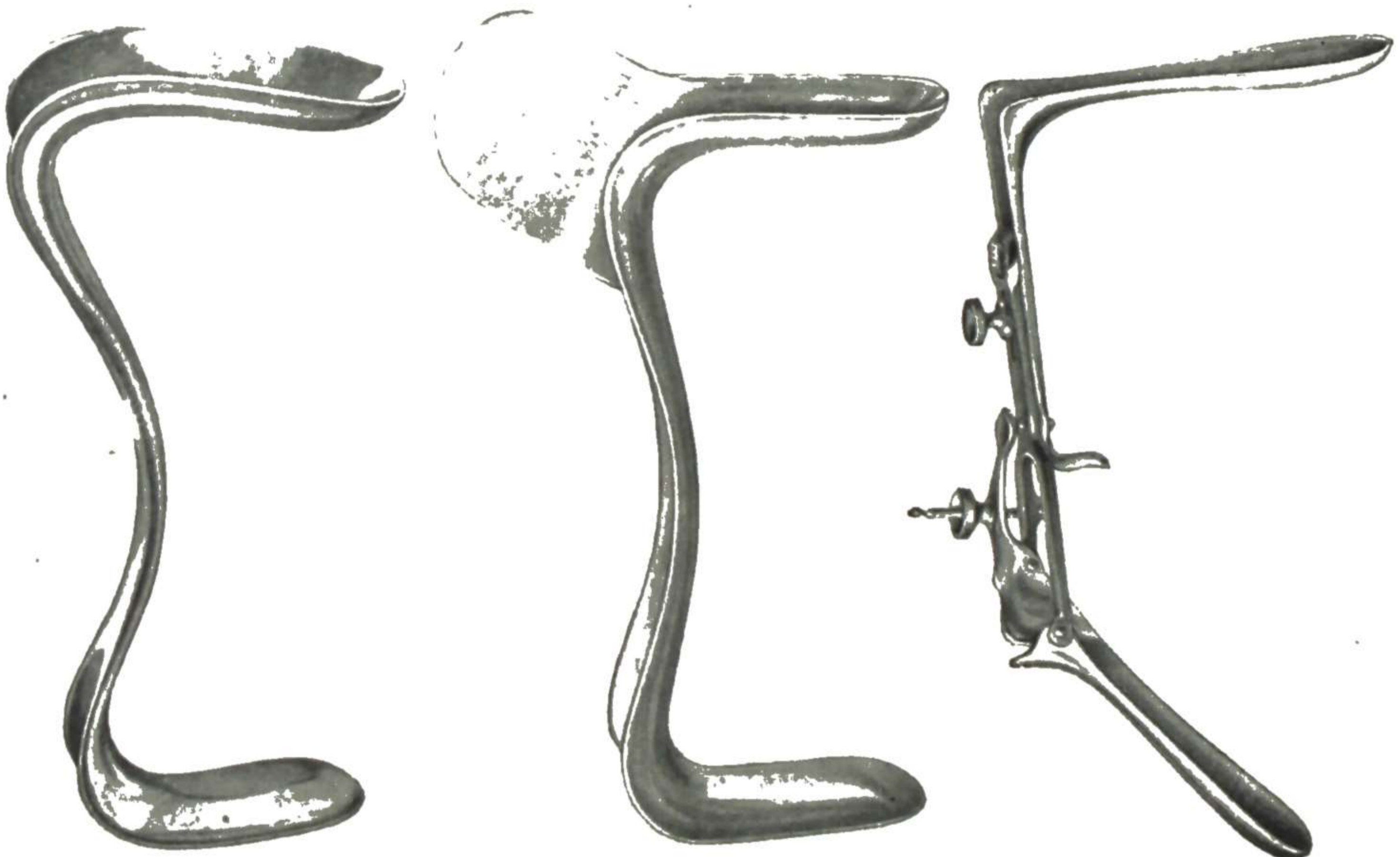


Fig. 271.

Fig. 272.

Fig. 273.

Fig. 271.—Sims' speculum, two blades of different sizes attached to one handle.

Fig. 272.—Flange attached to one blade to hold back buttocks.

Fig. 273.—Graves' bivalve speculum changed to the Sims type.

As the speculum is introduced, the vagina becomes distended with air, and when the perineum is retracted the cervix and anterior vaginal wall may be seen. To bring the cervix into still better view, catch it with the tenaculum forceps and bring it slightly toward the opening.

When Indicated.—The Sims speculum with the Sims posture is of decided advantage in the following conditions:

When the bivalve speculum fails to expose the cervix satisfactorily. This may be due to the vaginal walls being so lax that they fall about the blades and obscure the cervix, or it may be due to the vaginal opening being so small that the blades cannot be sufficiently separated. Again, in some cases of inflammation of the uterus or about the uterus, the bivalve speculum cannot be opened sufficiently because the anterior blade causes pain by pressure on the

inflamed structures. When examining or treating a lesion in the posterior vaginal fornix that is difficult to expose with the bivalve speculum, the employment of the Sims speculum and Sims posture may aid.

Securing Adequate Specimen From Cervix

There has been a marked advance in the handling of chronic inflammatory conditions about the cervix, whether or not there be suspicion of malignancy.



Fig. 274.

Fig. 275.

Fig. 274.—Patient in Sims' posture. Notice how the upper knee drops over the under one.

Fig. 275.—View from above, showing the arm behind the patient. (Dickinson—*American Textbook of Obstetrics.*)

The improved method consists of effective treatment of the chronic cervicitis, along with the obtaining of the specimen. This is accomplished by excising the whole affected area in the cervix. The patient is sent to the hospital so that the cervical conization and the usually needed endometrial curettage can be carried out in a thorough way. The excision of the area of chronic cervicitis may be made by conization with the electric cutting wire or by conical excision with the knife. The former is preferable where the proper current machine is at hand, for the latter entails more bleeding and extensive suturing.

This therapeutic handling of the chronic cervicitis removes that menace, and puts the cervix in good condition. At the same time it gives an adequate

specimen comprising all the area affected. Microscopic examination of such a specimen settles the question of malignancy. If no malignancy is found in the cervical and endometrial tissues the patient returns home with the uterus in good condition, and we have no further misgivings as to what process may be going on in it.

Contrast this thorough treatment of chronic cervicitis with the old procedure of excising a small specimen for the pathologist and, if no malignancy is found, allowing the process in the cervix to go on, and after a while when another area becomes suspicious excising another small specimen—and so on until malignancy finally develops in the area of persistent irritation. General



Fig. 276.



Fig. 277.

Fig. 276.—Introducing the Sims speculum.

Fig. 277.—Speculum in place, and showing also the method of holding it and of keeping the upper buttock out of the way.

adoption of the improved plan of handling chronic cervicitis and other irritative conditions about the cervix will go far toward prevention of cancer of the cervix and the diminution of deaths from that disease.

In explaining the proposed treatment to the patient, it is well to put it altogether on the therapeutic basis, the diagnostic side being touched on only as necessary to answer questions or prevent postponement of treatment. The sinister thought that she may have a cancer is easy to arouse in a patient but very difficult to quiet, hence any unnecessary intimation in that direction is to be avoided. The patient is sent to the hospital for removal of the chronic inflammation—and if no malignancy is found she may never know that cancer

was suspected, thus being spared unnecessary worry. If the patient asks about the possibility of malignancy, explanation is made that as a matter of routine all tissue removed is checked over microscopically.

Of course, a polyp with a small pedicle may be twisted off or a projecting piece of tissue clipped off in the office with cutting forceps (Fig. 278). Such



Fig. 278.—Gaylor's scissors for the removal of small projecting pieces of cervical tissue for microscopic examination.



Fig. 279.—Instruments for dilating cervix. *a*, uterine sound; *b*, three graduated metal dilators for enlarging the cervical canal; *c*, small branched dilator.

specimen should be at once dropped into a small bottle of 10 per cent formol or 95 per cent alcohol and sent in a mailing tube to the pathologist for microscopic study. A supposed simple polyp may show beginning malignancy. If the pathologist's report shows no malignancy, the incident is still not closed. What caused the polyp? A cervical polyp usually means chronic irritation inside the canal. This should be eliminated before adenocarcinoma develops in that hidden location. The plan of curettage and conization provides effective treatment for this condition, and at the same time gives adequate material for decisive microscopic investigation.

Exploration of Endometrial Cavity

Invasion of the uterine cavity with sound or curette requires careful asepsis. It carries some risk and should be employed only for some special purpose warranting the risk. The gas test for tube patency and the securing of minute endometrial specimens, for microscopic examination to determine if ovulation has taken place, are taken up later under special examination measures.

Dilatation of the cervical canal as a diagnostic and therapeutic measure for stenosis is not infrequently required. Instruments for office dilatation are shown in Fig. 279. When there is bleeding or discharge indicating some disease of the endometrium, regular curettage in the hospital under operative preparation and asepsis is the advisable diagnostic and therapeutic measure. At the same time under operative analgesia chronic inflammatory tissue may be coned from the cervix and also deep palpation made of the various pelvic structures. This is taken up in detail when considering examination under anesthesia.

RECTOABDOMINAL PALPATION

In many cases it is of decided advantage to follow the vaginoabdominal and speculum examinations with rectoabdominal palpation. This is made primarily for high palpation back of the uterus and peritoneal cul-de-sac and parametrium. It is particularly helpful when there is marked retrodisplacement of the uterus or a mass in the cul-de-sac or parametrial infiltration. In cancer of the cervix, rectal palpation in front of and back of the parametrium on each side will add much information as to the extent of parametrial involvement, for the sweep of the examining finger is not limited as it is when examining within the vaginal vault.

The index finger of the gloved hand, well lubricated, is introduced into the rectum and carefully worked up high back of the uterus and parametrium and between the uterosacral ligaments. Then with the abdominal hand the structures are pressed down for palpation with the rectal finger, as indicated in Fig. 280. The posterior surface of the retrodisplaced uterus may be outlined and also any mass in the cul-de-sac. Fluctuation there may be made out and the presence and extent of parametrial infiltration determined. When seeking the pedicle of a movable tumor, it is sometimes helpful to have an assistant push the tumor upward as shown in Fig. 281.

Incidentally, this rectal palpation will show whether or not there is any marked disturbance in the hemorrhoidal area, and trouble there is sometimes an important factor in the patient's distress. The hemorrhoidal area is usually somewhat tender and there may be sphincter spasm with considerable pain on introduction of the examining finger. This may be lessened by directing the patient to "bear down," thus relaxing the spastic muscle as much as possible. If there is sharp pain, as from a fissure, an application of 10 per cent cocaine solution may be made for the rectal intrapelvic palpation. Of course, if there is definite rectal trouble of undetermined character a regular examination with the rectal speculum is advisable.

Rectovaginoabdominal Palpation.—In exceptional cases when making the rectoabdominal examination, it is advantageous to introduce the thumb into the vagina in order to grasp the lower part of a mass between the finger in the rectum and the thumb in the vaginal canal, the structure being pushed down within reach by the abdominal hand (rectovaginoabdominal palpation, Fig. 282).



Fig. 280.

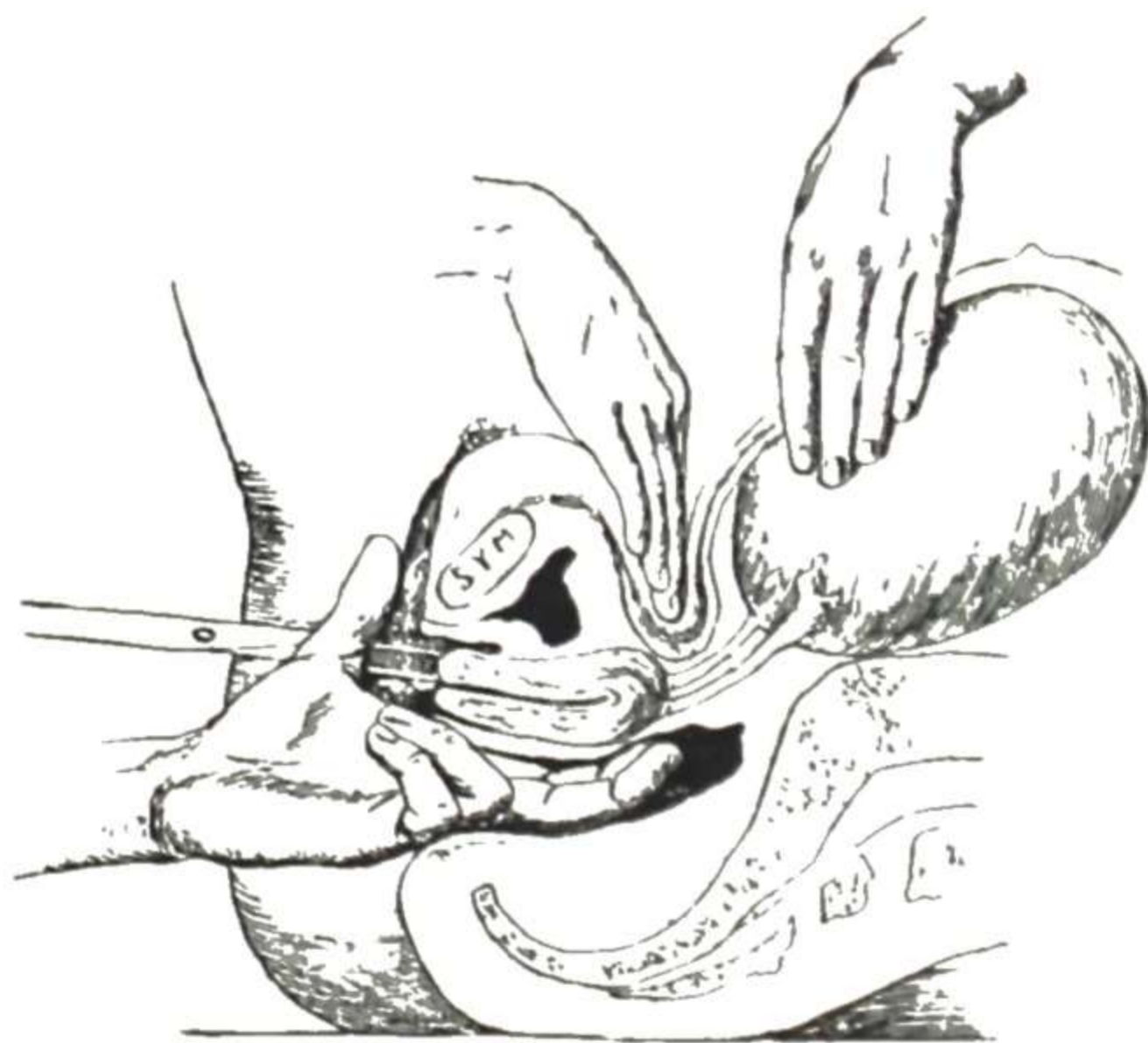


Fig. 281.

Fig. 280.—Rectoabdominal palpation. The hand should be gloved. (Montgomery—*Practical Gynecology*.)

Fig. 281.—Palpating the pedicle of a tumor, with the tumor pushed up into the abdominal cavity and the uterus caught with a tenaculum forceps and pulled downward. (Montgomery—*Practical Gynecology*.)

Palpation of Coccyx.—In cases of persistent pelvic pain where no sufficient cause is found about the uterus or adnexa, the coccyx should be palpated. This small bone at the tip of the sacrum is not infrequently the site of neuritis or arthritis or a chronic inflammation resulting from an injury sustained months or years ago. These injuries can usually be traced to childbirth, though occasionally such a condition will result from a fall. In some cases, disturbance may become manifest here without previous injury. Tenderness of the coccyx or a mass about any portion of it, or a deformity, may be easily determined by an examination with the gloved index finger in the rectum and the thumb over the coccyx (Fig. 283). The examination is most conveniently made with the patient lying on her side. In this way the coccyx may be accurately outlined and any deviation from the normal determined. In some cases the coccyx appears to be normal until an attempt is made to move it, when there is severe pain, indicating trouble in the joint or about the fasciae or muscles.

LOCALIZATION OF BACKACHE

Pain in the back is a prominent symptom in many pelvic diseases, and in many extrapelvic diseases as well. Its diagnostic significance depends on its location, that is, upon the structure involved. Consequently, a careful localization of the backache should be made in each case, the same as pain or tenderness in the abdomen is accurately located.

After finishing the intrapelvic examination, have the patient sit up on the table. The clothing is raised from the lower back and the patient is requested to indicate exactly where the backache is or comes at times. Notice whether it is in the lumbar region or over the sacrum or in the coccygeal area. Then palpate firmly with the finger tips over the region indicated and elsewhere, to determine if there is point tenderness or if the trouble is just a diffuse aching. Give particular notice to the sacroiliac joints to see if there is tenderness from arthritis on either side (Fig. 284).

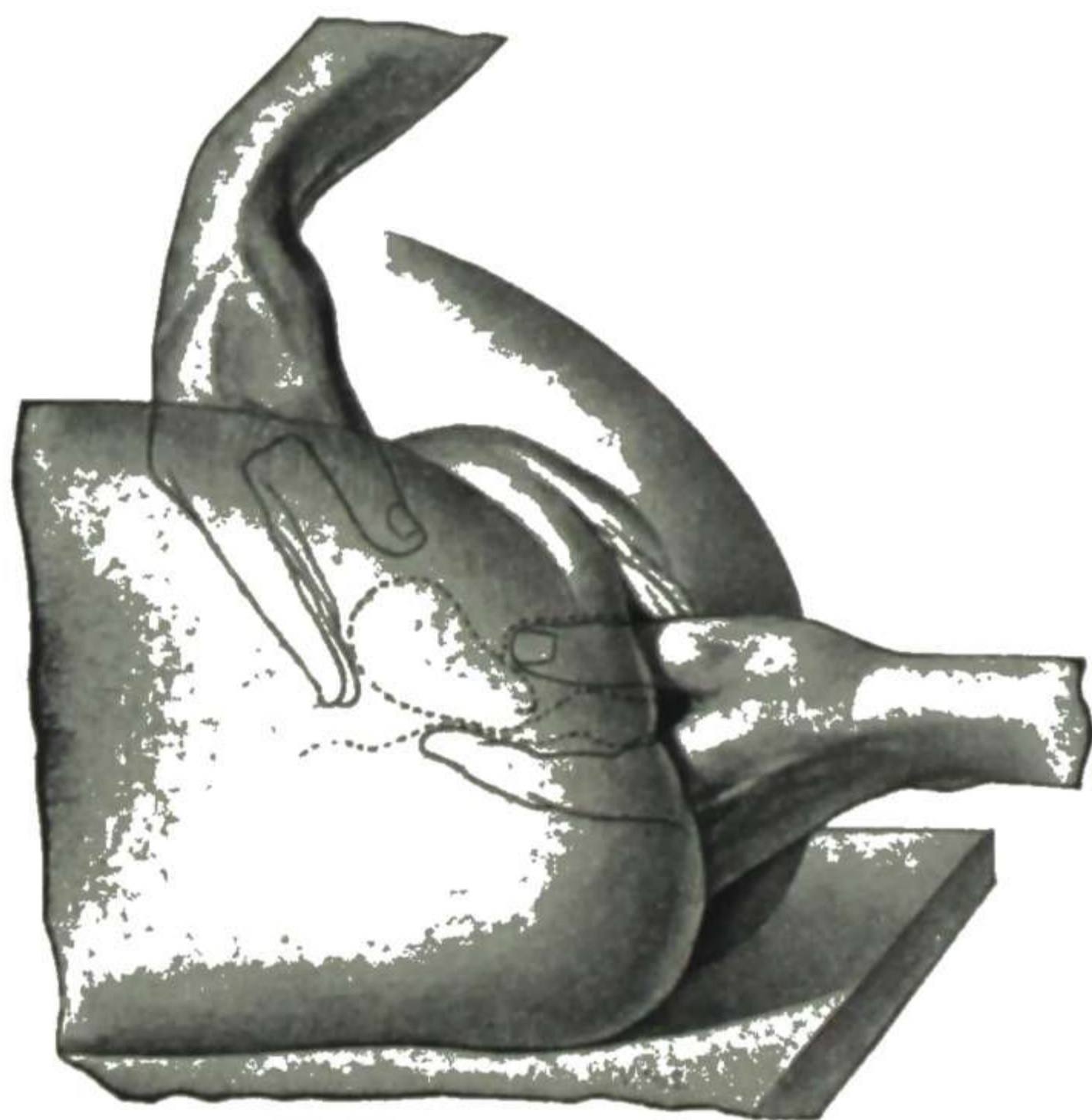


Fig. 282.



Fig. 283.

Fig. 282.—Rectovaginoabdominal palpation. One or two fingers of the gloved hand are introduced into the rectum and the thumb into the vagina, and the uterus, or other mass low in the pelvis, is grasped between them, as it is pushed down by the abdominal hand. (Montgomery—*Practical Gynecology*.)

Fig. 283.—Method of palpating the coccyx. The hand should be gloved. (Hirst—*Diseases of Women*.)

Backache From Genital Diseases

Backache may be caused by any genital lesion which leads to intrapelvic congestion or pulling or pressure. The pain in the back due to intrapelvic disease is usually diffuse across the sacrum. Definite tenderness on palpation is not ordinarily a part of this type of backache, though tender areas due to other conditions may be associated with it.

Though retrodisplacement of the uterus causes backache in some cases it does not do so in all cases or as uniformly as popularly supposed. A considerable proportion of patients with retrodisplacement have no pain in the back. One condition that causes a most persistent and annoying backache is parametritis posterior, and it is frequently overlooked in a pelvic examination.

Another genital lesion that nearly always causes backache is prolapse of the uterus with cystocele and rectocele.

Backache From Extragenital Conditions

Backache from extragenital disease is of very frequent occurrence and must be given due consideration when determining the diagnostic significance of this common symptom. It may be situated in the lumbar region, in the sacral region, or in the coccygeal region.

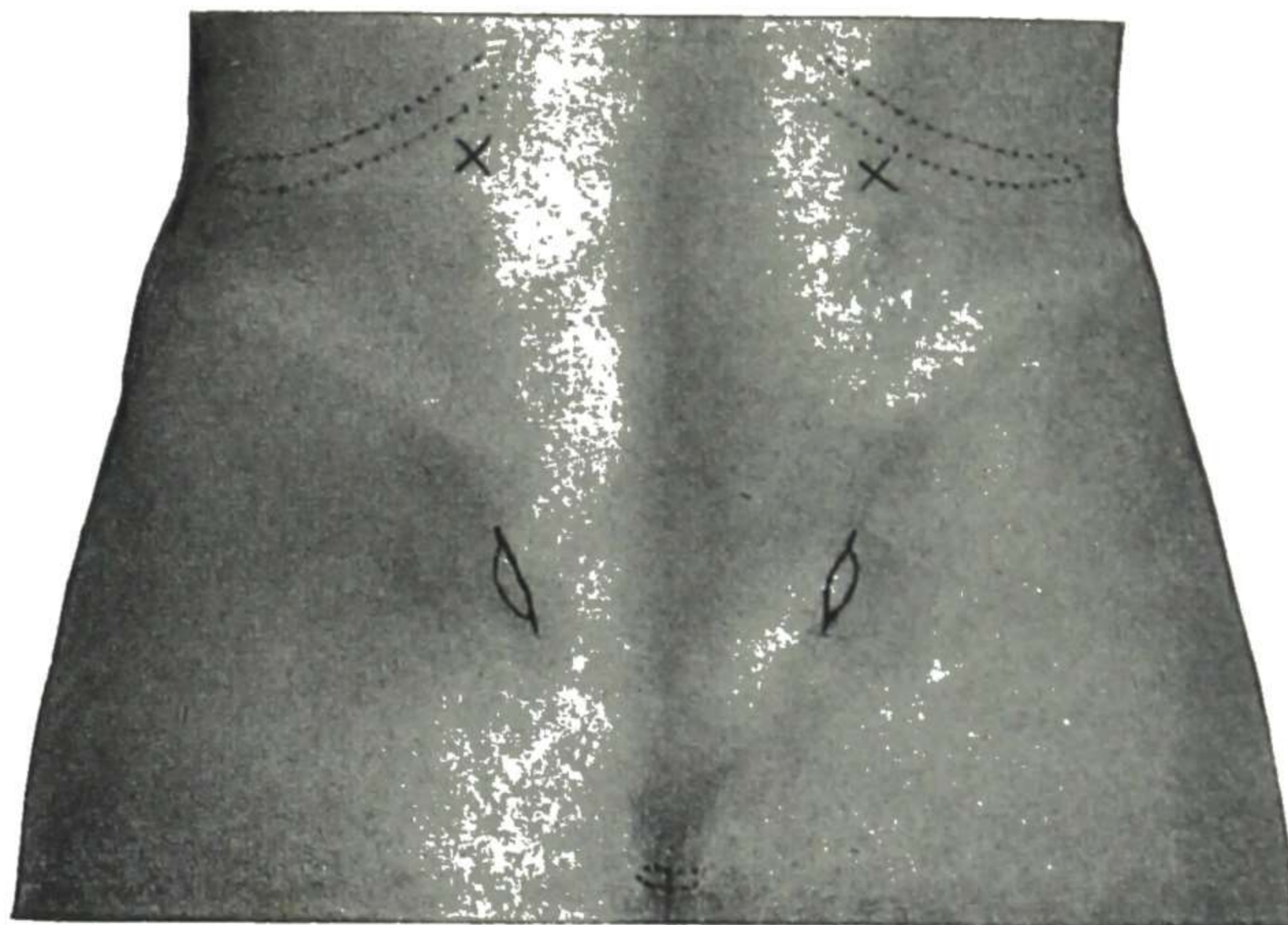


Fig. 284.—Areas to be palpated for point tenderness. Area of kidney tenderness shown by "x." Below; area of sacroiliac tenderness and still lower, area of coccygeal tenderness. (Crossen and Crossen—*Synopsis of Gynecology*, The C. V. Mosby Company.)

PREPARATION FOR GYNECOLOGIC EXAMINATION

The various points considered under this head may be grouped as follows:

- Office Arrangements.
- Directions to Patient.
- Protecting Measures.
- Preservation of Specimens.
- Examination at Home.

Office Arrangements

There are three things of particular importance in the handling of gynecologic patients:

1. **Screened Area in the Consulting Room.**—The portion of the room that is used for the examination should be suitably screened from the other part, so that the patient may make such arrangement of the clothing as she wishes in privacy. It is very convenient to have a separate room for the examining room. Where no separate room is available, a neat substantial screen, affording the patient privacy for the required preparation, does very well and is inexpensive.

2. **Table.**—A satisfactory table for gynecologic examinations is the regular surgical chair with footrests. The advantage of the footrests is that the patient's hips may be brought to the end of the table without her feet being forced so near the buttocks as to be uncomfortable.

3. **Nurse.**—When a physician is doing much gynecologic work, it will be found a wise investment to have a nurse to prepare the patients for examination and to prepare the necessary articles needed in office examination and treatment. Aside from the great convenience to the physician, it makes the patients more at ease, and, in addition, tends to protect the physician from blackmail by designing persons. When a nurse is not required for other work, she may be hired just for office hours.

Directions to Patient

Direct the patient to **loosen all bands** about the waist, so that the clothing may be pushed up and down sufficiently to bare the abdomen. This is necessary at first, for the first examination should be thorough, including examination of the entire abdomen as well as the pelvic exploration. Examination of the breasts may be necessary in cases of suspected pregnancy.

In the subsequent visits, it may not be necessary to loosen the clothing, depending, of course, on what treatment or further examination is required. It is not necessary in ordinary speculum treatments. Any treatment, however, necessitating deep bimanual palpation, such, for example, as replacement of a retrodisplaced uterus, requires the loosening of bands.

Protecting Measures

The measures necessary for protecting the patient and your hands from infection are simple and easily carried out. First, use a paper towel or other protecting material under each patient. Second, employ a rubber glove when palpating the genitals or making internal examinations. Third, drop soiled gloves and instruments immediately into a basin for later sterilization, and thus avoid contaminating the table or washstand or other articles.

After the office work is finished, water is poured into the basin of soiled gloves and they are boiled for ten minutes. It is well to have a towel in the basin to protect the gloves from injury by direct contact with the hot metal bottom and sides. After the sterilization, the gloves are taken out, cleansed in water to remove all foreign particles adhering to them, dried on a clean towel (being turned inside out often enough to secure good drying), dusted inside and out with a drying powder, wrapped in a clean towel, and laid away for subsequent use. When there is an examination or treatment requiring sterile hands, a pair of the rubber gloves is wrapped in a small towel and dropped into the water on top of the instruments, to be boiled with them.

Preservation of Specimens

The preservation of specimens for microscopic examination is a very simple procedure, and yet in many doubtful cases, curettings or cervical polypi removed or pieces of tissue passed spontaneously are thrown away or kept in such a manner that they are not fit for microscopic examination. Thus is lost a valuable aid to early diagnosis, in conditions where early diagnosis is important.

A good all-round preservative for these specimens is alcohol (95 per cent). It is nearly always at hand, and it preserves the specimen indefinitely in good

condition for microscopic examination. As soon as possible after removal, and without unnecessary handling, the specimen is dropped into a small bottle containing the preservative and then forwarded to the pathologist.

A 10 per cent solution of formol is another good preservative. Formol, which is a 40 per cent solution of formaldehyde gas, is known also as formalin and as formaldehyde solution. An advantage of the formol solution over alcohol is that the formol does not interfere with immediate diagnosis by frozen section.

Examination at Home

When a patient is seen at her home, sick in bed, the methods of exploration employed are usually abdominal, vaginal, vaginoabdominal and, in some cases, rectoabdominal. A patient who is too sick to come to the office for a



Fig. 285.—Patient arranged in bed for abdominal examination.

pelvic examination is usually suffering, not with a superficial disturbance that can be seen by inspection of the external genitals or through a speculum, but with some deep-seated trouble, the nature of which can be determined only by deep internal palpation. In most cases of this kind the inspection of the genitals and the speculum examination add nothing of importance to the information otherwise obtained, and may be omitted.

In such a case, the abdominal examination is made first. The patient is directed to move to the edge of the bed and the clothing is loosened and pushed up and down, to expose the abdomen, and the knees are drawn up to relax the abdominal muscles (Fig. 285). The abdomen is then examined by the various methods previously explained.

The vaginal and vaginoabdominal examinations, with deep bimanual palpation, may be conveniently and satisfactorily conducted with but little dis



Fig. 286.—Patient arranged in bed for vaginal examination.



Fig. 287.—Position of examiner for accurate bimanual examination with the patient in bed, showing the relations of the examining hand and arm. The examiner sits on the side of the bed and the arm lies *between* the widely separated thighs, so that the examination is made from directly in front of the pelvis.



Fig. 288.—Regular "cross-bed" position. The patient is turned directly across the bed, with the hips resting on the edge of the bed and each foot on a chair.

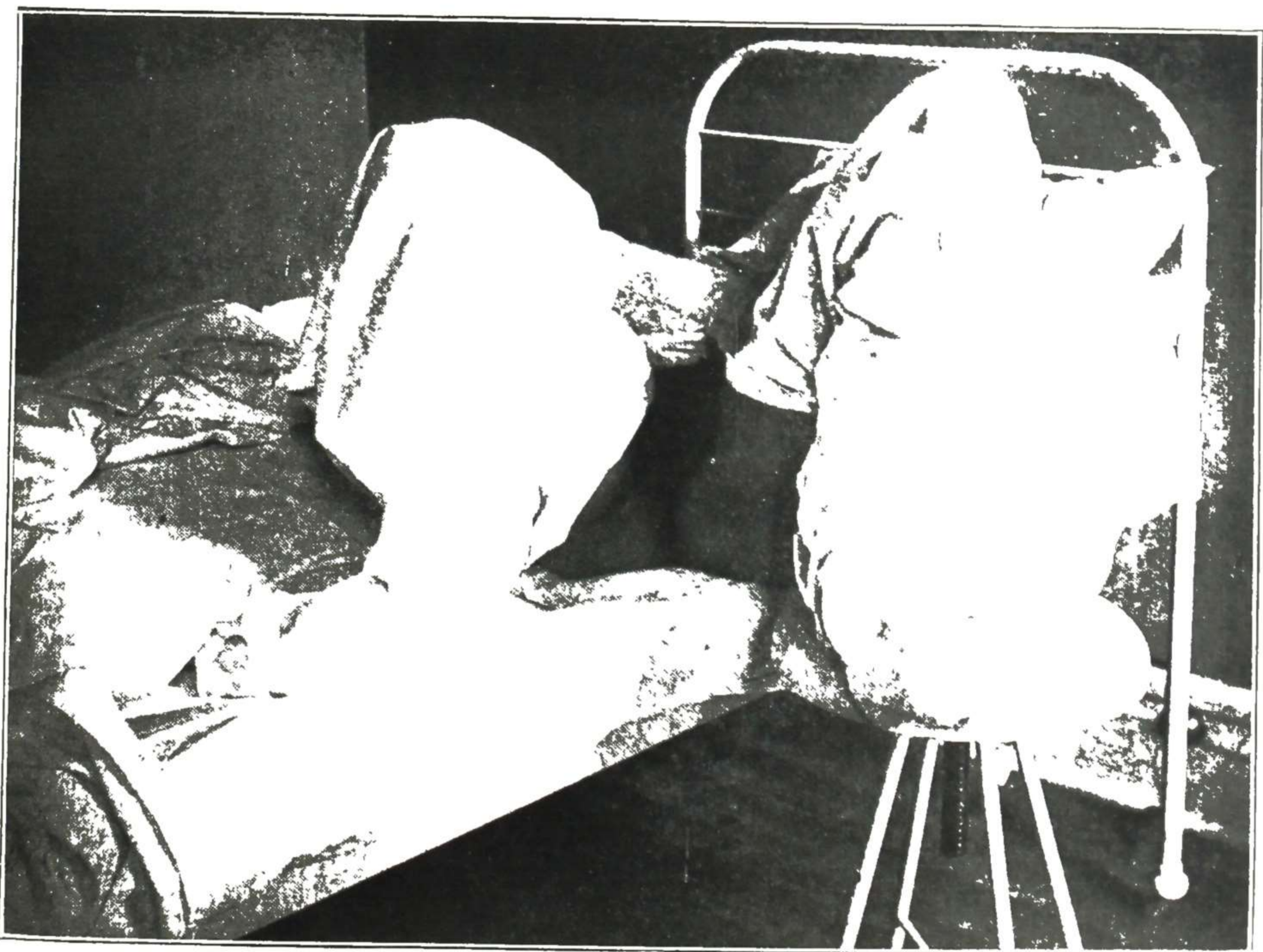


Fig. 289.—Another method of arranging a bed-patient for examination of the external genitals. This is useful when the patient is very sick or when movement is painful. The hips are simply slipped to the edge of the bed and one foot is placed on a chair.

turbance to the patient by observing the following directions, some of which were partially carried out in arranging for the abdominal examination:

1. Direct the patient to move close to the left edge of the bed. There is but little disturbance—she lies just as she is in bed, except nearer the left edge (or the right edge, if the examiner uses the right hand for the internal palpation). A patient seriously sick, even with peritonitis, may usually be moved over sufficiently.

2. Remove the heavy bedclothing, all except the sheet with perhaps a light blanket, and have the patient draw up both knees so that the feet are near the buttocks (Fig. 286).



Fig. 290.

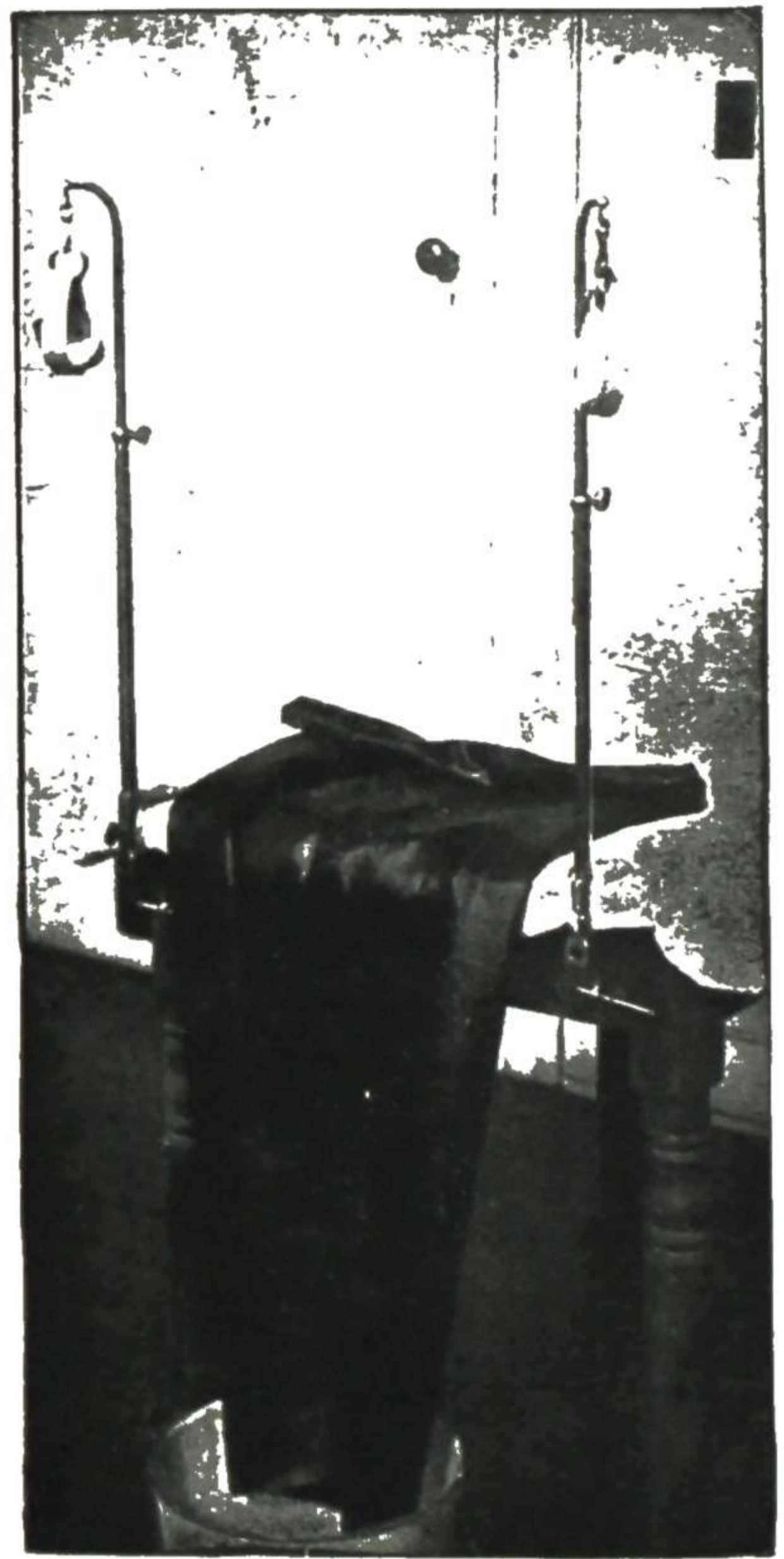


Fig. 291.

Fig. 290.—Kitchen table, with portable foot rests attached ready for a gynecologic examination.

Fig. 291.—Kitchen table arranged with portable leg holders, for curettage or other small vaginal operation, when the patient cannot be taken to the hospital.

3. Sit on the bed, against the patient's left foot, and direct the patient to separate the knees widely. The gloved examining hand (with the index and middle fingers well lubricated) is to be passed **between** the patient's thighs (Fig. 287)—not under one thigh, as ordinarily directed. The examining fingers are introduced deeply into the vagina, care being taken to depress the perineum sufficiently to allow their introduction without pain.

4. After the simple vaginal examination is completed, then the right hand is made to depress the abdominal wall into the pelvis as in the regular bimanual examination.

The authors call special attention to the details given above because they find that their accurate carrying out aids materially in securing needed information in deep-seated pelvic troubles. By following the directions closely, the examining hands and arms are made to occupy practically the same advantageous relation to the pelvis as in the regular office examination with the patient at the end of the table—that is, the examination is made from **directly in front** of the pelvis. The usual procedure of sitting on a chair beside the bed, with the examining arm passed under the thigh (instead of between the thighs) is much less effective when deep pelvic palpation is required.

While the above-mentioned examination methods are generally the only ones required when the patient is sick in bed, there are some cases in which further examination is advisable. Whenever the patient complains of sores about the genitals or of itching or burning or profuse discharge, the genitals should be inspected in a good light. Likewise in any case in which it is thought that additional information of value may be obtained by the speculum examination, that procedure should be carried out.

For the inspection of the external genitals and for the speculum examination, the patient may be turned across the bed with the hips near the edge and each foot resting on a chair (Fig. 288). This is often referred to as the "cross-bed" position. If movement of the patient to this extent is likely to cause pain, she may be simply turned slightly and one foot placed on a chair while the other foot rests on the bed, as shown in Fig. 289.

Where a special gynecologic examination is required at the patient's home, portable footrests may be attached to a plain kitchen table (Fig. 290). With these portable footrests are furnished also tall uprights for use as leg-holders (Fig. 291), by which the feet and legs may be held out of the way during examination under anesthesia or during an operation. They are convenient for use where a minor operation must be done in the patient's home.

SPECIAL EXAMINATIONS

It is not necessary to take space for details of all the examinations required in regard to probable or possible conditions or complications in gynecologic patients. Perusal of the list near the beginning of Physical Examination will direct attention to the possibilities in various directions and the necessity of following them up—either personally or through consultations. The importance of this is emphasized by the growing demonstration that the body functions as a unit in physiological and pathological activities and consequently that the whole must be considered when trying to determine the cause of special action in a part. By keeping this in mind many serious diagnostic mistakes will be avoided, such as the employment of radical gastric and dietetic measures for persistent nausea and vomiting without determining if the patient is pregnant or the employment of pelvic operation for severe pelvic distress that is only a psychic fixation. Space is available here only for those special examination measures particularly related to the genital organs. They are taken up in the following order:

Through the Speculum (colposcopic magnification, chemical [iodine] test, pH of vaginal contents, endometrial specimens, gas test for tube patency).

X-ray Examinations (outlining tubal occlusions, uterine and tubal cavities, fetal bone shadows, calcified portions of tumors, sacroiliac and spinal arthritis, tumor metastasis in bone, prolapsed kidney, intestinal conditions, sella turcica distortion, internal exostosis of skull).

Pelvic Examination under Anesthesia (vagoabdominal, rectabdominal).

Aspiration of Fluid.

Intra-abdominal Inspection (through endoscope, through incision).

Endocrine Investigations.

Pregnancy Tests.



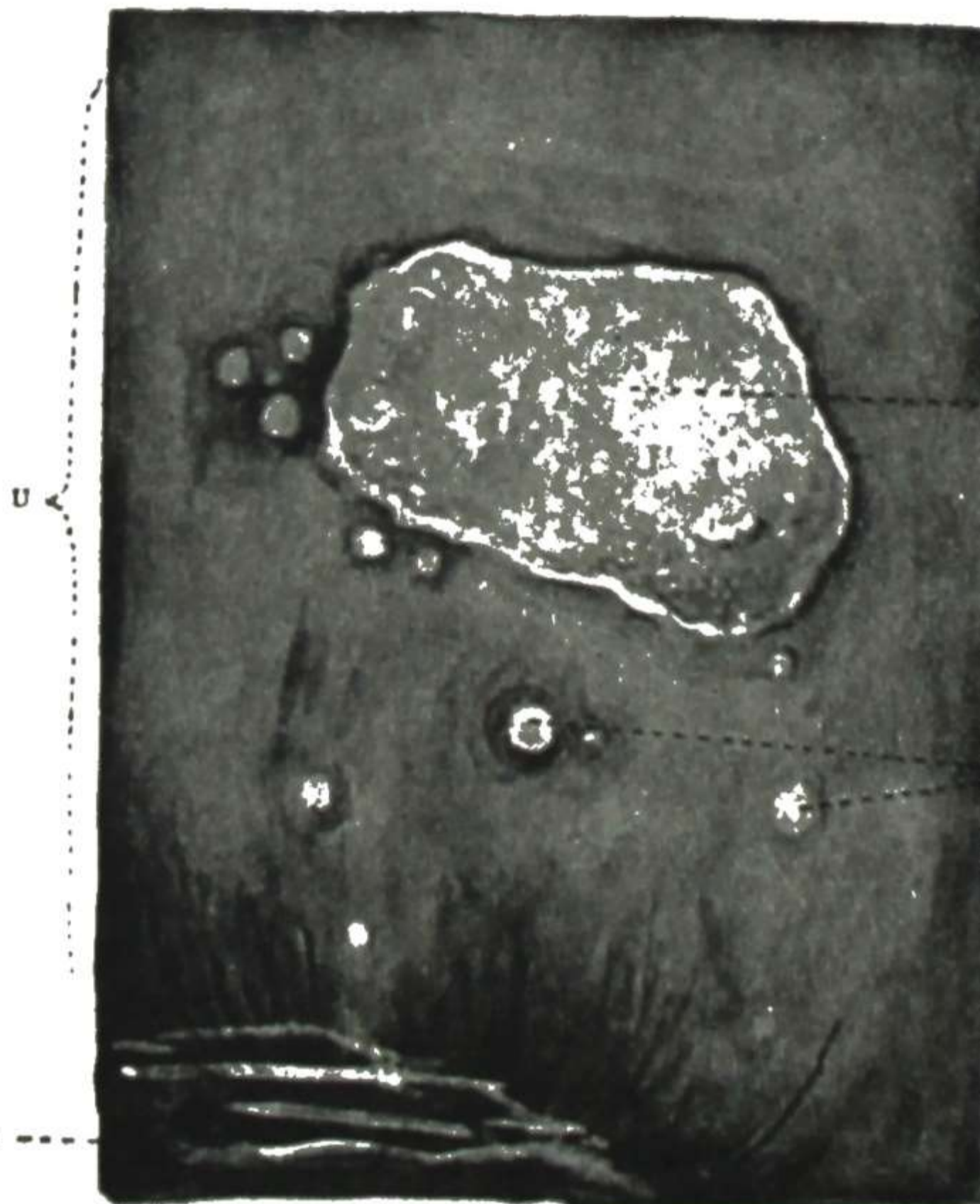
Fig. 292.



Fig. 293.

Fig. 292.—The colposcope. (Hinselmann in *Gynecology and Obstetrics* by Davis, published by W. F. Prior Co.)

Fig. 293.—View of everted cervix as seen through the colposcope. (Hinselmann in *Gynecology and Obstetrics* by Davis, published by W. F. Prior Co.)



A



B

Leukoplakia
External os
Mucus

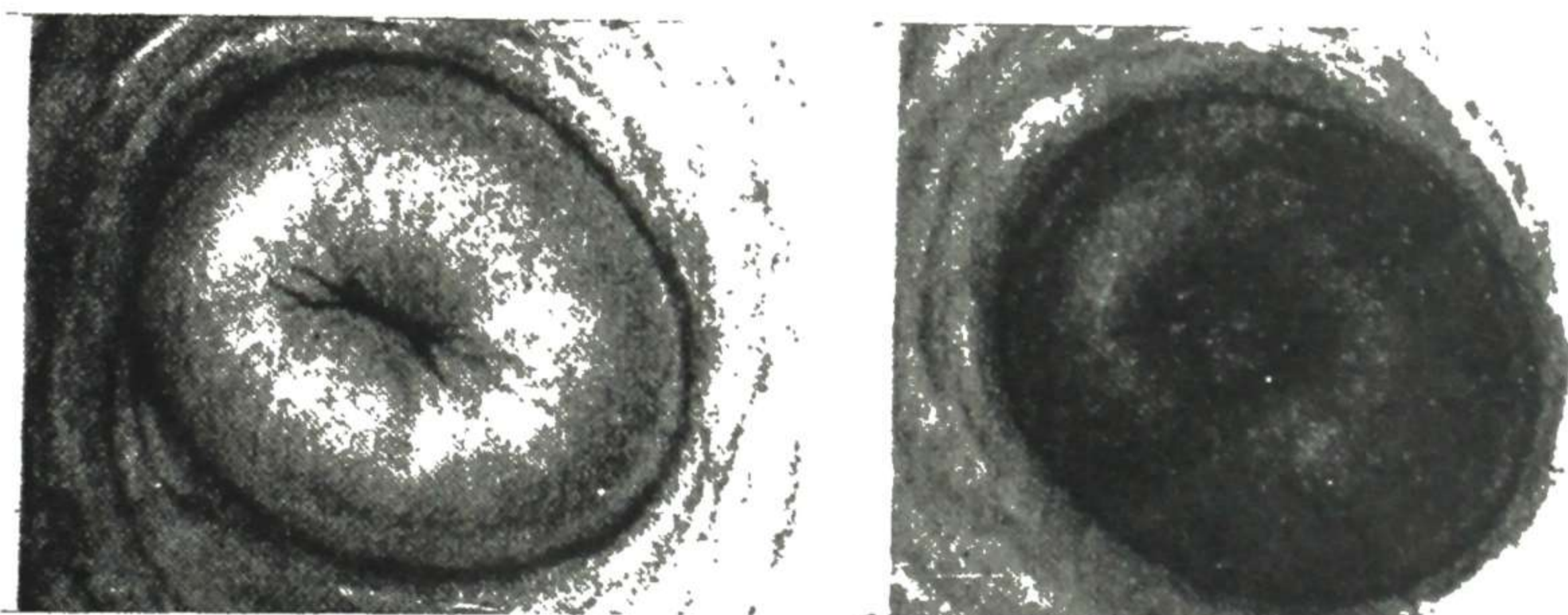
Leukoplakia

Occluded small glands

Fig. 294.—Leucoplakia of the cervix. A. As it appears through the colposcope; B, same cervix as seen through the speculum with the naked eye. (Hinselmann in *Gynecology and Obstetrics* by Davis, published by W. F. Prior Co.)

Colposcopic Magnification

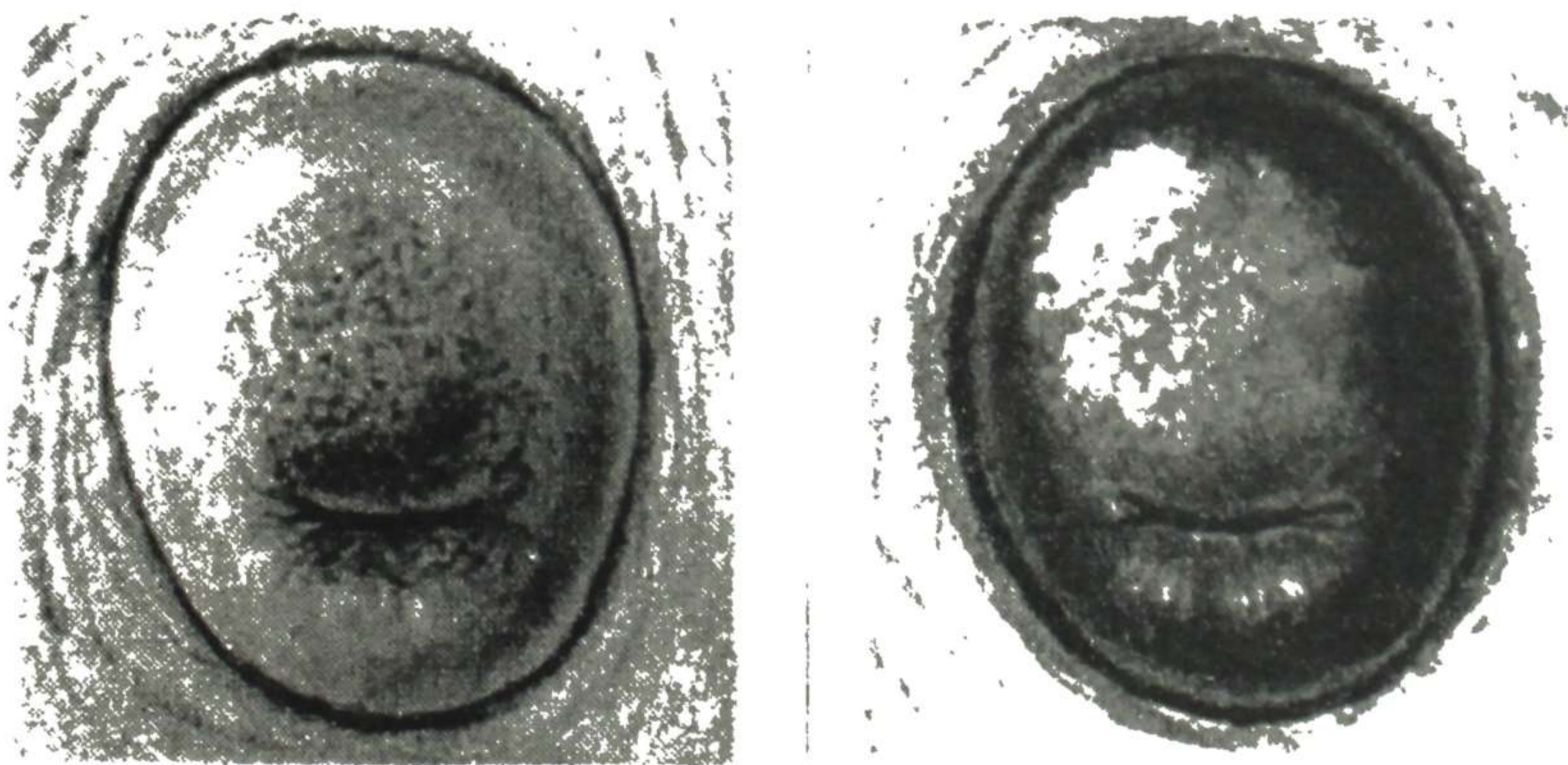
By means of the colposcope a magnified view of areas of the cervical and vaginal surfaces are obtained through a system of magnifying lenses used in connection with the speculum examination. The magnification is five to ten times, and it brings out the minutia of a pathological area in a striking way. Fig. 292 shows one type of colposcope, and the magnification secured is shown in Figs. 293 and 294. Less expensive colposcopic instruments are now made as part of the popular lighted endoscopic diagnostic sets. Such a magnifying lens-tube attached to a speculum is a convenient form.



A.

B.

Fig. 295.—Lahm-Schiller test on a normal cervix. *A*, before use; *B*, after iodine solution has been applied. (Henriksen—*Surg., Gynec. and Obst.*)



A.

B.

Fig. 296.—Lahm-Schiller test on an abnormal cervix. *A*, before use; *B*, after iodine solution has been applied. Note that the areas of eversion and erosion are not stained. (Henriksen—*Surg., Gynec. and Obst.*)

This diagnostic instrument for magnifying early pathologic changes on the surface of the cervix is very helpful in certain lines of investigation, particularly in studying the early changes in cancer and other lesions. It is not necessary, however, to have expensive instruments in order to make the important clinical decisions that must be made in these cases of pathologic cervix. The important thing is to remove promptly any chronically irritated area, while

it is still a simple process. Do not procrastinate by watching such an area, with or without special instruments, for the first sign of cancer. Remove it before the cancer develops.

Chemical (Iodine) Test

The chemical test, called also the Schiller test, depends on the fact that the normal squamous epithelial cells of the vagina contain glycogen and hence stain brown when iodine is applied. The cervix and adjacent mucosa are painted with Gram's iodine solution (iodine 1 part, potassium iodide 2 parts, water 300 parts), which causes the normal squamous epithelium to stain a uniform brown color. Areas of eversion, erosion, cervicitis, cancer, and other pathologic conditions do not stain, and hence become more noticeable by contrast (Figs. 295, 296).

Interesting in this connection is the fact, mentioned in Chapter I (Anatomy and Physiology), that this glycogen storage in the vaginal epithelium seems to depend on the sex hormones, and is ordinarily absent in childhood up to puberty and also after the menopause. During the first few days after birth the cells show glycogen storage, presumably due to the sex hormones supplied to the child by the mother.

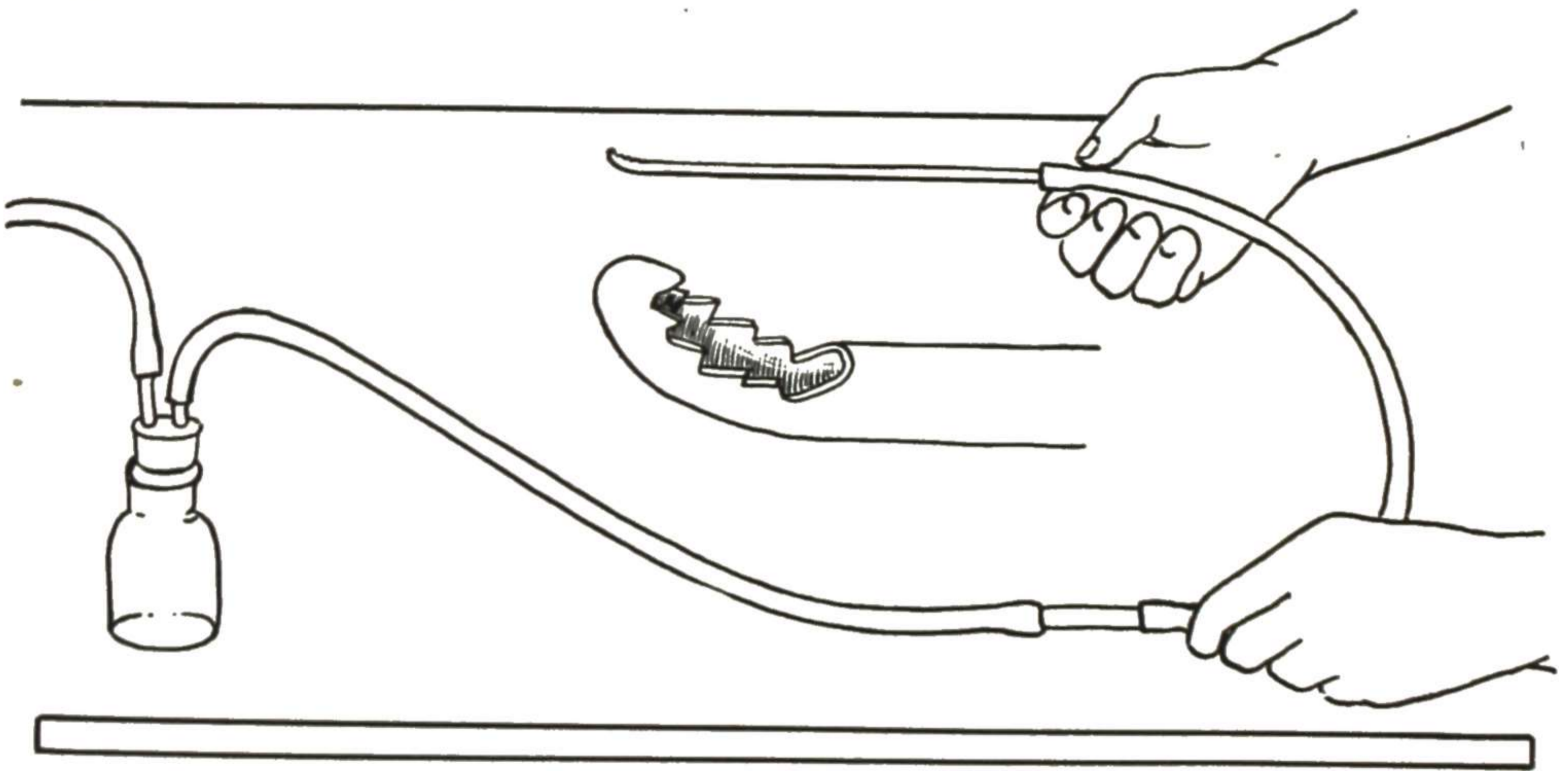


Fig. 297.—Diagram of cannula used by Novak and its connection with the bottle that receives the aspirated curettings. The tube at the left is connected with the motor suction pump. The tubing must be rigid, as a flaccid tube would be collapsed by the strong negative pressure. As particles of tissue may adhere to the walls of the tubing, the latter should be washed by sucking a formaldehyde solution, cold water, or citrate solution through the open end of the cannula into the bottle after the operation. The detail of the serrated fenestrum of the cannula is shown in the insert. At the proximal end of the latter is a flattened disk to indicate the direction of the serrated edge. (Novak—*J. A. M. A.*)

Determination of pH of Vaginal Contents

(Quantitative pH Determinations)

A fairly uniform relation has been demonstrated between the chemical reaction of the vaginal contents and the activity of various forms of pathogenic organisms, as explained when considering vaginal discharge (Fig. 250). Determinations of the pH at different parts of the vagina and at different times are useful, particularly in investigative work. There are different methods of estimating the pH.

Nitrazine Method. The nitrazine test paper, prepared by the Squibb Company, records pH readings from 4.5 to 7.5. The introitus is wiped dry, to remove any secretion from the Bartholin glands. Then before any digital examination the speculum is introduced *dry* without turning it in the vagina. The nitrazine paper can then be placed against the vaginal wall at the posterior fornix, or some secretion can be wiped from that area with a cotton swab and applied to the paper. After a few seconds the color of the paper is compared to the color chart, and the pH is read directly from that chart.

Endometrial Biopsy

The physiological studies given show that the condition of the endometrium is an index as to ovarian activity. By means of minute specimens of the endometrium, secured in the office at certain periods of the menstrual cycle,

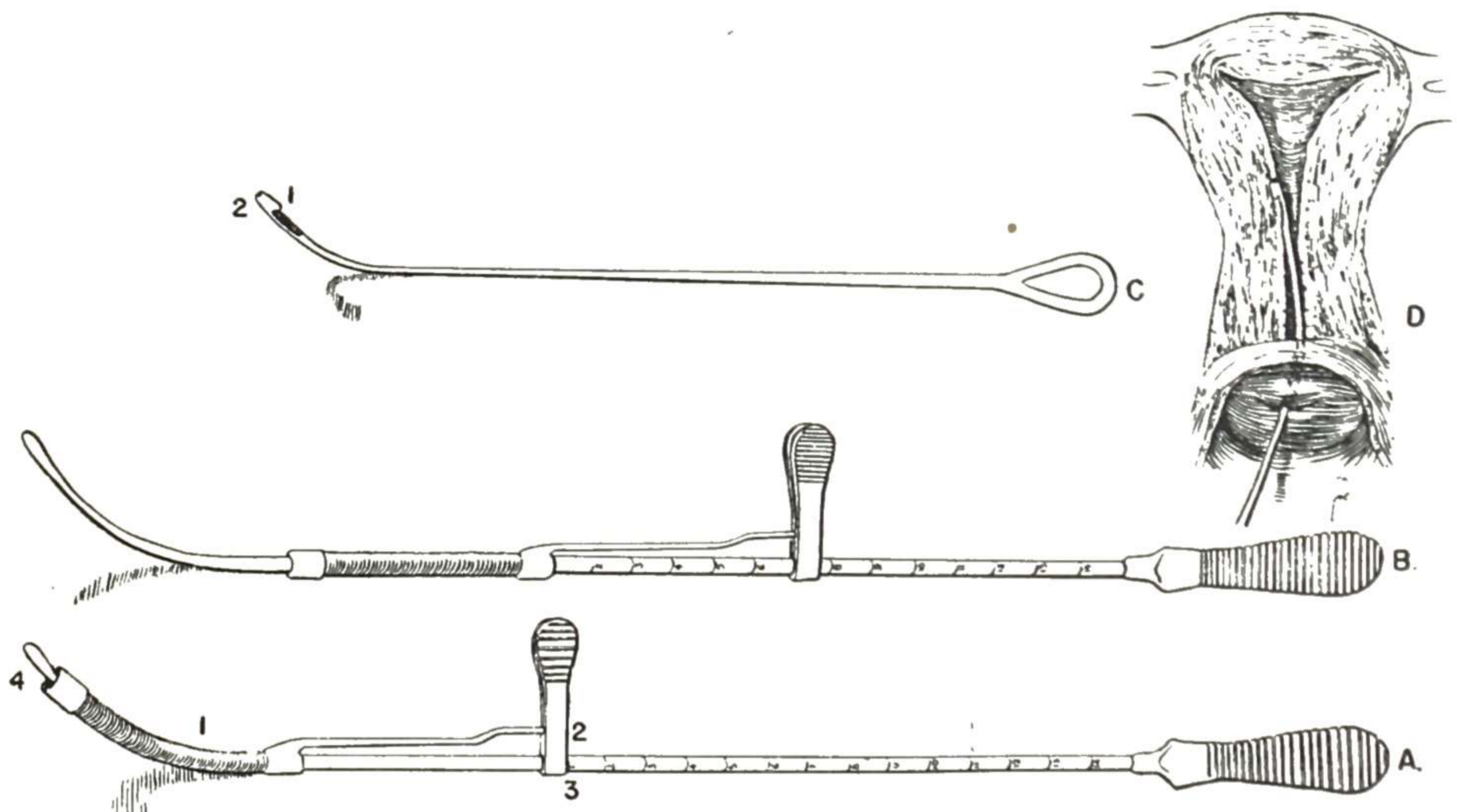


Fig. 298.—A, hystrometer. 1, coiled spring so that curve of sound may be passed; 2, spring clip which is used as handle to move measuring part of apparatus and to hold it steady on shaft; 3, area of measurement. Note that it registers 1 cm. and that there is 1 cm. at 4. B, hystrometer measuring cupped curette. 1, sharp overhang to curette; 2, small hole in cup to allow escape of secretions. D, curette removing tissue from endometrium. Curette can be used numerous times to obtain tissue from different regions but a piece from either side is usually sufficient. (Meigs—*Am. J. Obst. & Gynec.*)

information may be gained as to ovulation and also as to the effects of endocrine treatment. Several types of small curettes for this purpose have been devised. Some are used with suction, as Novak's shown in Fig. 297, and some without suction, as that devised by Meigs (Fig. 298). The latter is very small, which reduces the discomfort of the procedure.

With the vaginal speculum in place, a suitable antiseptic is applied to the cervix and the cervical canal; the sterile curette is introduced to the fundus and then drawn gently but firmly along the wall to obtain the endometrial specimen. The specimen is immediately placed in the small bottle of 10 per cent formol.

After the usual laboratory preparation, examination of the specimen shows whether the endometrium is that of an ovulatory or nonovulatory cycle, which

information is important in the diagnosis and treatment of sterility and other functional ovarian and uterine disturbances. Also, the effectiveness of endocrine medication may be checked on by information thus gained. The twenty-fifth day of the cycle is the time usually selected. In the term "endometrial biopsy" used in this connection, the "biopsy" refers to the "examination of tissue from the living" and not to the procedure of obtaining the tissue.

Special endoscopes have been devised from time to time for the purpose of visual exploration of the endometrial cavity. However, the imperfect vision secured because of the difficulty in distending the cavity and the dangers of manipulation within the uterine cavity and the more decisive information furnished by curettage, militate against uteroscopy. Hamant and Durand report success in attempts to distend the cavity with sterile water, using just enough pressure to avoid sending the fluid through the tubes into the peritoneal cavity.

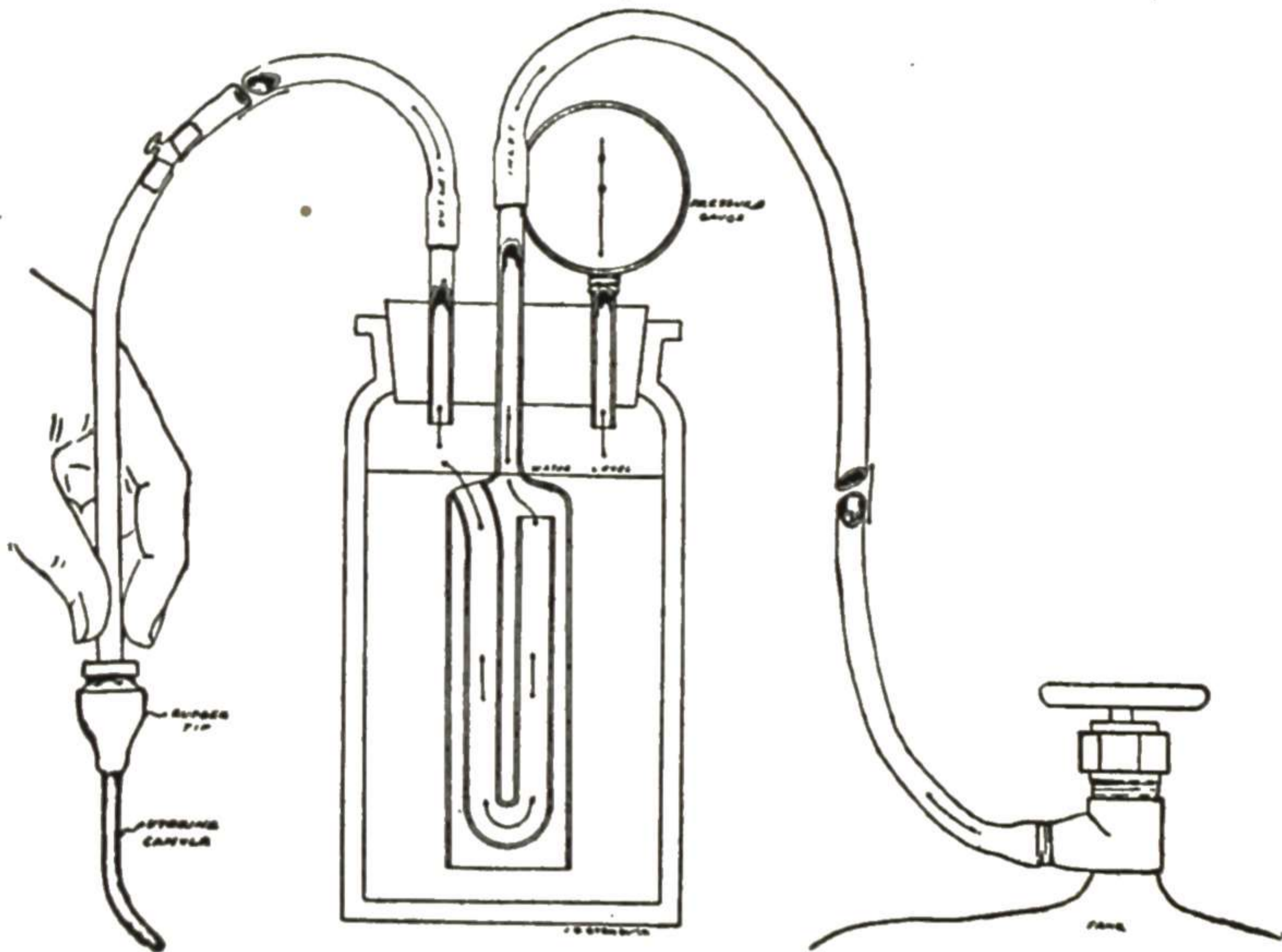


Fig. 299.—Diagram showing the principles of the apparatus for tubal insufflation. The gas flows from the tank through the tubing into the inlet of the pulsating gas meter. The inflowing gas displaces the water in such a way that each pulsation of the meter equals about 40 c.c. of gas. The outflowing gas flows through the rubber tubing leading to the cannula. Between the meter and the cannula is a needle valve conveniently placed for regulating the rate of gas flow. The cannula is equipped with a rubber stopper for the purpose of preventing leakage at the cervical os. The pressure gauge shows the pressure under which the gas is introduced. A mercury manometer may be used for this if desired. (Rubin—*Am. J. Roentgenol.*)

Gas Test for Tube Patency

By introducing carbon dioxide into the uterus under measured pressure, the patency or occlusion of the fallopian tubes may be established. This method was introduced by Rubin, who has also done much excellent work in further developing it. If either tube has a normal patency, the gas pressure rises to about 70 mm. Hg, and then falls rapidly to about 40 mm. Hg as the gas passes into the abdominal cavity. Confirmatory evidence that the gas has passed through the tube is the occurrence of shoulder pain when the patient assumes the sitting position. This is a referred pain due to the pressure on the diaphragm, and when characteristic, it is pathognomonic of patency. If the pressure rises to 200 mm. Hg without a fall, this signifies that the gas cannot

pass through, i.e., both tubes are closed. One negative test does not necessarily mean that the tubes are permanently closed, for tubal spasm will sometimes resist the passage of the gas even at fairly high pressure, requiring subsequent tests as mentioned later.

INDICATIONS

1. The test is a step in the systematic examination of a sterility patient. It should not be used until evident causative lesions of the lower genital tract have been eliminated and the husband's fertility has been established by the Huhner test or otherwise.

2. As a therapeutic aid in opening closed tubes. In a total of 2,000 cases of infertility, Rubin reported 205 cases of pregnancy following uterotubal insufflation. Some of these cases were in women over thirty years of age, married five years, who had used no contraceptive measures for a year. Some of these patients became pregnant without other therapeutic measures within

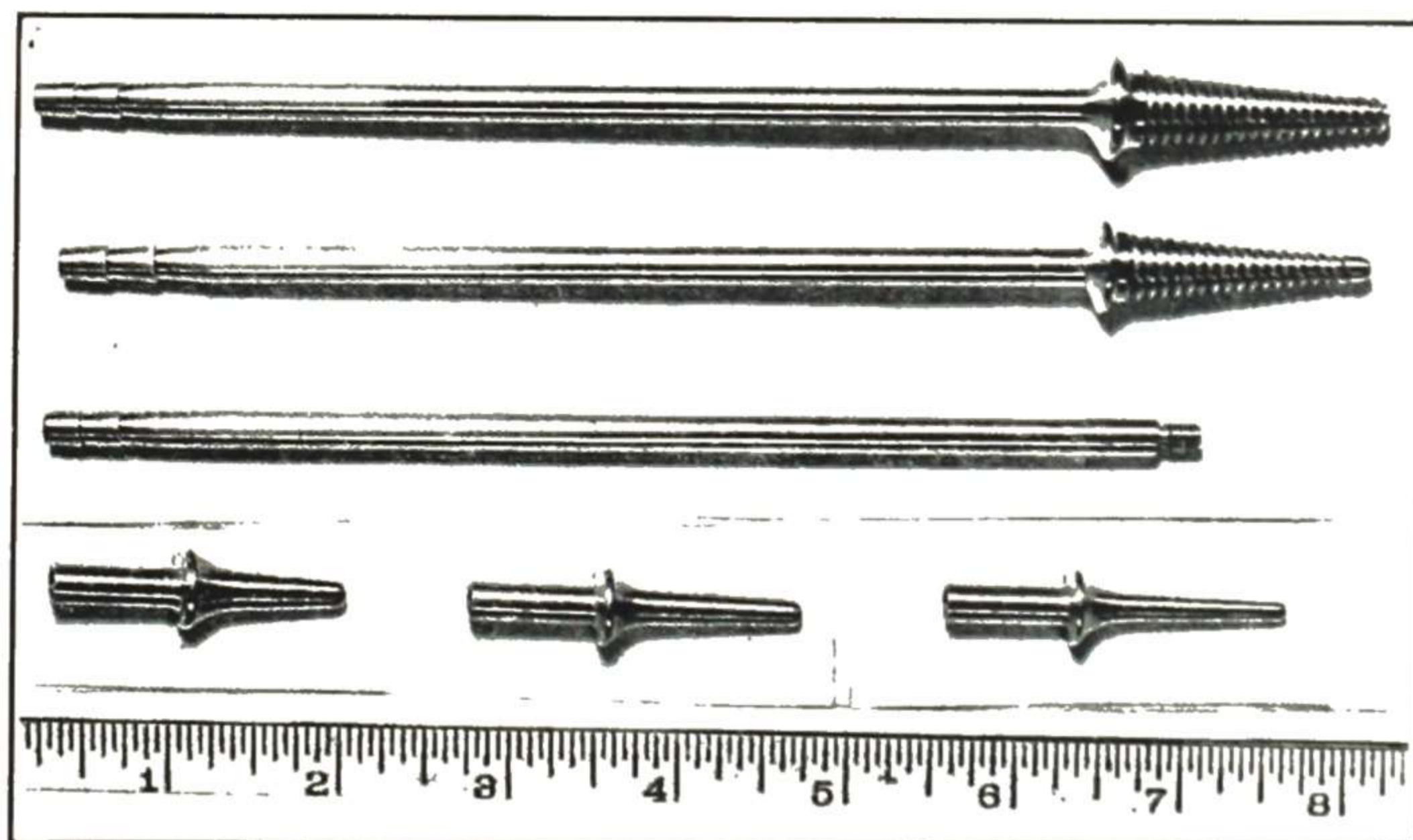


Fig. 300.—Colvin type of cervical applicators for tubal insufflation and uterosalpingography. The screw tips for insertion in the cervix are to obviate the necessity of countertraction with a tenaculum forceps to prevent leakage. (Colvin—*Am. J. Obst. & Gynec.*)

one month after insufflation. In a review for the period 1920 to 1940, he reported 5,269 insufflations with 32.4 per cent complete obstructions and 33.1 per cent partial obstructions.

3. During laparotomy for closed tubes insufflation from below is an accurate method for proving that patency has been attained.

CONTRAINDICATIONS

1. Bleeding from the uterus or purulent discharge.
2. Recent pelvic inflammation or tenderness.
3. Large pelvic tumors or tumors associated with inflammation.
4. Serious cardiac or respiratory disease or fever.
5. Free bleeding on insertion of cannula (usually means cervicitis, acute or subacute).
6. Pregnancy.

APPARATUS

The apparatus for the introduction of the gas consists of (1) a metal cannula of the Keyes-Ultzman type, with several small perforations near its tip and fitted with a conical rubber stopper, (2) an arrangement for measuring the gas as it passes through water, (3) a manometer for measuring the gas pressure, and (4) the tank containing the gas to be used, i.e., carbon dioxide or oxygen, preferably the former. It is well to have a needle valve, for releasing the gas pressure, at a convenient part of the tube near the uterine cannula. The ordinary apparatus is shown in Fig. 299, and a special screw cannula to prevent leakage from the cervical canal in Fig. 300.

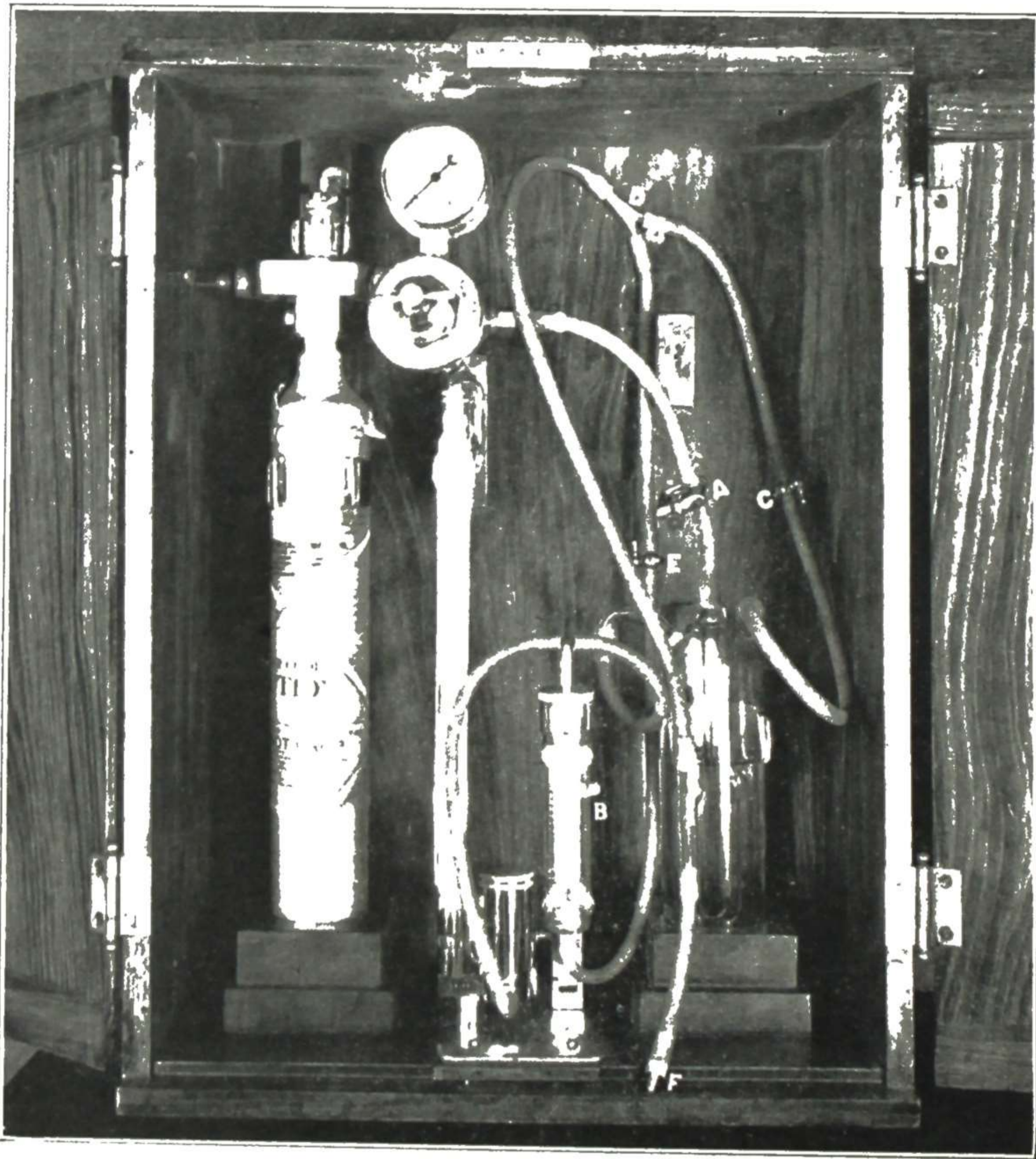


Fig. 301.—Baldwin modification of the Jarcho pressometer for transuterine insufflation, pneumoperitoneum and uterosalpingostomy. (Baldwin—*Am. J. Obst. and Gynec.*)

There are many modifications of apparatus. The one shown in Fig. 301 is a combination which may be used for tubal insufflation, pneumoperitoneum, or lipiodol injection. It is a modified Jarcho apparatus reported by Baldwin.

TECHNIQUE

The best time for the test is from four to seven days after the beginning of menstruation. At this time the endometrium is lowest and is least liable

to infection; there is less chance of blowing bits of endometrium into the abdominal cavity; and the possibility of interfering with an existing pregnancy is eliminated.

1. The apparatus is tested and the necessary instruments and parts are sterilized. The rate of flow is adjusted so that the mercury rises 100 mm. Hg in fifteen seconds.

2. The patient is placed in the dorsal position with hips elevated, a bi-valve speculum is inserted, and the cervix is painted with a suitable antiseptic.

3. The uterus is sounded to ascertain the direction of the canal and to be sure that there is no stenosis of the internal os. If there is some stenosis, dilatation is done with a uterine dressing forceps.

4. The anterior lip of the cervix is then grasped with a two-toothed tenaculum and the modified Keyes-Ultzman cannula is inserted into the uterine canal so that the point is well above the internal os and the rubber stopper fits snugly into the external os.

5. The needle valve is opened and the gas allowed to flow into the uterine cavity while the operator watches the pressure on the manometer. During this time the rubber stopper must be kept tightly pressed against the cervix to prevent leakage of gas. If there is any leakage, it can usually be heard.

6. The pressure should be watched carefully and not allowed to rise above 200 mm. Hg. Four pulsations of the siphon meter, or 160 c.c. of gas, are all that is required to show patency. Two or three pulsations, or from 80 to 120 c.c., will suffice in thin individuals.

7. After the test has been completed, the gas is turned off, and the cannula withdrawn. Replace the uterus in the anterior position. If there is any oozing after withdrawing the cannula, a dry vaginal tampon may be inserted.

8. Have the patient sit up, and ask her if she notices any pain. If the shoulder pain is very troublesome, have her assume knee-chest position for five minutes. The gas is usually partially absorbed in this time and the pain disappears.

9. In doubtful cases where the shoulder pain is not characteristic, an x-ray plate may be necessary to demonstrate the pneumoperitoneum. This happens occasionally in stout patients.

INTERPRETATION

The decision as to whether the gas has passed through the tubes is based on two factors: the manometer reading and the patient's symptoms. With the normal patent tube there is an initial rise to 70-100 mm. Hg, followed by a fall in pressure or an absence of further rise when the gas begins to go through the tubes. After patency has been established by the manometer reading, check this by having the patient sit up and inquire if she has any pain. If the gas has passed through the tubes, the patient will usually notice some pain in the shoulder or clavicle area.

When the tubes are permanently closed, the pressure will rise to 200 mm. Hg without a fall. This pressure should not be exceeded except in rare cases and by one thoroughly familiar with the dangers entailed. If the gas passes through at a pressure between 100 and 200 mm. Hg, the tubes are patent; but there is a partial block, either structural or spasmodic.

Some idea as to the position of the block is gained by having the patient locate the pain. With patent tubes there is only a sense of discomfort felt above the symphysis. When the tubes are closed at the uterine end, there is definite, rather dull pain over the uterus during the test, which disappears rapidly on release of the pressure. Sharp pain well out from the median line on both sides, in some cases radiating down the legs, means the block is at the fimbriated ends of the tubes. Unilateral pain with patency established by drop in pressure usually means the blocked tube on the side of the pain. With the block located between the isthmus and the fimbriated end, the pain is felt just lateral to the uterus.

The injection of air or gas with a syringe without measuring pressure and rate of gas flow is not advisable, though it has been recommended by some and instruments have been devised for it. The necessity of knowing the exact pressure and rate of flow for interpretation of conditions has been emphasized by Rubin who insists upon "a slow and careful introduction of the gas rather than an irregular, uncertain and haphazard insufflation." He now uses a ky-

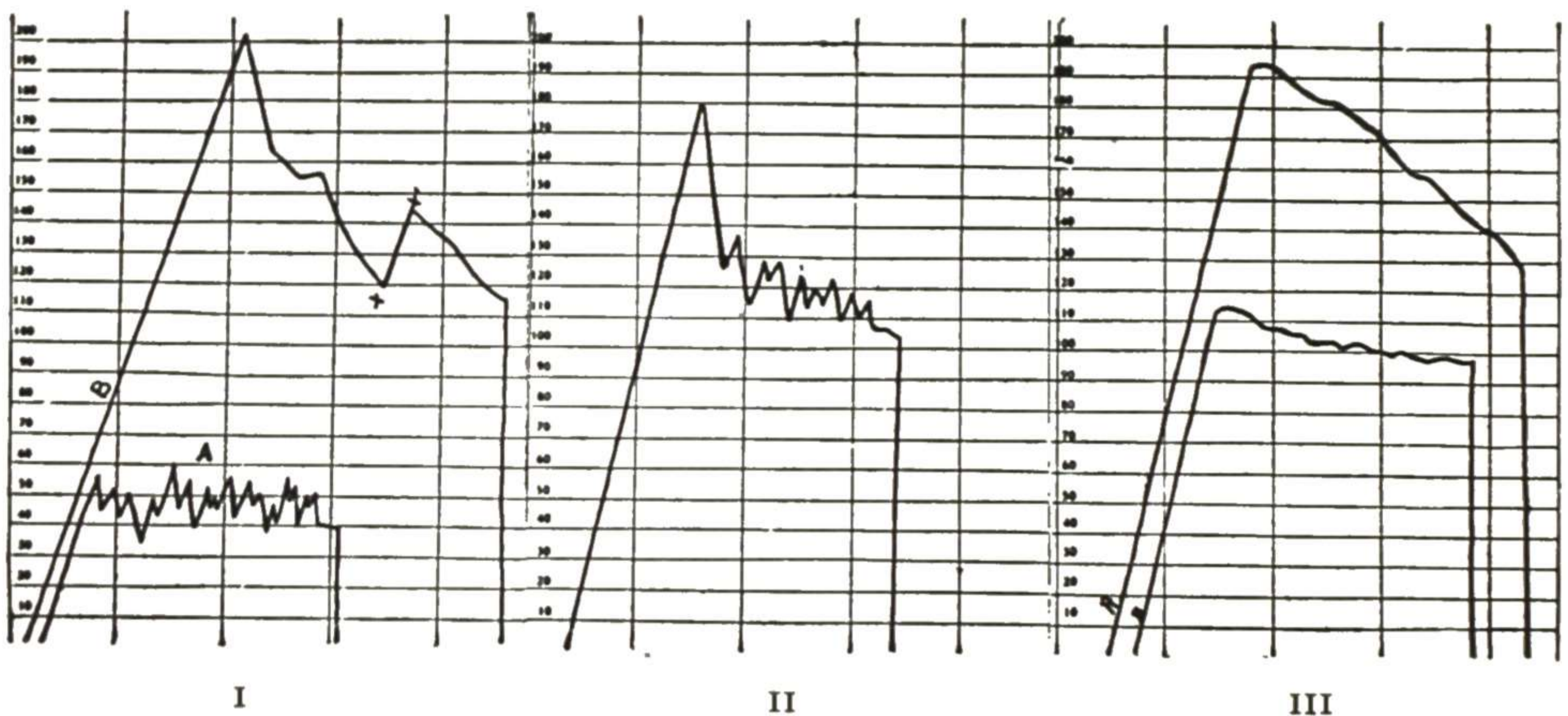


Fig. 302.—Kymograph tracings showing variations in pressure from different causes. I. (A) Tracing of a normally patent tube. (B) Tracing in a case of stricture of the tube with slight patency. X-X' shows rise in pressure when patient was instructed to bear down.

II. Shows a relatively high pressure before the initial drop, when practically normal peristaltic waves are registered on the kymograph.

III. (A) High grade stenosis in a tube probably patent but probably bound down by light adhesions which inhibit normal peristalsis. (B) Less marked stenosis, no definite peristaltic fluctuations visible in the tracing. (Rubin—*Radiology*.)

mograph with the apparatus in order to record variations in pressure on a smoked drum. This records the peristaltic waves, and is especially helpful in differentiating tubal spasm from structural stenosis (see Fig. 302).

Before making a diagnosis of complete obstruction, it is well to make several tests and to precede one of them with a course of medication to relax the tubal sphincters, for example, 75 mg. of trasantin three times daily for five days.

DANGERS

The unfortunate results occurring after gas injection are rare compared with those reported after oil injection, but they do occur. Mansfield and Dudits reported a fatal case of air embolism from a Rubin test done in a patient with unrecognized tuberculosis of the endometrium. We had a case of severe pelvic

infection after a Rubin test in a patient with a partial stricture of the tubes from an old inflammation, probably from an undiagnosed brucellosis infection which later flared up.

Visualization of Uterine and Tubal Cavities

Since the introduction of lipiodol by Sicard and Forestier in 1922, hysterosalpingograms have been added as important aids in gynecologic diagnosis. The use of oily solutions has been largely discarded in later years because of undesirable complications, such as accidental injection of vessels into which the oil penetrated, embolism, nonabsorption of oil from peritoneal cavity and apparent irritation, and acute peritonitis and abscess formation. These dangers have been overcome by the use of water solutions, such as diodrast, skiodan, uroselectans, and in our hands the water medium has been adequate and harmless. Titus suggested the use of acacia with skiodan solution because the combination remains in the uterus and tubes thirty to fifty minutes longer than skiodan alone, and still has none of the disadvantages of an oily solution.

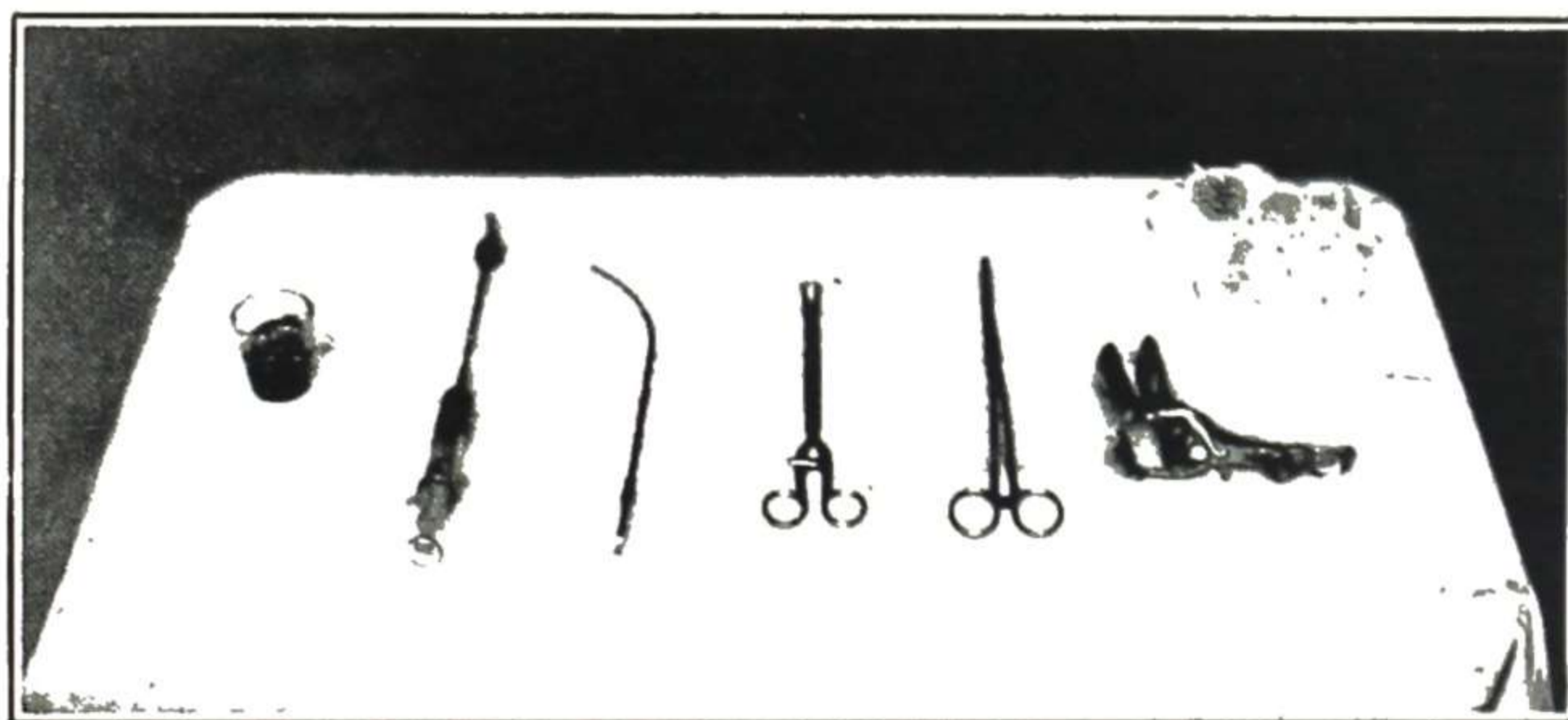


Fig. 303.—Visualization with iodized oil. The articles needed in the technique of the oil injection are here shown. They are, reading from the left, the opaque oil in a sterile medicine glass, the injecting syringe, a uterine sound for testing the direction of the canal and the size of the cavity, a uterine tenaculum forceps for holding the cervix, a uterine dressing forceps, a bivalve speculum, and sterile cotton balls. (Newell—*Am. J. Obst. and Gynec.*)

Though improved solutions have superseded the original lipiodol, the procedure is still conveniently referred to as the “lipiodol test” or “lipiodol injection,” meaning visualization of the cavities by injection of any of the numerous solutions.

INDICATIONS

1. To localize the point of tubal obstruction in a patient who has previously been shown to have closed tubes by the gas test for patency.
2. In doubtful and obscure cases it is used to show the location of the uterus and tubes in relation to other masses present.
3. It is helpful in the diagnosis and demonstration of congenital abnormalities of the uterus and tubes.
4. Reports of pregnancy following the test in some cases of long-standing sterility indicate that it may have some therapeutic value.

CONTRAINDICATIONS

The contraindications to hysterosalpingography are the same as for the Rubin test, and it should be done only after the Rubin test has shown obstruction in the tubes.

APPARATUS

The apparatus needed for the test is shown in Fig. 303. A specially arranged hand bulb and manometer, suggested by Rubin, are shown in Fig. 304. This addition gives accurate knowledge of the pressure used during injection and enables one to avoid the danger of exerting excessive pressure when the tubes are closed. Jacoby uses the apparatus shown in Fig. 305. A short-tipped cannula should be employed so that the cervical and lower uterine canal can be visualized and submucous myomas diagnosed.

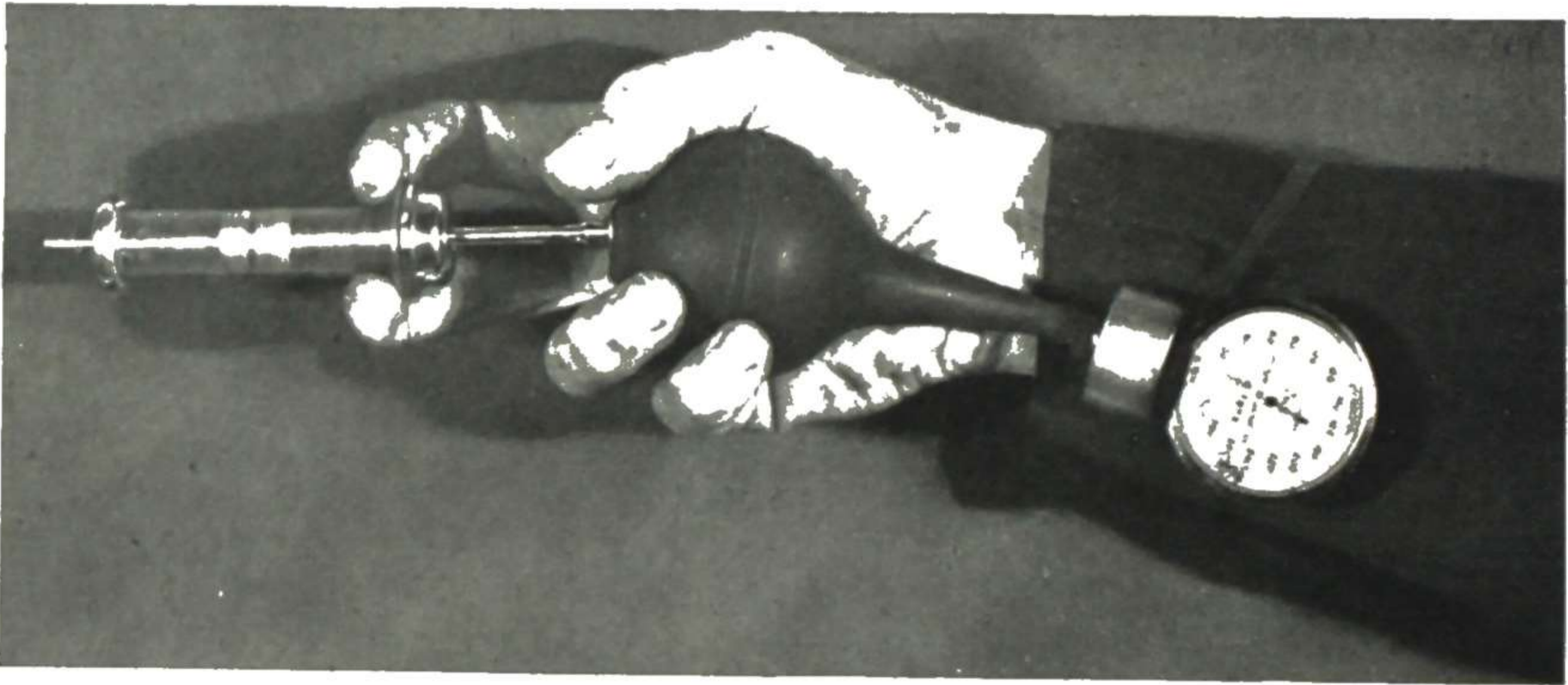


Fig. 304.—A simple method of measuring the pressure under which lipiodol is introduced into the uterus. Pressure is made against the plunger of the syringe with an ear bulb attached to a Tycos manometer. (Rubin—*Radiology*.)

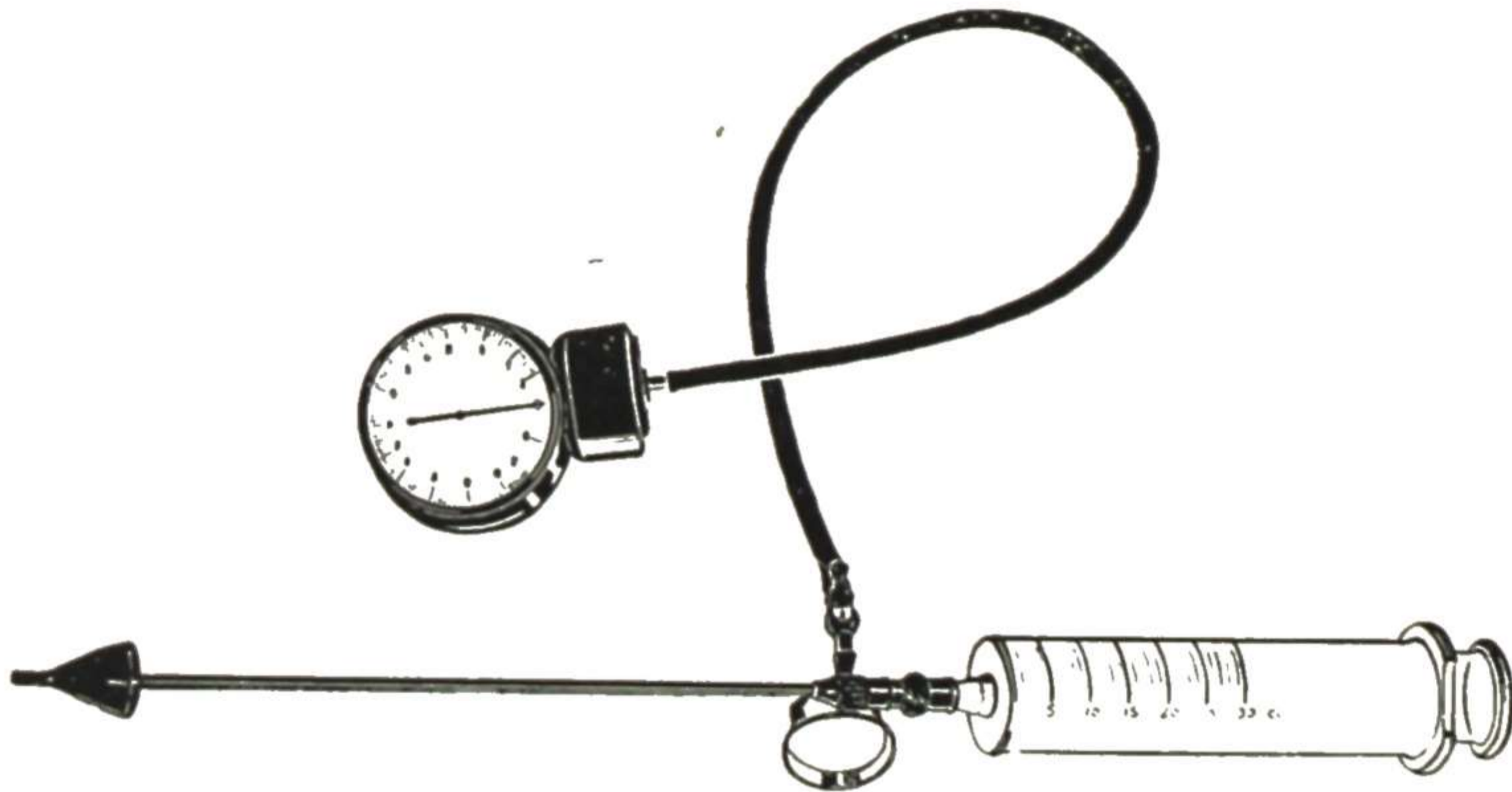


Fig. 305.—Jacoby Instrument for tubal insufflation and uterosalpingography. (Jacoby—*Am. J. Obst. & Gynec.*)

TECHNIQUE

The technique of injection is as follows: The cervix and vagina are washed with green soap and an antiseptic is applied to the cervix and cervical canal. A short-tipped cannula adapted for use on a 10 c.c. syringe is employed. Ten cubic centimeters of the contrast medium are drawn into the syringe and the cannula is fitted on to it. The cervix is then grasped with a tenaculum forceps and, with the rubber cork tight against the cervix, the solution is slowly injected.

The injection is under controlled pressure, so as to avoid rupture of a tube. The simplest method is to press on the plunger with the rubber bulb attached to the sphygmometer, as in Fig. 304. A simple system is shown in Fig. 305.

The exposure is made as soon as the solution has been injected. The cannula is then withdrawn. Hyams suggested taking films after successive injections of 2 c.c. He finds that the patient has less pain with this method, and it also helps to localize the filling-defects from myomas.

INTERPRETATION

In the interpretation of the x-rays it must be kept in mind that the tube cavity does not fill completely, or at least does not become distended, if the outer end is normally open. When the solution reaches the fimbriated extremity, it leaks into the peritoneal cavity; this leakage demonstrates the patency of the tube. The quantity injected should be adequate to cause sufficient leakage for x-ray demonstration but not enough to obscure the picture. If the tubes are closed, the solution fills the tubal cavity proximal to the point of block. The portion of the tube proximal to the block is usually distended, giving a clear-cut, blunt, rounded outline.

If the block is in the isthmus, there is no filling of the tube distal to the uterus. If there is doubt as to whether the solution has escaped into the peritoneal cavity, a simple x-ray taken from three to four hours later will show the mottled distribution of the solution throughout the pelvis. Small constrictions at the cornua of the uterus denote the sphincter muscles located at these points. The lipiodol remains in the pelvis from two to three months and may lead to errors later in x-ray examination for other conditions. Salpingograms and uterograms are shown in Figs. 306 to 309.

DANGERS

As the use of iodized oil increased, the reports on undesirable results likewise increased. There have been at least eleven cases reported in which the oil accidentally entered the pelvic veins, and there are probably many more that have not been recorded in the literature. In an unreported case of ours, the patient experienced a chill and became faint during the injection, but within an hour she felt well enough to go home. The following day her sclera and skin turned a pale yellow and her temperature rose to 103° F., and she had a chill. Because the patient had had frequent attacks of malaria a blood smear was searched for parasites, but none was found. The patient was merely observed and kept at rest in bed until the temperature returned to normal. There has been no subsequent disturbance. In another uterotubal visualization for this patient, made one year later, a watery, opaque solution (neo-iopax) was used instead of iodized oil and there was no leakage into the veins.

Sicard and Forestier deliberately injected iodized oil intravenously first in animals, then into human beings, to see what the effects were. They state that the injection caused no symptoms. In a case reported by Meaker there were no adverse symptoms. Coventry's patient had a chilly feeling, was nauseated, had a rapid respiration and, as she expressed it, was "knocked out" for about thirty minutes.

The frequency of occurrence of this accident led Neustaedter and his associates to recommend a pyridine derivative called "neo-iopax" (uroselectan

B) as the solution for injection. This is similar to the skiodan and is used intravenously in kidney disorders to outline the kidney pelvis and the ureters.

Although some workers in this country and abroad have used lipiodol therapeutically in acute and subacute cases of salpingitis, this certainly is not a measure to be recommended. The importance of excluding such cases when



Fig. 306.—Visualization with iodized oil. This case also presents normal tubes and a more nearly normal uterine cavity. There is a quantity of escaped fluid at the outer end of each tube, sufficient to give a clear demonstration. Gyn. Service. (Newell—*Am. J. Obst. and Gynec.*)

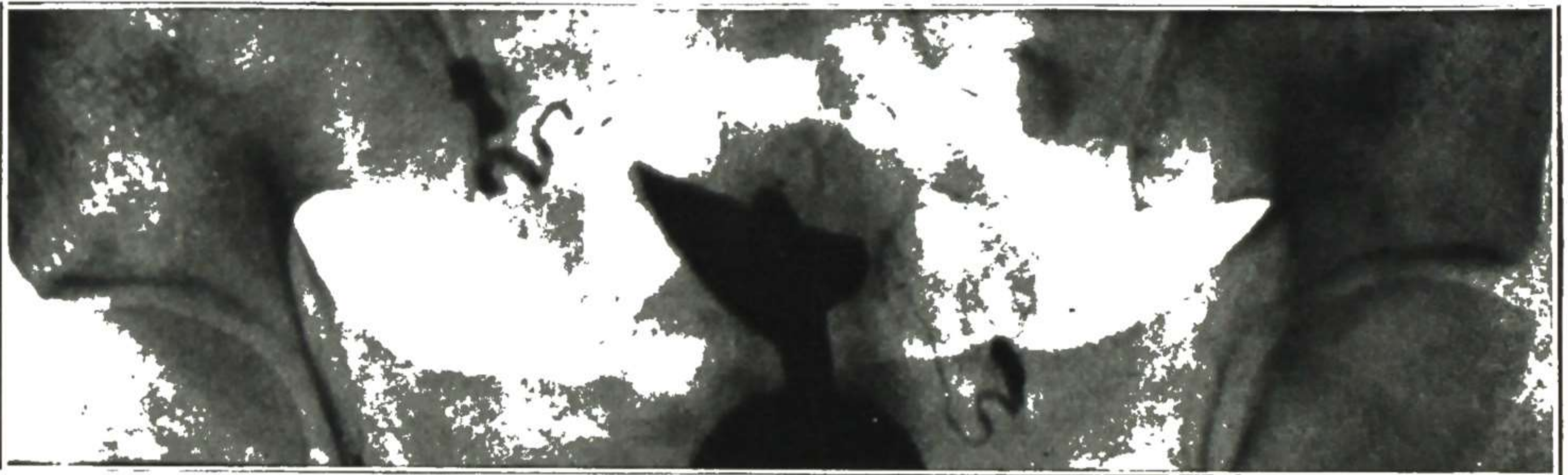


Fig. 307.—Visualization with iodized oil. In this case the right tube was open, as demonstrated by escaped fluid. The left tube was closed at the outer end, as demonstrated by the distention of the ampullar cavity. These findings were confirmed at operation. When the sealed tube was incised, the dark fluid escaped. A portion of the fluid ran out of the uterine cavity before the picture was taken, hence the upper part of the cavity does not show. Gyn. Service. (Newell—*Am. J. Obst. and Gynec.*)

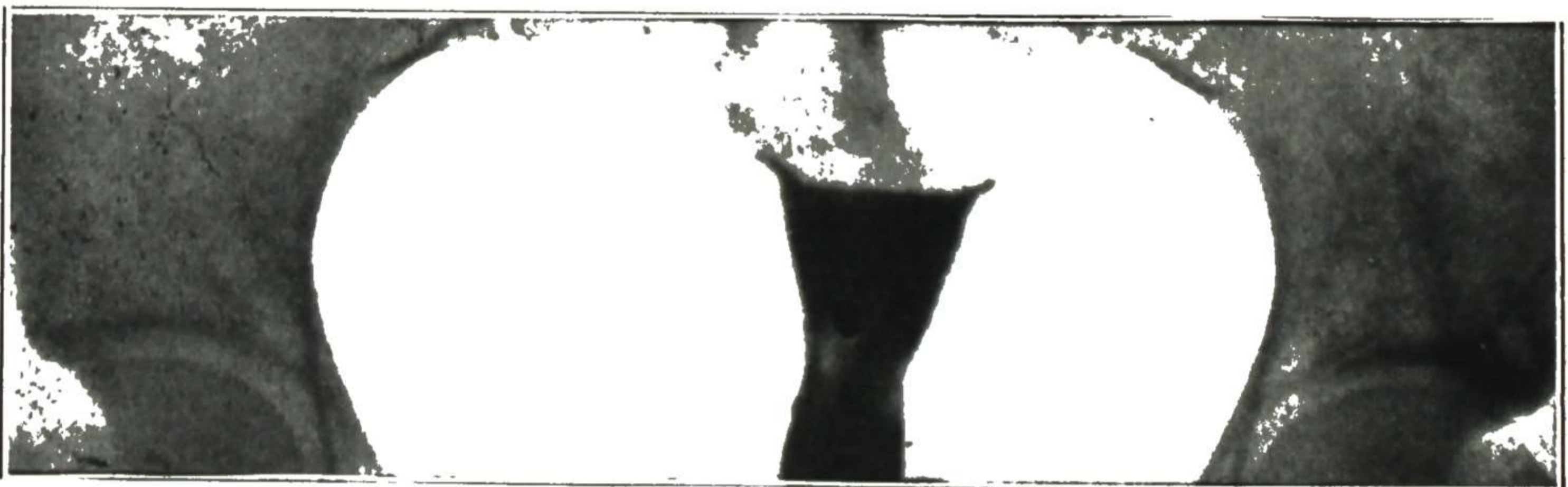


Fig. 308.—Visualization with iodized oil. In this patient the plate shows that each tube is occluded in its uterine portion, thus demonstrating at once the uselessness of operation for opening the tubes in this case. Gyn. Service. (Newell—*Am. J. Obst. and Gynec.*)

lipiodol is to be used has been mentioned under Contraindications. One patient in the Gynecological Service of Barnes Hospital developed an acute peritonitis following the test. As the peritonitis continued to spread upward, the abdomen was opened, the old pelvic lesion removed, and free drainage established. The patient recovered after a stormy course.

Rubin reports large pelvic abscesses requiring drainage in two patients and symptoms of peritoneal irritation (cramps, nausea, and vomiting) in three others in a series of 66 injections. J. C. Hirst reports a death from streptococcic peritonitis in which operation for closed tubes was done twenty-four hours after the test.

These facts emphasize the importance of a careful elimination of contraindications before using the test, and warn against its use where the simpler gas test will suffice, as in determining tubal patency. In a case in which the gas test shows tubal occlusion, the lipiodol injection is indicated to show the



Fig. 309.—Visualization with iodized oil. This is a plate from the case mentioned in the text in which the patient introduced a bent hatpin to produce an abortion. Notice that the uterine cavity is normal, showing no pregnancy. The tubes appear normal, each being open throughout, as demonstrated by the escaped fluid from each. The wound-canal through the uterine wall, made by the thrusts of the large pin, is well visualized by the opaque fluid. The injection of the iodized oil demonstrated clearly that the long pin was entirely outside the uterine cavity. Gyn. Service. (Newell—*Am. J. Obst. and Gynec.*)

location of the occlusion. The importance of this **localization**, upon which largely turns the possibility or advisability of operation for relief, is sufficient to justify the additional risk.

The improvements in contrast material used, particularly the change from oil to water solutions, have eliminated most of the dangers from the solution, but not all. An allergic death has been reported by Dolan in the use of diodrast for intravenous urography, and he states: "We now test patients who give any past history of allergy. The patient holds 1 to 2 c.c. of the solution in the mouth

for ten minutes, and if there is no reaction the solution is then swallowed. There is then a wait of thirty minutes, and if no reaction the intravenous use is then proceeded with." In one case the mouth test gave a prompt reaction. In three minutes there was a sensation of numbness which began in the mouth and spread rapidly over the entire face. The patient expectorated the solution immediately and ephredine was given, but the reaction lasted five hours. The fact that there is always the possibility of the solution getting into the veins makes still stronger the advisability of testing any allergic patient before hysterosalpingography.

To Show Fetal Bone Shadows

After the fetal bones have formed, the bone shadows as shown by x-ray examination may be used as an aid in differential diagnosis in obscure cases. The question as to how early in gestation an x-ray diagnosis of pregnancy may be made from the bone shadows has been reviewed in an instructive article by Bartholomew, Sale and Colloway. Positive bone-shadow x-ray evidences of pregnancy do not appear until four and a half to five months after conception. Keeping this limitation in mind, ordinary x-ray examination may be helpful in differential diagnosis.

A large mass may be a pregnant uterus or a uterine tumor (soft myoma) or an adnexal mass from which the uterus cannot be differentiated. The questions here would be, first, whether or not a pregnancy is present, and if so then, second, whether or not it is in the uterus. If only irregular bone shadows appear, it must be kept in mind that they may be due to a pregnancy too early to show the characteristic systematically arranged shadows, or to an ovarian dermoid, or to calcified areas in a uterine myoma.

Visualization of Arthritis or Stone or Prolapsed Kidney or Tumor Metastasis in Bone

Troublesome pain in the back increased by motion should always arouse suspicion of arthritis of sacroiliac joints or of lumbar spine. If there is definite point-tenderness over these structures with a tendency to arthritis elsewhere and no intrapelvic lesion that should cause the backache, the suspicion is confirmed. In cases in which the diagnosis is doubtful, because lacking definite tender areas in the back or because of a pelvic lesion that may or may not cause the backache, x-ray pictures of the lower spine and pelvis will give helpful information as to joint and bone conditions.

In complicated pelvic conditions in which it is important to rule out stone in the bladder or ureter or kidney or prolapsed kidney or tumor metastasis in bone, a plain x-ray film of the area may be helpful.

Gastrointestinal X-Ray for Appendix, etc.

The close proximity of the appendix and cecum on the right and of the sigmoid at the left and center necessitates those structures being taken into consideration in obscure or complicated pelvic conditions. Consequently x-ray visualization of those structures is frequently required for a differential diagnosis in such cases. Its systematic use in suitable cases would avoid those

tragic surprises in which the abdomen is opened for supposed tubal or ovarian or uterine mass which proves to be tuberculosis of the cecum or cancer of the cecum or colon. The possibility of appendicitis or diverticulitis also must be considered in planning treatment for a persistent mass of doubtful origin. Especially in aged patients with central or left-sided inflammation it is important to rule out diverticulitis. Of course the inflamed and occluded diverticulum does not show in the x-ray, but the probability of this condition is indicated if diverticulosis is shown in a patient presenting no other cause for the inflammatory mass. When desiring to rule out diverticulitis, make particular mention of this to the roentgenologist so that he will take a late plate for residue retained in the diverticuli after elimination of the barium from the intestinal lumen.

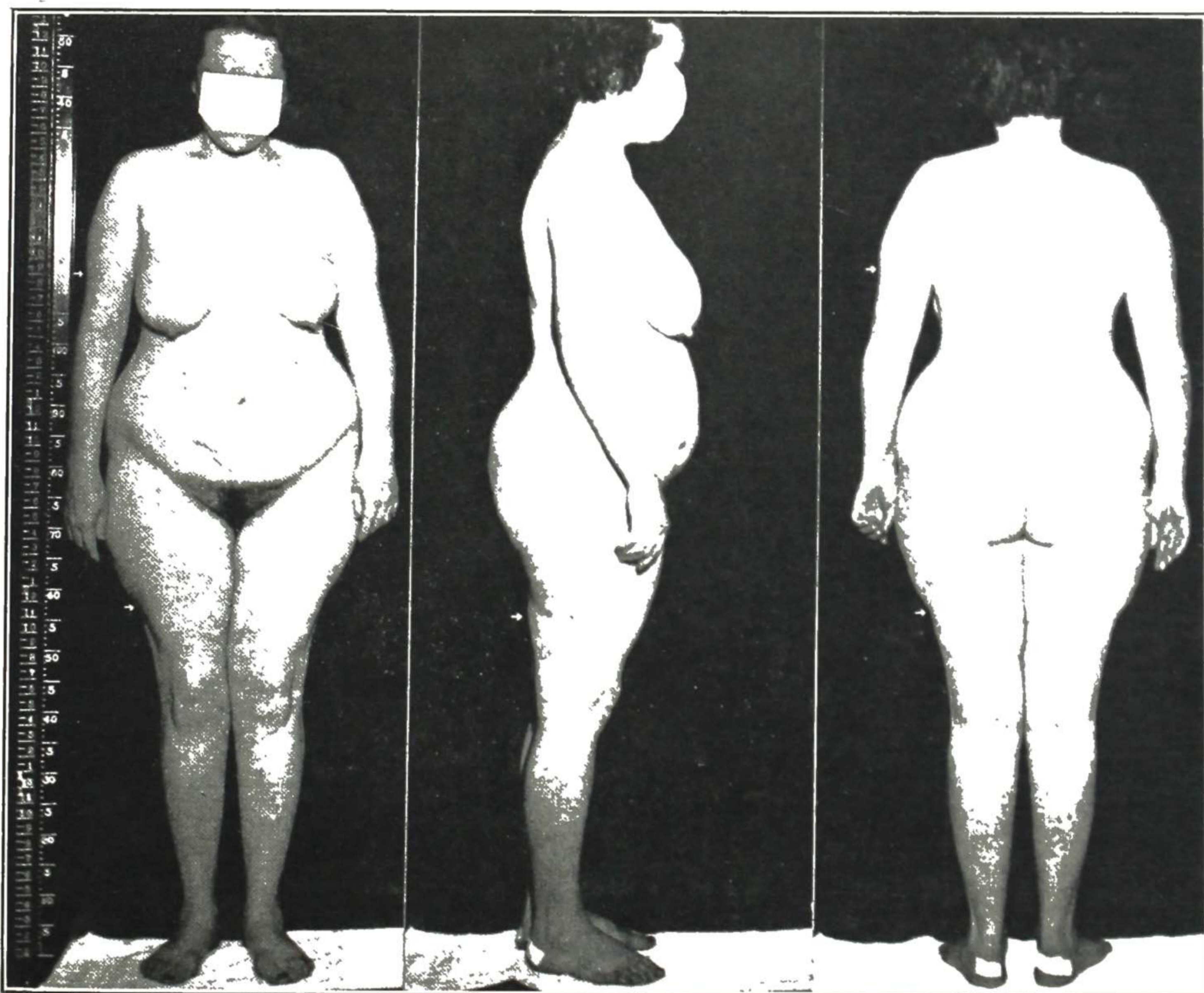


Fig. 310.—Patient with condition shown in Fig. 311. The exostoses are in the frontal area and hence gave no localizing symptoms. This patient was thirty-one years old and suffered from generalized headaches associated with epileptiform-like seizures, dizziness, general fatigue. Menses normal. Negative Wassermann reaction.

The distribution of the fat extending about halfway down the arms and thighs (indicated by the small arrows) is considered typical by Dr. Moore. (*Am. J. Roentgenol.*)

X-Ray of the Skull

In certain gynecological patients x-ray of the skull is necessary to give required information, for example, in endocrine disturbance possibly due to pituitary tumor or in menstrual headaches that may be a symptom of exostosis affecting the inner table of the skull.

Sella Turcica Distortion.—The functional disturbances of the pituitary gland are sometimes associated with organic changes of sufficient extent to

modify the surrounding bony structures, so that such modification shows in x-ray pictures of that region of the skull. Consequently, in persistent endocrine trouble it is advisable to make x-ray examination of the pituitary region, particularly if the patient presents a pituitary type of obesity or other special indication of pituitary disorder. The reliability of the findings and conclusions depends, of course, on careful roentgenization and experienced interpretation.

Internal Exostosis.—In a patient inclined to headache, the menstrual period is often the favorite time for the most troublesome manifestation, as it is for many other disturbances of the nervous system. There is not space for a general differentiation of menstrual headaches, but it seems advisable to call attention to one troublesome type which has recently been elucidated, with considerable relief to the patients so afflicted.

This is characterized by exostoses on the inner table of the skull in the frontal region, with resulting pressure on the so-called "silent area" of the brain. The condition is of interest to gynecologists in that it is the cause of one of the severe types of menstrual headache (often with visual disturbances) and not infrequently there are other menstrual disturbances, such as exces-



Fig. 311.—Exostoses frontalis interna. This condition, described by Dr. Sherwood Moore, consists of exostoses on the inner table of the skull. In this roentgenogram the exostoses are seen at the left edge of the figure on the inner table in the frontal area. This is the skull plate of the patient shown in Fig. 310. (Moore—*Am. J. Roentgenol.*)

sive flow or amenorrhea. Another point of interest is that the pelvic and other symptoms closely resemble those ordinarily associated with certain cases of pituitary dysfunction, and this diagnosis is very likely to be made.

The details of this condition were worked out by Sherwood Moore, professor of Radiology, Washington University School of Medicine. He investigated very extensively these inner-table exostoses, the resulting clinical symptoms and associated bodily changes, and has called attention to their importance in the articles given in the Reference List.

The symptoms listed by Moore as characteristic of this condition are:

1. Headaches, often disabling. Cranial tenderness with sometimes a feeling of pressure.
2. The obesity may be extreme and is of the rhizomelic type.
3. Visual disturbances of various types.
4. Easy fatigue and muscular weakness.
5. The breasts are usually larger and more pendulous than they are in women who do not have hyperostosis of the skull.
6. Hair growth on the chin is common.
7. Mental dullness, dizziness, depression, and poor memory.
8. Epileptiform-

like seizures. 9. Cranial nerve disturbances. 10. Regional sensory and motor disturbances, tingling, numbness, transitory hemiplegias and hemiparesis.

One of the clinical features of diagnostic importance is the fat distribution just to the middle of the upper arm and to the middle of the thigh. This is shown in Fig. 310 which is a photographic study from Dr. Moore's collection. Fig. 311 shows an x-ray of the frontal area of the skull in the same patient. The sella turcica was normal.

We recall particularly two patients with this disorder. One suffered with severe headaches at each period, and also had dizziness, vomiting, partial loss of vision in one eye, and occasionally had convulsive seizures. The other came to us because of daily vaginal bleeding extending over a period of two years. On first examination she seemed to be a typical pituitary case with the usual obesity, bitemporal and frontal headache, and dizziness. Curettings showed a hyperplastic endometrium of the "Swiss cheese" type. The Aschheim-Zondek test gave a Type I reaction. The basal metabolic rate was minus 6. A stereo x-ray of the skull showed a normal sella turcica but an early hyperostosis frontalis interna.

The first patient mentioned above was under treatment by Dr. Carr, of the Department of Neurology, for some months, and had complete recession of troublesome symptoms on a diet high in gelatin.

Pelvic Examination Under Anesthesia

The advantage of anesthesia is that it eliminates PAIN and MUSCULAR TENSION, the two factors that make the ordinary pelvic examination incomplete and unsatisfactory in certain cases.

Preparations

In preparation for this examination the patient's bowels should be moved with a purgative on the previous day and the rectum should be cleared out with an enema some hours before the examination. The same preparatory examination of the heart, lungs, and urine should be made as though anesthesia were for an operation. Have ready a light, strong tenaculum forceps, so that the cervix may be caught and the uterus pulled down as desired. If the interior of the uterus is to be explored, the antiseptic preparation for curettage must be carried out and the instruments prepared.

Examination Methods

The principal manipulations employed in examination under anesthesia are as follows:

1. Bimanual palpation of pelvic interior.
Vaginoabdominal palpation.
Rectoabdominal palpation.
2. Uterine investigation.
Curettage.
Conization of cervix for specimens.

Vaginoabdominal Palpation

In vaginoabdominal palpation under anesthesia, the same manipulations are employed and the same facts concerning normal and abnormal pelvic structures are sought as in the ordinary vaginoabdominal (bimanual) examination. Under anesthesia, however, the examination is much more thorough, as deep palpation may usually be made in all portions of the pelvis.

In the examination under anesthesia, the manipulations must always be made carefully and gently, otherwise a collection of pus may be broken open internally, causing peritonitis, or the sac of a tubal pregnancy may be ruptured, causing hemorrhage.

Rectoabdominal Palpation

The rectoabdominal palpation under anesthesia is made for the same purpose as the vaginoabdominal palpation and in the same way except that a finger of the gloved hand is introduced into the rectum instead of into the vagina.

Much additional information may in this way be obtained in some cases because, under anesthesia, the finger can pass farther up the posterior surface of the uterus. By catching the cervix with a tenaculum forceps and pulling the uterus downward, the posterior surface of the uterus and the ovaries and the broad ligaments may be palpated with but little intervening tissue.

Curettage

Curettage for diagnostic purposes is carried out the same as regular curettage for therapeutic purposes. Tissue is thus obtained from all portions of the endometrium for microscopic examination. Consequently, if in the subsequent microscopic examination no malignant tissue is found, we may be fairly certain that there is no malignant disease. Furthermore, regular curettage under anesthesia combines with its diagnostic value a decided therapeutic effect, for it removes the diseased endometrium and diminishes bleeding and discharge. As will appear later, curettage is often indicated in a particular case by both therapeutic and diagnostic considerations.

If there should be any suspicion of carcinoma high in the cervical canal, curette that part of the canal and put the curettings in a separate bottle. The lower part of the cervical canal is included in conization specimens.

Collecting Curettings

In a diagnostic curettage, observe the following points, which assist the pathologist in his work :

1. Put citrate solution (2 per cent sodium citrate) in the vagina, so that it will be carried into the uterine cavity with the curette. Keep adding more citrate solution to prevent clotting on the specimens.

2. Remove the endometrium from all parts of the uterine cavity, so that no small area of carcinoma could be missed.

3. Put all the curettings directly into a basin containing citrate solution. It is preferable to wash them out of the vagina with the citrate solution, so as to avoid handling.

4. Pour the solution containing the fragments through gauze, and then transfer all the tissue fragments, without compression, to a small bottle containing 10 per cent formol, and send to the laboratory. If no formol is at hand, 95 per cent alcohol may be used.

5. If the pathologist is in a distant city, the little bottle should be corked securely and put in a mailing tube or wrapped with cotton and otherwise packed securely for safe transmission.

6. With the specimen, send a note stating the nature of the specimen (curettings from within uterus), when obtained, name and age of patient and some of the important facts in the history of the case. Always give the date of the last menstruation, as the phase of the menstrual cycle at which the specimen is removed has an important bearing on the differential diagnosis in many cases.

Conization of Cervix for Specimens

This excision of all the cervicitis area of the cervix as a therapeutic and diagnostic measure is carried out as described in detail under Chronic Cervicitis in Chapter VII. Its advantages over the old obsolete method of clipping out a small specimen have already been explained in this chapter under Securing Adequate Cervix Specimen.

The cervicitis area may be excised by conization with the electric cutting wire or by conical excision with the knife. The former is preferable where the proper current machine is available, for the latter entails more bleeding and extensive suturing.

Aspiration of Fluid

Ascites. Ascitic fluid obtained by paracentesis may give information as to a causative or associated pelvic growth. All the fluid should be centrifuged and the residue blocked and cut and stained. Tumor cells thus discovered may aid materially in diagnosis.

Pelvic Mass. Occasionally it is advisable to aspirate fluid from a mass in the cul-de-sac, to see whether it contains blood or pus or clear fluid. But before doing so, the points for and against aspiration should be carefully considered, that there be no undue risk in obtaining information that might be better obtained some other way. Exceptionally, an adherent loop of bowel, distended with feces or tense from gas, will give the impression of a cyst or other abnormal mass.

Intra-Abdominal Inspection

When the ordinary methods of pelvic examination fail to furnish sufficient information for a diagnosis which is urgent, intra-abdominal inspection is to be considered. Such inspection may be accomplished through a puncture of the abdominal wall and the use of a specially designed endoscope or through the regular laparotomy incision.

Through Endoscope (Peritoneoscope).—Much work has been done in developing a practical instrument and technique for peritoneoscopy. Ruddock has given an excellent presentation of the subject, and the illustration is from his article. Fig. 312 indicates its pelvic application in combination with movement of the organs by fingers in the vagina. Peritoneoscopy seems par-

ticularly useful in upper abdominal conditions where satisfactory internal palpation cannot be carried out, as it usually can in the pelvis. It is being tried out extensively in abdominal and pelvic cases, and the results attained will determine its place in pelvic diagnosis. When under consideration in any case the advantages and disadvantages should be carefully compared with those of abdominal incision.

Through Incision.—Abdominal incision permits thorough inspection of different sides of a growth, and in addition allows palpation of the lesion, breaking of adhesions and detailed exploration to determine definitely whether or not removable, and removal if such is found feasible. When finished, the surgeon knows definitely the character of the mass and whether or not re-

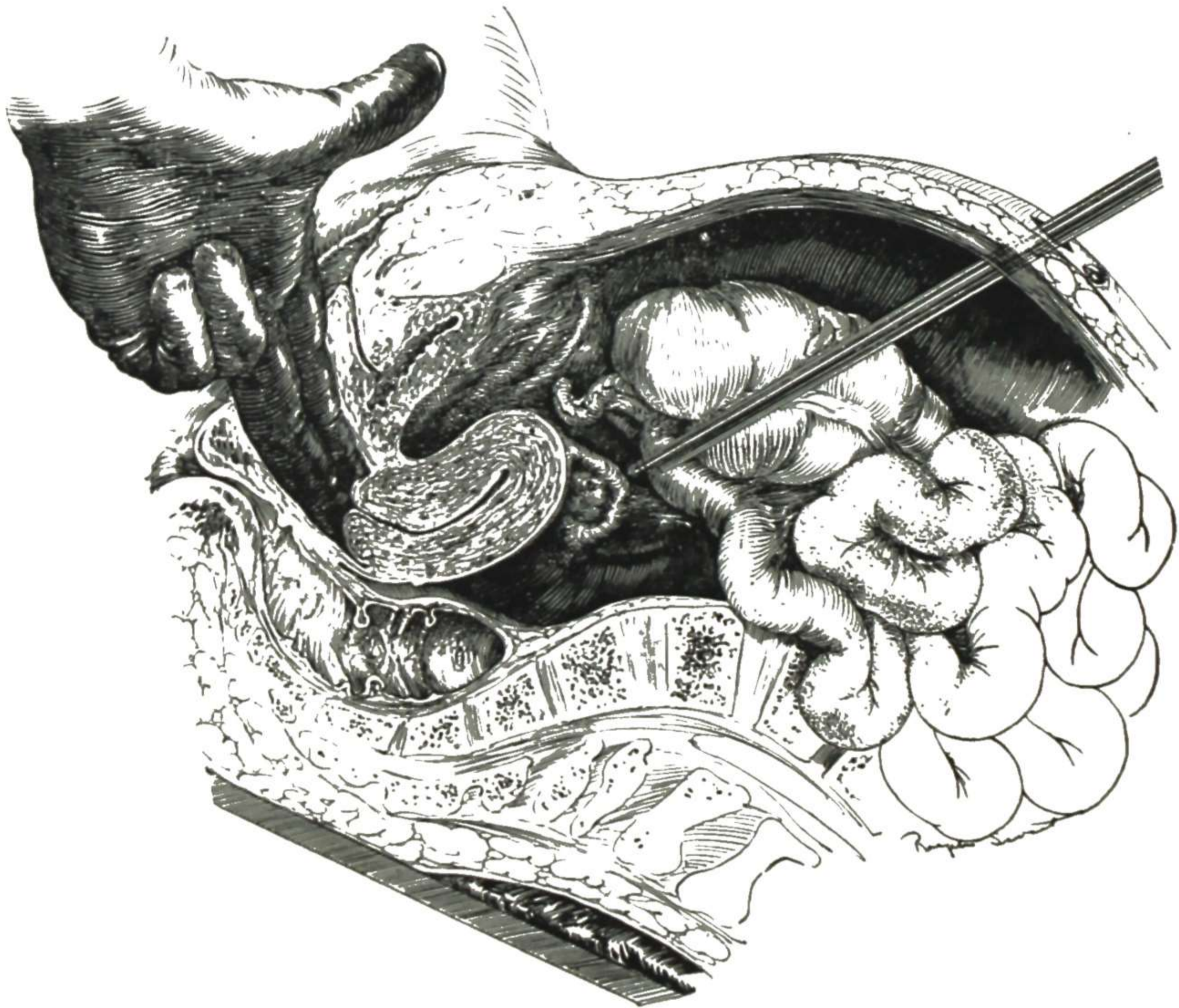


Fig. 312.—Peritoneoscopy, with a special endoscopic tube and pneumoperitoneum. The pelvic structures may be moved by fingers in the vagina to bring different parts into view. (Ruddock—*Surg., Gynec. & Obst.*)

movable and if so it has been removed. If not removed, the family knows beyond a doubt that it is irremovable and that no further operative work is advisable. The decisive thing, in choosing between peritoneoscopy and regular incision, is not simply how much can be seen through a tube in a puncture-wound but which procedure will be most beneficial to the patient when everything is considered.

Endocrine Investigations

The various extragenital examinations mentioned in the list of examination measures belong to general medicine, where the methods are given in detail along with the diseases concerned. It seems advisable, however, to make particular mention here of endocrine disturbances. Endocrine deficiencies caus-

ing pelvic disorder are sometimes first recognized by some general manifestation. These signals should be known and heeded in seeking the cause of pelvic disturbance and planning treatment.

There are certain bodily changes that point to serious endocrine disturbances having a bearing on the origin of pelvic symptoms. These disturbances are due to defective functioning of the system of endocrine glands—the normal



Fig. 313.—Diagnostic facial signs in myxedema (hypothyroidism). Before treatment (left) and after treatment. (Engelbach—*Endocrine Medicine*, Charles C Thomas.)



Fig. 314.—Same patient as shown in Fig. 313, side view. (Engelbach—*Endocrine Medicine*.)

balance of influences being disturbed by hypoactivity or hyperactivity of one or more glands, with resulting reactions on the remaining parts of the system.

Thyroid disturbance is a very frequent endocrine disorder affecting the functioning of the pelvic organs. In regard to diagnosis, the pulse and blood pressure are, of course, recorded as part of the general check-up, and indicate the general physical tone of the patient, in addition to any special significance of other findings. Ascertainment of the basal metabolism rate is indicated when

the pulse is rapid and the patient on nervous tension, as shown by being excitable and "jumpy." In such cases it is important to know whether or not hyperthyroidism is present in planning treatment, and particularly before undertaking any serious operation.

In depressed individuals, always tired and never buoyant, the basal metabolism test often shows a depressed state of metabolism which can be greatly improved by the judicious administration of thyroid, with consequent improvement in pelvic disturbances. In the menopause period especially, hypothyroidism is a frequent complicating condition, and must be recognized and treated along with other endocrine troubles (Figs. 313, 314).

In regard to other endocrine disturbances, the complexity of the endocrine system and the various direct and indirect actions and reactions produce mixed clinical pictures. Confusing contradictions are met in the symptomatology of many cases, and a comprehension of any case requires considerable knowledge

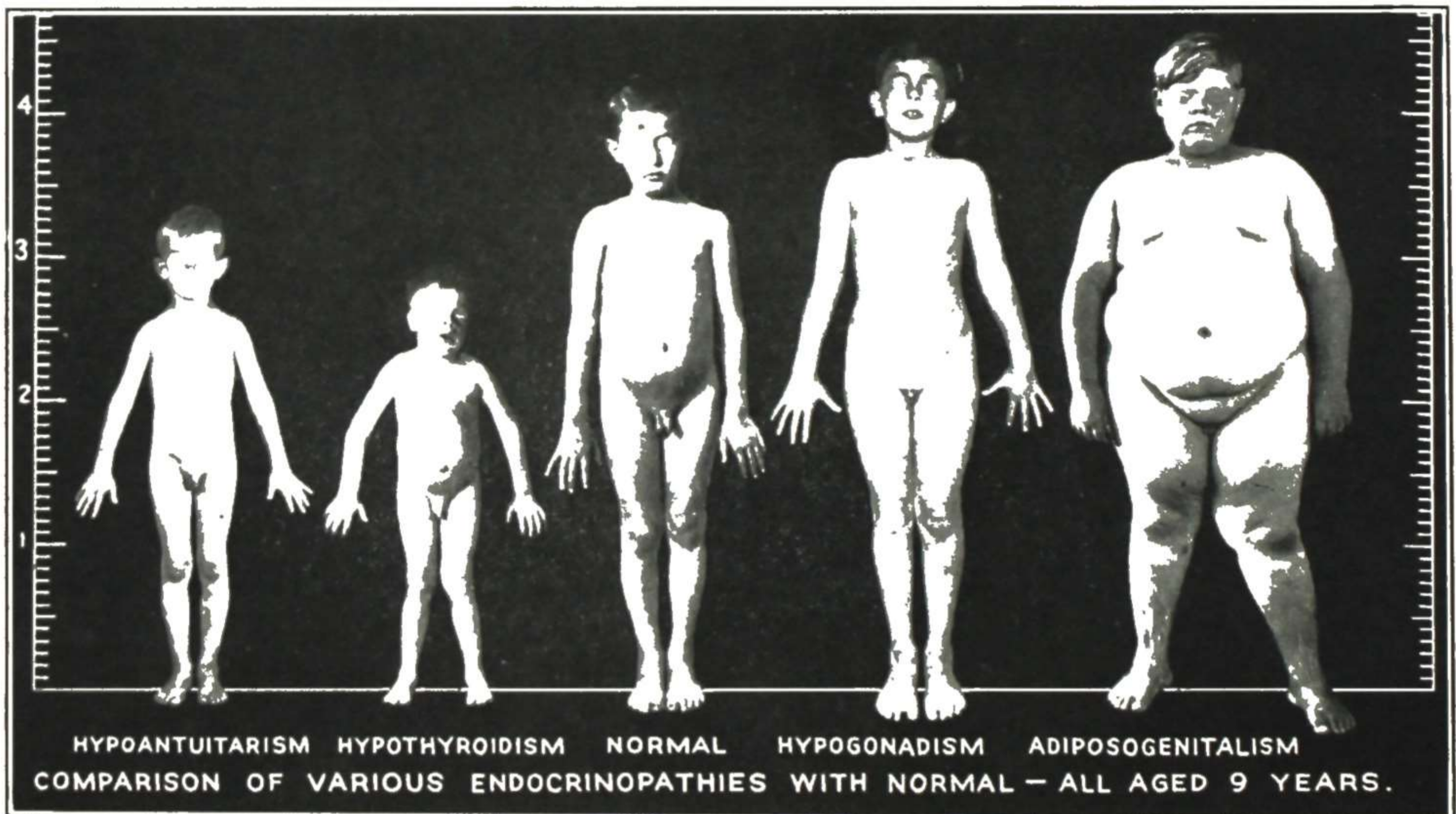


Fig. 315.—Showing striking characteristics of various endocrinopathies in patients of the same age (9 years) compared to normal child (center). (Turner—*Southern M. J.*)

of the whole subject. All we can hope to do here is to point out certain general signs which should arrest attention, and lead to detailed study of the case along these lines.

In childhood endocrine disorders produce their most serious and irremediable effects, and it is important to watch for them, particularly as the age of puberty is approached. Fig. 315 shows four children with endocrine disturbances compared with a normal child of the same age. In both sexes there is close coordination between the gonads and the general endocrine system, and disturbances centering in one or the other give rise to a great variety of symptomatic patterns.

The development of the underlying disorder is so gradual that it may be overlooked. The patient comes complaining of some apparently minor disorder, such as delayed beginning of menstruation or missing at times or exces-

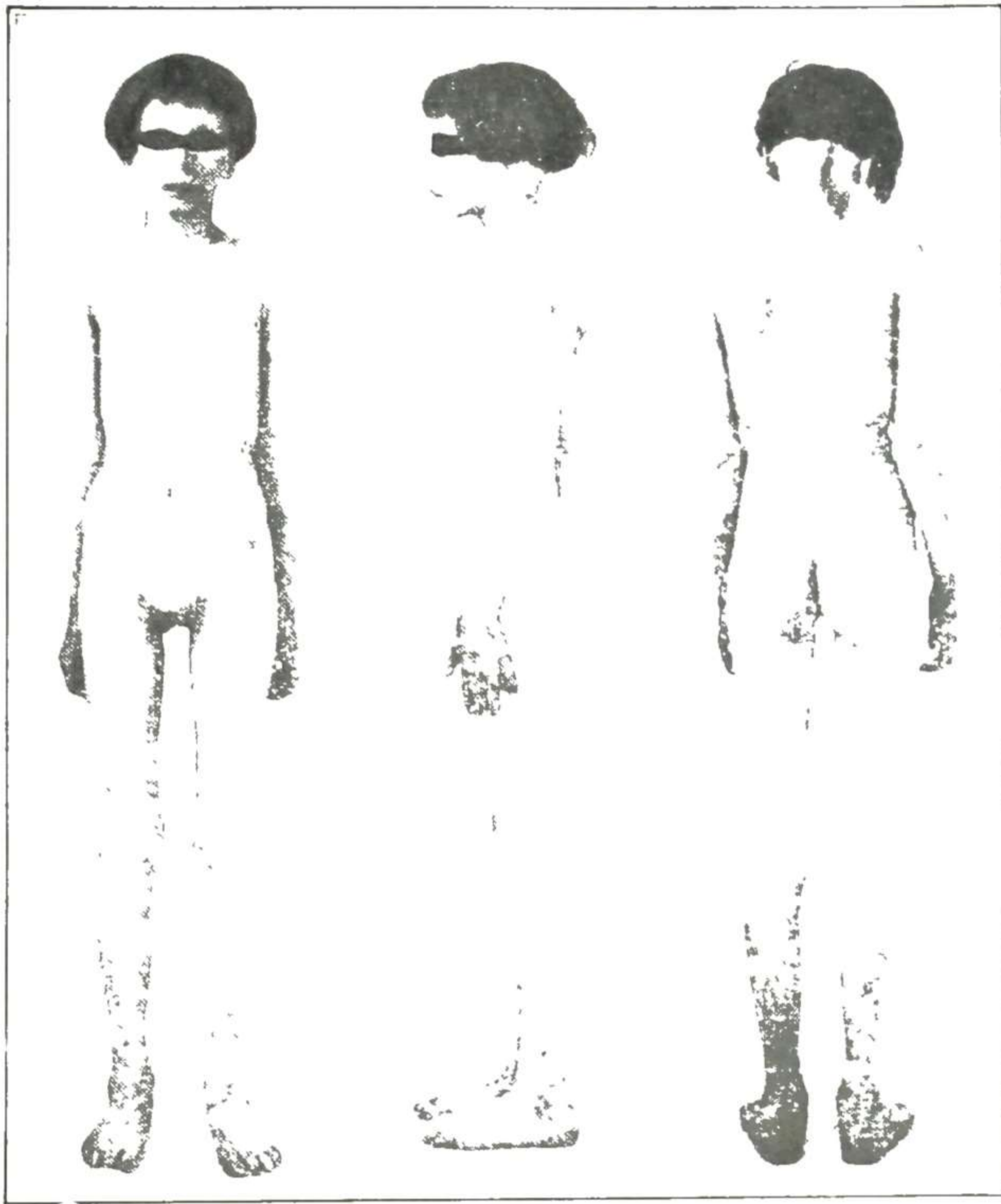
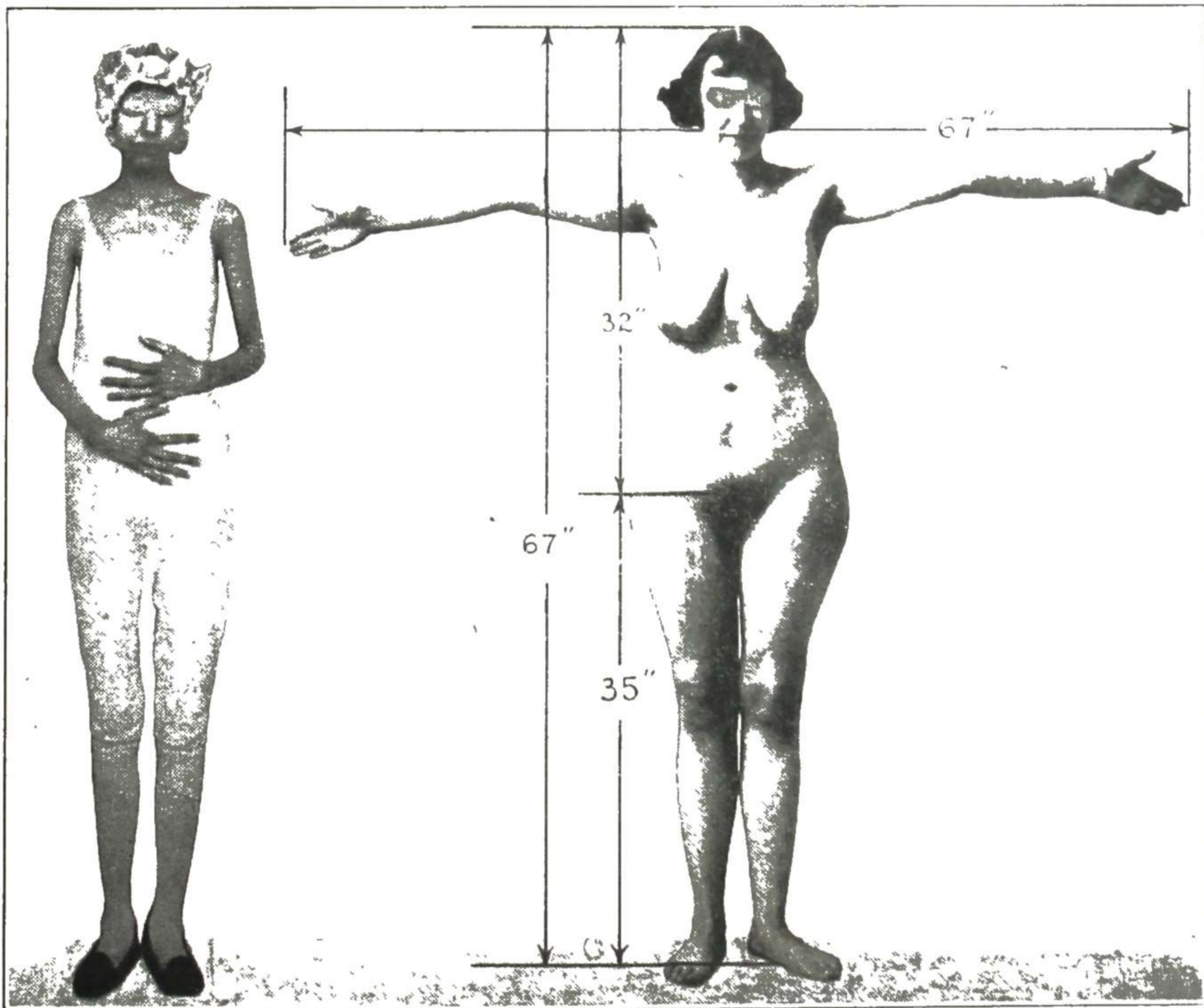


Fig. 316.—Primary hypogonadism in a fourteen-year-old girl. Note the eunuchoid build, absence of primary and secondary sex characteristics and malnutrition. (Turner—*Southern M. J.*)



A.

B.

Fig. 317.—Primary hypogonadism, (A) before treatment, (B) six months after replacement therapy. Note the classical eunuchoid measurements: height equalling span; lower exceeding upper. (Engelbach—*Endocrine Medicine*, Charles C Thomas.)

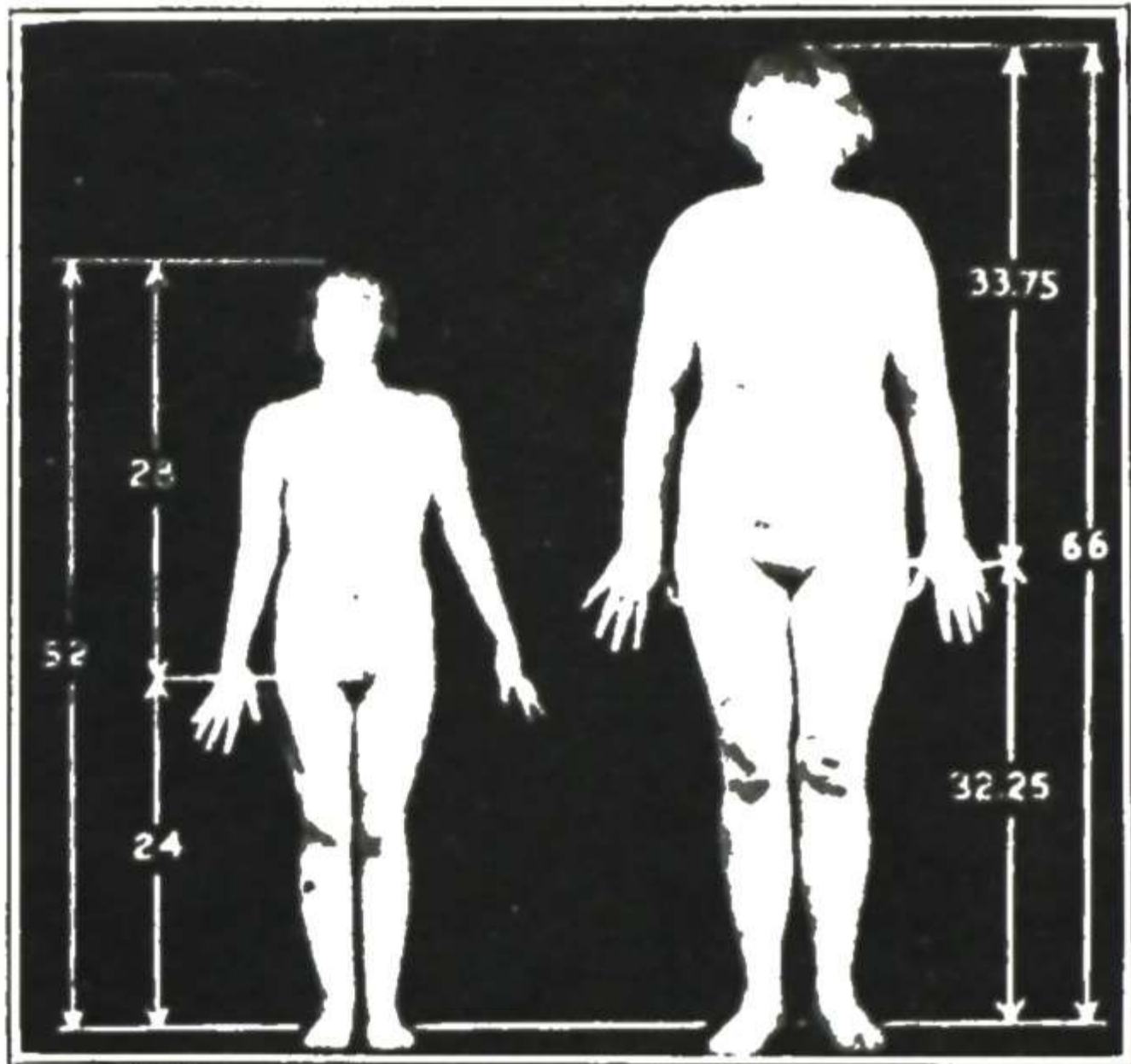


Fig. 318.

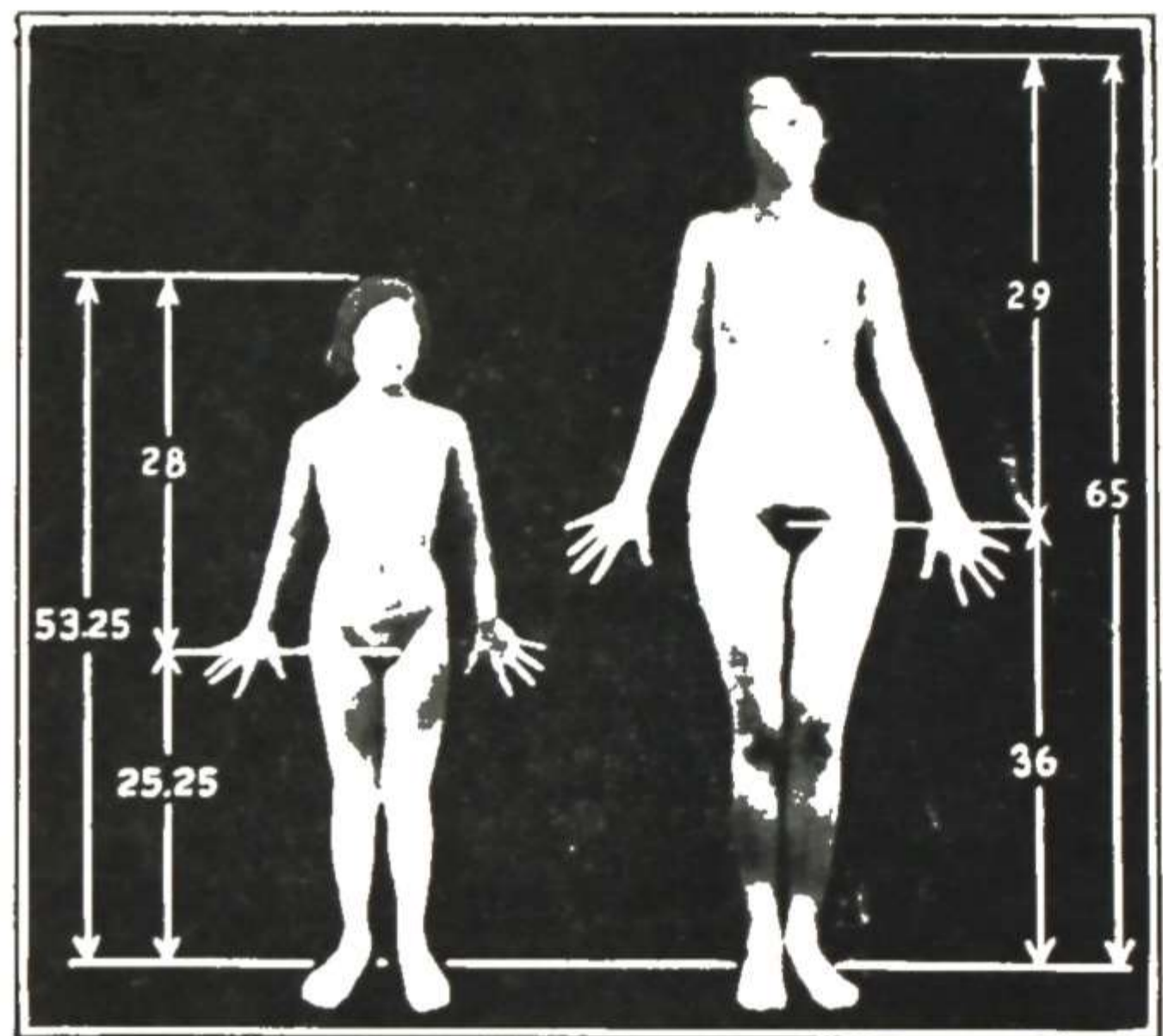


Fig. 319.

Fig. 318.—Hypoantuitarism (left), aged twenty years, compared with adiposogenitalism, aged thirteen years. (Turner—*Southern M. J.*)

Fig. 319.—Hypoantuitarism (left), aged sixteen years, compared with hyperantuitarism aged ten years. Contrast dwarfism and agenitalism with statural and genital overdevelopment of the latter. (Turner—*Southern M. J.*)

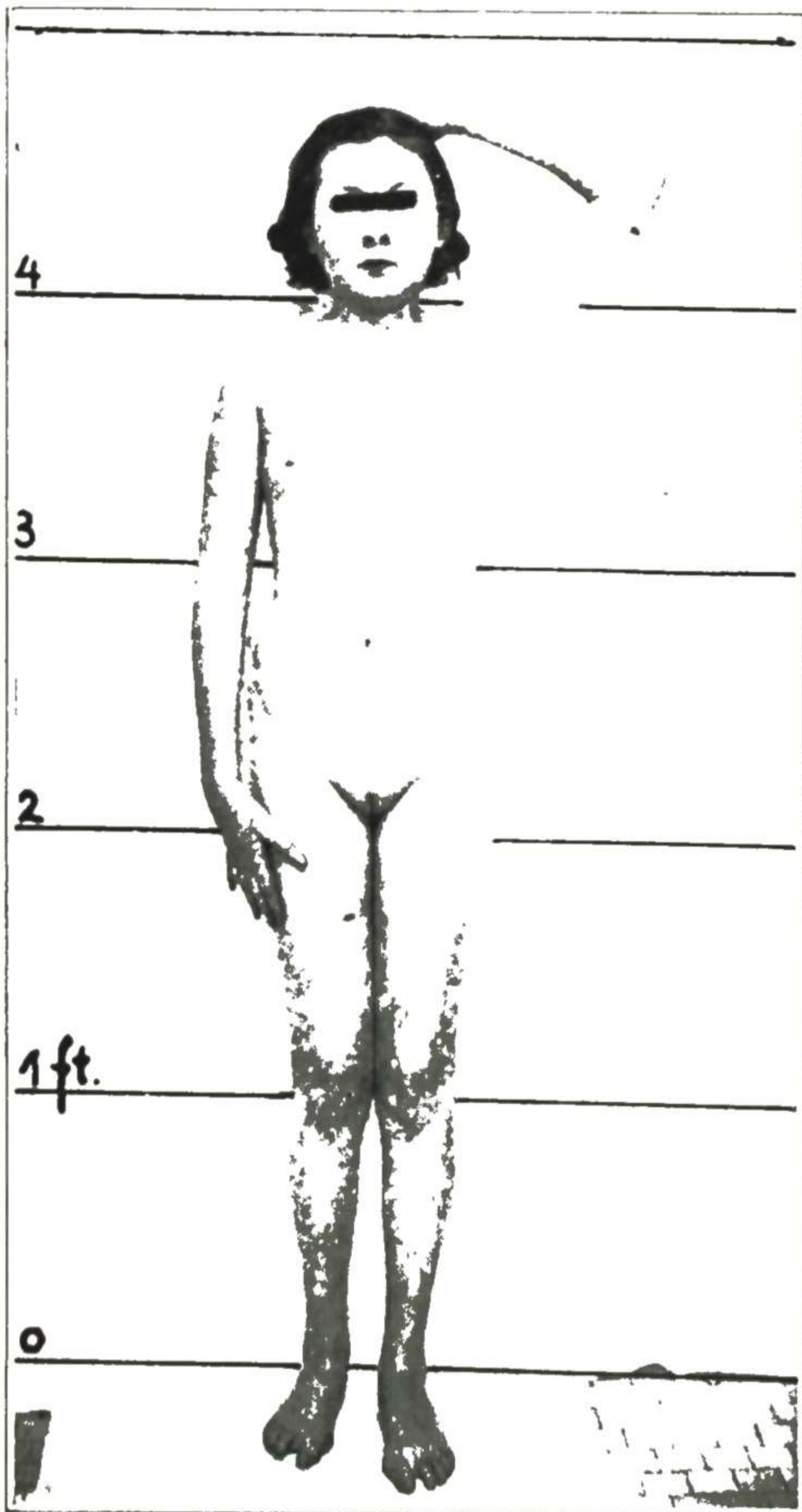


Fig. 320.

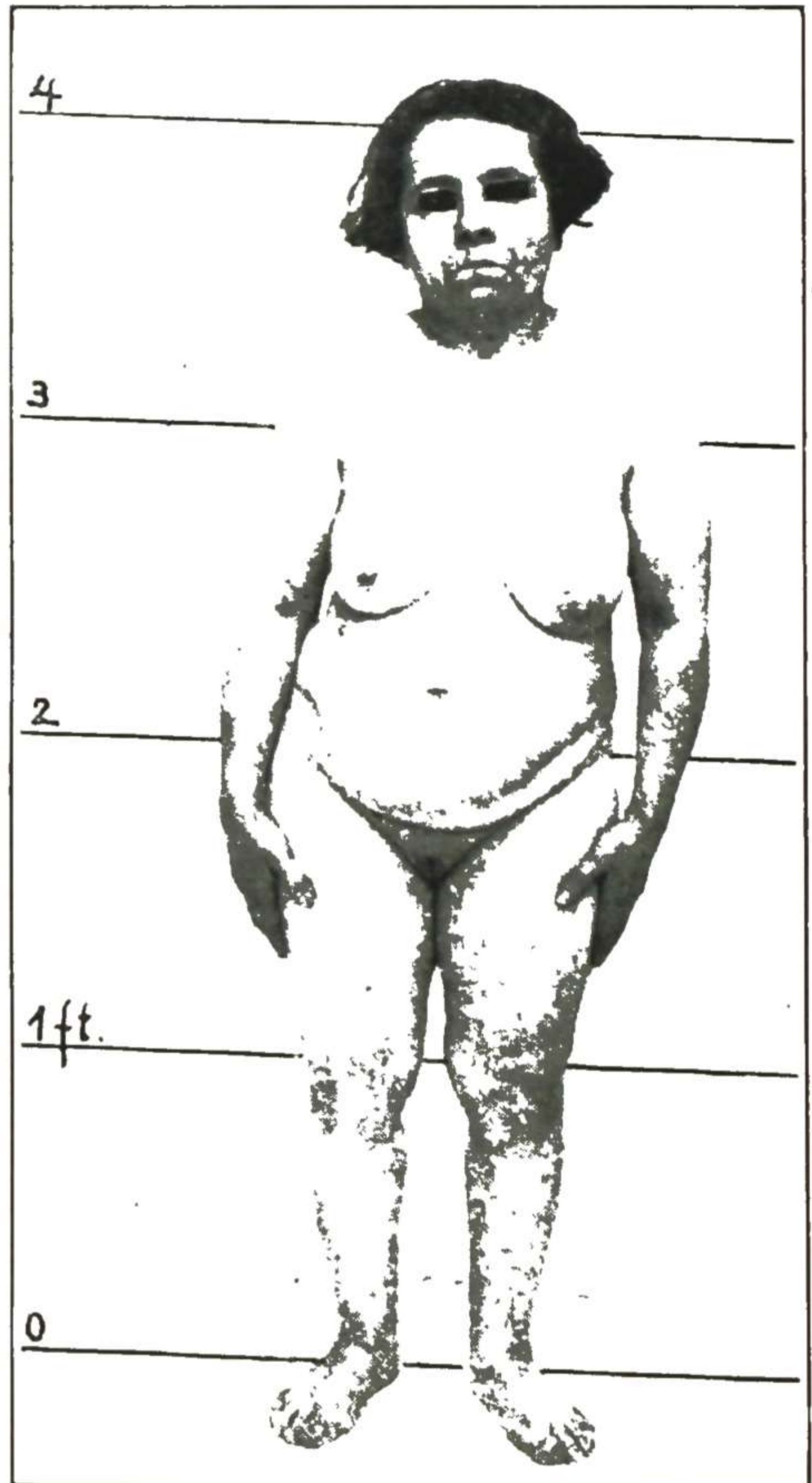


Fig. 321.

Fig. 320.—Pituitary dwarfism, Lorain-Lévi type. Age, eighteen years; height, 4 feet, 8 inches; gracile build; weight, 84 pounds; progeria; never menstruated; poor development of secondary sex characters. Patient has large, eroded sella, but no eye symptoms. To be operated upon. (Frank—*Endocrine Aspects of Gynecology*, Thos. Nelson and Sons.)

Fig. 321.—Pituitary dwarfism, Fröhlich type. Adult female, 4 feet, 3 inches in height; deficient pubic and axillary hair; amenorrhea; sterility. (Frank—*Endocrine Aspects of Gynecology*.)

sive menstruation, with perhaps an incidental remark that she is too stout or too thin. Fig. 316 shows an amenorrheic girl of fourteen with serious functional disorder of the pituitary and gonads. Fig. 317 shows what recognition of the trouble and appropriate treatment can do, even though treatment was begun too late to change the bony maldevelopment.

In Figs. 318 to 321 are shown departures from normal statural development resulting from unrecognized, and hence long-continued, pituitary and gonadal endocrine disorders. Hirsutism, or abnormal hair development on face and body, called also hypertrichosis, may be caused by gonadal disorders of

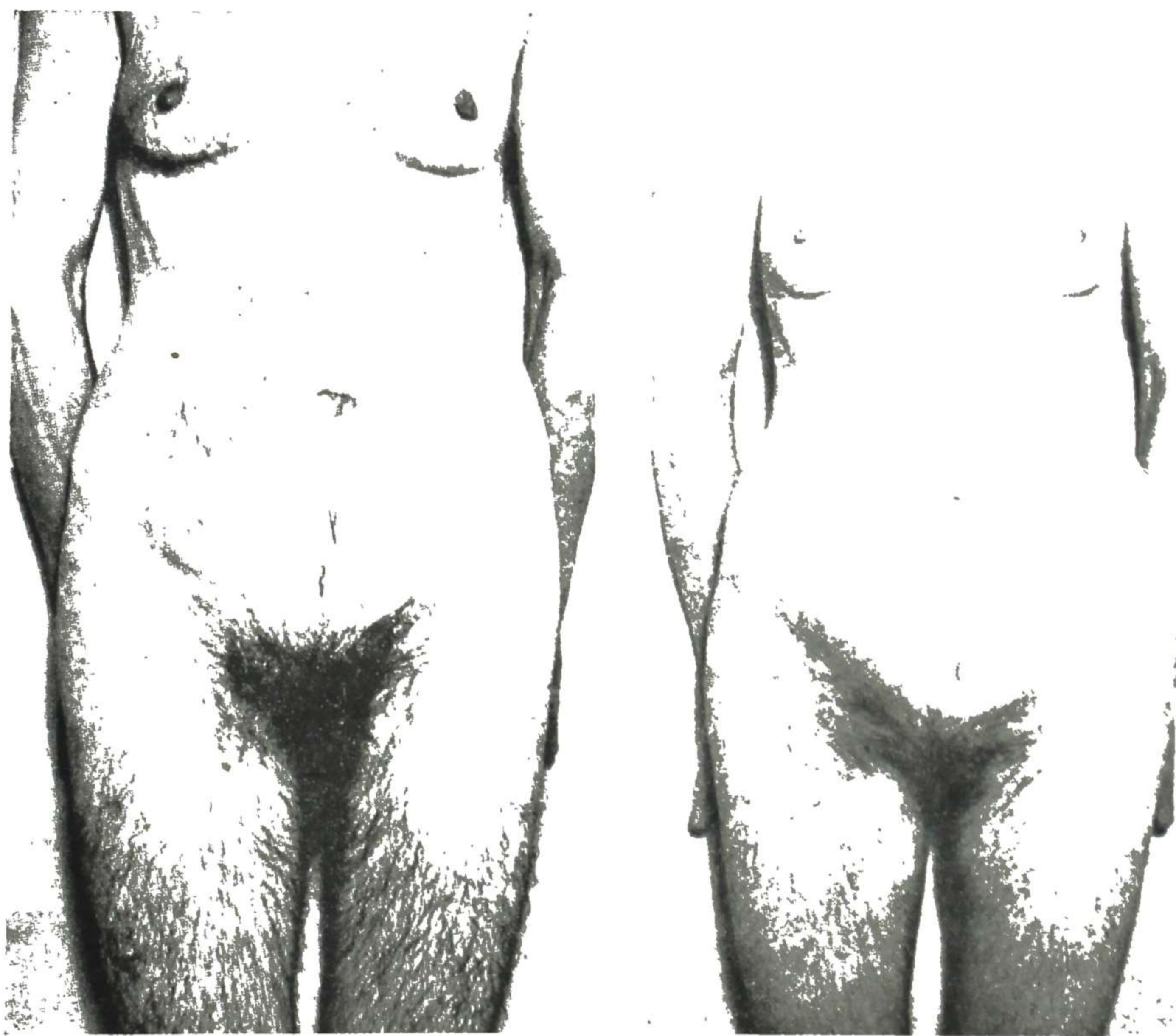


Fig. 322.

Fig. 323.

Fig. 322.—General hirsutism from an arrhenoblastoma of the ovary.

Fig. 323.—Disappearance of excess hair after removal of the ovarian tumor. (Maxwell—*West. J. Surg.*)

various types. The particular location and distribution of the abnormal hair indicates whether the gonadal disturbance is of the hypertype (increased femininity) or of the hypotype (tendency to masculinity). Fig. 322 shows development of general hairiness due to an arrhenoblastoma of the ovary. Fig. 323 shows the return to normal after removal of the tumor.

Endocrine cases present certain history items and examination findings which identify them. Some of this information is brought out in the ordinary history and examination, while some requires special inquiry and investigation.

The items of special importance in the differentiation are as follows:

1. History items of special importance:
 - a. Menses: age of onset, regularity, duration, amount.
 - b. Weight: loss or gain, with time involved.
 - c. Hair: texture, distribution, premature graying or undue falling out.
 - d. Headaches: locations, type, duration.
 - e. Vision: glasses necessary or other disturbance.
 - f. Gastrointestinal symptoms.
 - g. Nervous symptoms: irritability, depression, crying spells.
 - h. General symptoms: Does patient tire easily? Is she sleepy most of the time? What are her habits of sleep, exercise, work about the home, study, recreation at home, vacation activities?
2. Examination items of special importance:
 - a. Type of build: measurements symphysis to floor, symphysis to crown, span from finger tips to finger tips.
 - b. Lean or fat; if fat, note distribution.
 - c. Secondary sex characteristics: hair distribution and texture, breast development, vulvar hair growth and development of parts (labia, clitoris).
 - d. Blood pressure and pulse; basal metabolism rate.
 - e. Findings in the vaginoabdominal and rectoabdominal palpation. Is the uterus fully developed in size and location (well forward) or is it very small and still in backward position, with tendency to prolapse on exertion?

From the gynecologic standpoint it is convenient to group clinical pictures under two main headings: hypogonadism and hypergonadism. At first thought it may seem that these two opposite conditions should present clear-cut clinical pictures, with opposed symptomatology; but such is not the case, and a second thought will show reasons for the confusing mixture of symptoms. Gonadism represents the activity of the gonad gland (ovary in female and testis in male) with the influences back of it, and the primary and secondary changes which its activity produces. The normal activity of the ovary and testis is opposed in some particulars. Some things which are normal in the male constitute abnormal symptoms (masculinity) in the female, and vice versa.

Hypoactivity of the gonad causes a masculine shift in the female and a feminine shift in the male. On the other hand, hypoactivity of the anterior pituitary (the activator of the gonads) produces some effects (growth disorders, etc.) which are identical in male and female and other effects (through the gonads) which are opposite in male and female.

Still another item to be considered is the fact that potentially testicular cells are found in the ovary and potentially ovarian cells in the testicle. Now in such a female patient, the symptoms of masculinity may be due to hypogonadism affecting the female cells or to hypergonadism affecting the male cells. In this individual, hyperfunction of the anterior pituitary may produce femininity or masculinity, depending on which group of cells in the complex ovary is most stimulated. Also some conditions, for example a tumor, may at first stimulate cells to hyperfunction and later destroy them, producing hypofunction, with a resulting shift in the symptomatology. Furthermore, the structural changes, which are such a striking feature in certain endocrinopathies, depend to some extent on the age of incidence of the disease. Tallness (due to delayed union of long-bone epiphyses), which is characteristic of hypogonadism of early incidence, will be absent in a case in which the hypogonadism does not come on until after epiphyseal union.

These various possibilities must make one cautious in interpreting the significance of the symptoms and signs encountered—even of the marked ones which are so striking that it would seem they should be pathognomonic of some particular lesion. However, the following classification should aid materially in the understanding of the diagnostic significance of the signs and symptoms presented by these patients as they come to the office seeking treatment.

TYPES	CAUSES	SPECIAL SYMPTOMS	
HYPOGONADISM <i>Genital Symptoms</i> Menstruation absent or scanty. Sterility or miscarriages. Libido absent or diminished. Poor development of genitals and sex characteristics. Tendency to masculinity. Deficiency in sex hormones. <i>General Symptoms</i> Weak, tired, atonic. Poor appetite and tendency to nausea, vomiting. Basal metabolism normal or low. Structural signs depend on type (ovarian, pituitary, thyroid, or adrenal).	Primary (ovary at fault) <ul style="list-style-type: none"> Underfunction of ovary Castrated or menopause Arrhenoblastoma 	If early—patient thin, poorly muscled. Delayed union of long bone epiphyses, tall, longer below pubes than above (Figs. 316, 317, A).	
		Secondary (other glands at fault) <ul style="list-style-type: none"> Pituitary Thyroid (hypothyroidism) Adrenal (tumor late stage) 	Tendency to obesity and neurovascular disturbances (hot flushes, depressed). Masculinity tendency is marked.
			Anterior lobe (hypoparathyroidism) <ul style="list-style-type: none"> Bilobar (adiposogenitalis)
	Depressed, easy to weep or be irritated. Fat deposits, coarse hair, myxedema. Basal metabolism low and blood pressure low. (Figs. 313, 314.) Masculinity—marked development of male characteristics.		
	HYPERGONADISM <i>Genital Symptoms</i> Early sexual maturity. Free menstruation. Fertile. Libido increased. Excess of sex hormones. <i>General Symptoms</i> Energetic, hyperactive. Good musculature. Normal fat. Basal metabolism normal or high. Structural changes depend on type (ovarian, pituitary, thyroid, adrenal).	Primary (ovary) <ul style="list-style-type: none"> Overfunction of ovary Granulosa-cell tumor 	Excess menstruation. Endometrial hyperplasia.
			Secondary (other glands) <ul style="list-style-type: none"> Pituitary (hyperparathyroidism) Thyroid (hyperthyroidism) Adrenal (tumor early stage)
Statural overdevelopment, gigantism. Tall, well-muscled, no excess fat. Sexual overdevelopment (feminine). (Fig. 319.)			
Mixture of hyperthyroid symptoms with sexual speeding-up.			
Hypertrichosis (Fig. 322) and usually a tendency to male type. Musculature firm, athletic type. Some adiposity. Early epiphyseal union, short, stocky.			

Pregnancy Tests

When the diagnosis of pregnancy is not clear from the physical examination signs, there are two courses to follow in obtaining additional diagnostic information. When there is no urgency, a wait of four to six weeks and another examination will probably settle the matter without the expense of special laboratory tests. When there is urgency, on account of the pelvic condition or the patient's anxiety to settle the uncertainty, there are reliable tests which aid in the diagnosis.

These tests are based on the fact that pregnancy increases the manufacture of the pituitary-like gonadotropic hormone, which consequently is found in excess in the body and in the body excretions, such as the urine. This hormone has the property of stimulating ovulation and corpus luteum formation

in the quiescent ovaries of animals into which it is injected. It resembles, but is not identical with, the gonadotropic hormones of the anterior pituitary gland, and is supposed to be of placental origin.

The test is made by injecting an animal (mouse, rabbit, rat) with urine from the supposed pregnant patient. The animal is killed after a certain interval (usually 36 to 48 hours) and the ovaries are examined for evidences of ovulation and corpus luteum formation. As these appear normally in the animal when cohabiting, care must be taken to separate the test animals from the males or use immature animals. As an additional precaution, and to avoid confusing conditions from previous ovulations, immature animals are usually used.

As to diagnostic reliability, it must be kept in mind that the test is not for pregnancy directly but for a certain hormone in quantity which is usually due to normal pregnancy, but which may be present also in various abnormal conditions associated with pregnancy and even in conditions in which there is no pregnancy and has been none for many months. Such quantity reactions in the nonpregnant are due to the persistent activity of isolated fetal cells remaining from a former labor or abortion, usually in the form of a chorio-epithelioma in the uterus or elsewhere. When such a tumor is present, the hormone may run to enormous quantities, far exceeding that of normal pregnancy. Another point is that the diagnosis of pregnancy depends on the amount of reaction. The reaction in the animal ovaries must be marked, for smaller reactions may be caused by ordinary ovarian tumors and other nonpregnant conditions. Other possible sources of error are the animal and the technique employed. With these precautions the Aschheim-Zondek test and its modification by Friedman have proved remarkably reliable in both the "positive" and "negative" phases, running 94 to 98 per cent correct in large series of cases.

Aschheim-Zondek Test. This pregnancy test, reported in 1928 and critically tested since then, uses immature mice of a certain age-weight, and five of these are given a subcutaneous injection of one-half c.c. of the filtered urine three times daily. In four days after the first injection the five mice are killed and the ovaries inspected for evidences of ovulation and corpora lutea. In two thousand tests carried out by Aschheim, he obtained the remarkable accuracy of 98 per cent correct positive reactions and 99.5 per cent correct negative reactions.

Friedman Test. This modification of the Aschheim-Zondek test was reported in 1929. It uses a rabbit instead of the five mice. The details, various modifications, points of special interest and reliability of this test and the Aschheim-Zondek, are given in an instructive article by Weisman, from which the following quotation is taken:

"Comparison of the Aschheim-Zondek and Friedman Tests: Many laboratory workers adhere to one or the other of the two tests, and it is simply a question as to which test one is accustomed. Aschheim and his followers maintain that the mice are infallible while Friedman and his supporters claim that the rabbit is more advantageous because the test is quicker, more economical and the rabbit is less easily killed by toxic substances and less bothersome as a test animal.

"In summarizing the comparative value of the two tests Crew states that both the Aschheim-Zondek and the Friedman tests are 99 per cent perfect. Crew maintains that 'a 90 to 95 per cent accuracy is not sufficient. . . . No test which yields more than 1 per cent of error can claim much support.' Dawson finds the mouse and the rabbit tests 99 per cent correct and positive within fourteen days after conception. Mack and Agnew

compared the two tests in 1,110 cases and found them equally exact. As more refined techniques are being introduced the personal error in each case will eventually dwindle and both tests at some future date should prove 100 per cent accurate in trained hands."

Randall, Magath and Pansch reported 645 patients who had the Friedman test, most of them because of doubtful conditions. This was a severe try-out, but there were only 17 patients (2.63 per cent) in which the ultimate diagnosis was at variance with the test result. This report is particularly valuable because of the special consideration of the patients who had some condition which interfered with the reliability of the test.

McCullagh and Cuyler discuss positive Friedman-test reactions in non-pregnant states. They obtained 241 positive Friedman tests in 2,134 individuals in whom neither pregnancy nor evidence of chorionic tissue was present. Though the test is extremely accurate and helpful, it must be remembered that occasionally nonpregnant conditions give a positive reaction. Hence the significance of the result of the test must be evaluated in conjunction with the clinical findings—that is, before deciding that a positive reaction means pregnancy we must exclude other conditions that may cause it.

In the extensive series in their instructive report, McCullagh and Cuyler found a positive reaction without pregnancy in various disorders of the pituitary, in gonadal deficiencies (as in the climacteric, at puberty, in functional ovarian disturbances, in ovarian tumors, and in men with testicular deficiency), in other endocrine disorders (hyperthyroidism, diabetes mellitus, adrenal hyperfunction or tumor), in depressed nutritional states with local manifestations such as skin and eye disturbances, and in disorders of the nervous system (epilepsy, hysteria, psychoses, arterial hypertension, and anorexia nervosa).

Other Pregnancy Tests. There are many other forms of tests. In fact, a large literature has grown up in the strenuous efforts to try out all possible ways and substances which offer hope of a simpler or quicker test for pregnancy. In modifications of the pituitary-like hormone tests other animals are used, including rats, guinea pigs, fish, and frogs. Other reactions also are used in some cases, for example, variations in skin coloration as in fish and frogs. Male animals have been used as in fish (color variation) and in rats and mice, injection of pregnancy urine causing changes in the seminal vesicles. Protozoa have been used, by observing under the microscope their actions on the addition of a drop of pregnancy urine. One reported test is based on the effect of pregnancy urine on the sprouting of seeds.

Much work has been done on a test based on the intradermal injection of antuitrin-S, which is made from pregnancy urine. This is known as the skin test or intradermal test, and is dependent on an allergic or other reaction to the injection when there are excess pregnancy hormones in the circulation. Another type which looms large in the literature depends on chemical testing of the patient's urine for the pituitary-like gonadotropic hormones and for other substances (Visscher-Bowman test and others). Special chemical sets for such tests have been devised for general use. Various types of pregnancy tests and also other articles on the subject will be found in the Reference List.

Many other hormone tests are used in endocrine investigations and diagnosis and treatment, but there is not space here for this complicated laboratory work, details of which can be found in listed articles.