



Fig. 316.—Carcinoma of the vulva. High power, showing a portion of the leukoplakic epithelium above and a nest of carcinoma cells below and to the right. Gyn. Lab.



Fig. 317.—Carcinoma of the vulva. Higher power of the nest of carcinoma cells, showing the variation in size, mitoses, and pearl formation. Note the round cell infiltration at the periphery. Gyn. Lab.

quency were: tumor, usually cystic and sometimes painful, and abscess with draining sinus accompanied by itching or tenderness.

Homan gave four diagnostic criteria for carcinoma of the Bartholin gland: typical vulvar site, position deep in the labia, connection with gland duct, and presence of intact gland tissue.

Because of the paucity of cases no conclusions can be drawn concerning prognosis or type of treatment. As can be seen in the table of the five patients who were still living after five years, four had had simple wide excision.

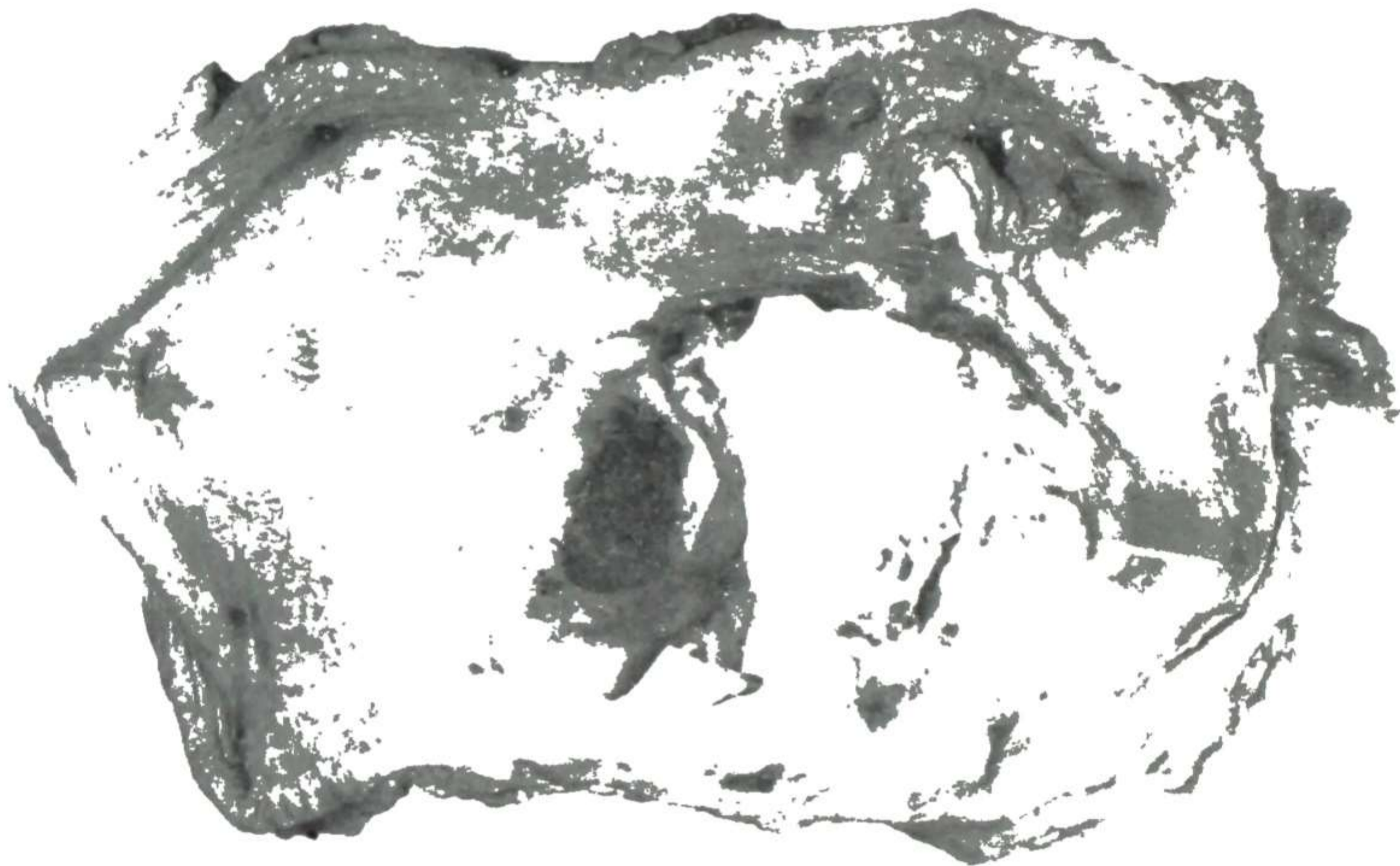
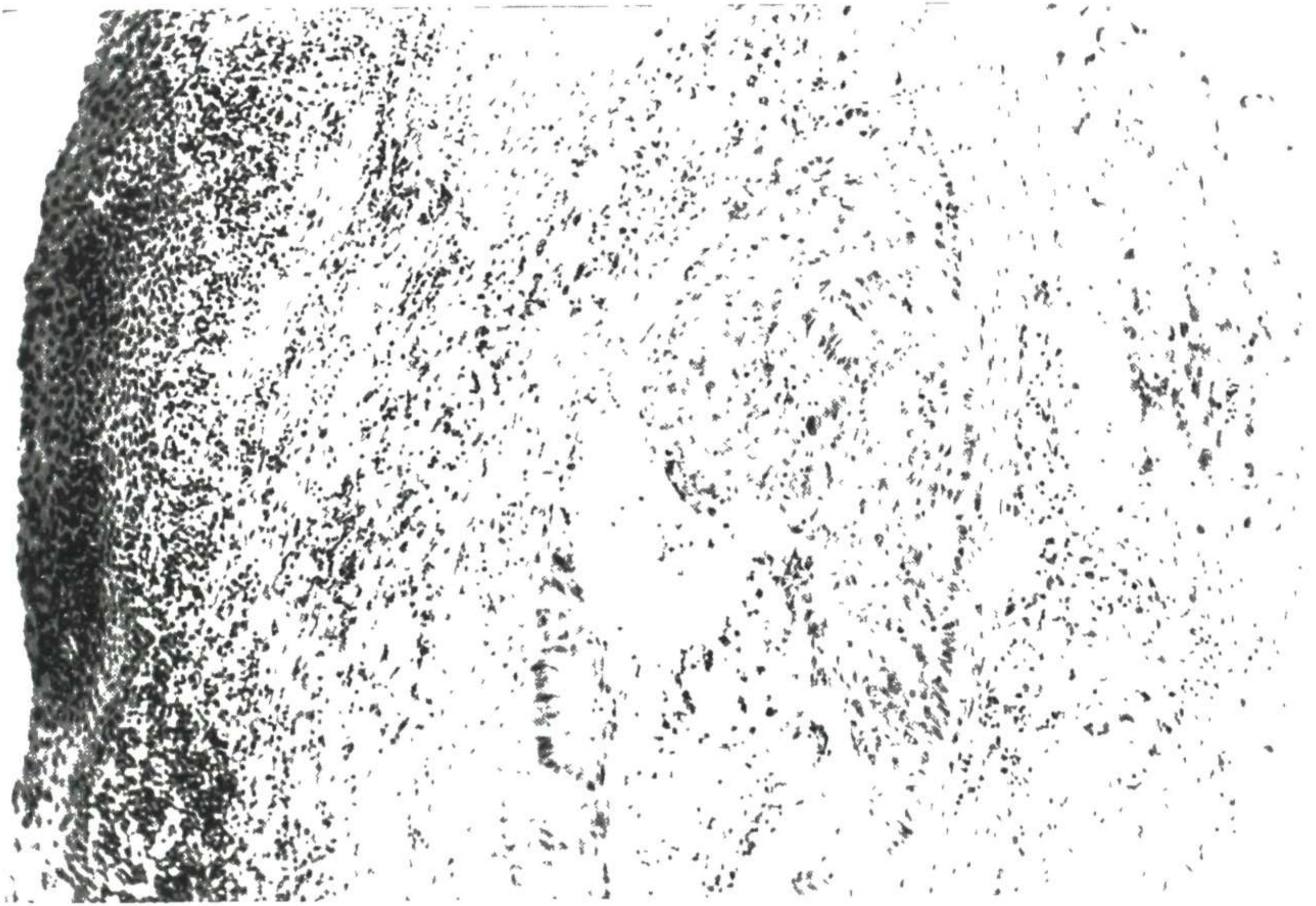


Fig. 318.—Specimen from the vulvectomy. In region of the right Bartholin gland there is a raised, firm area 1 cm. in diameter with superficial ulceration as shown. The clitoris can be seen above in midline. (From Crossen: *Am. J. Surg.*, April, 1948.)

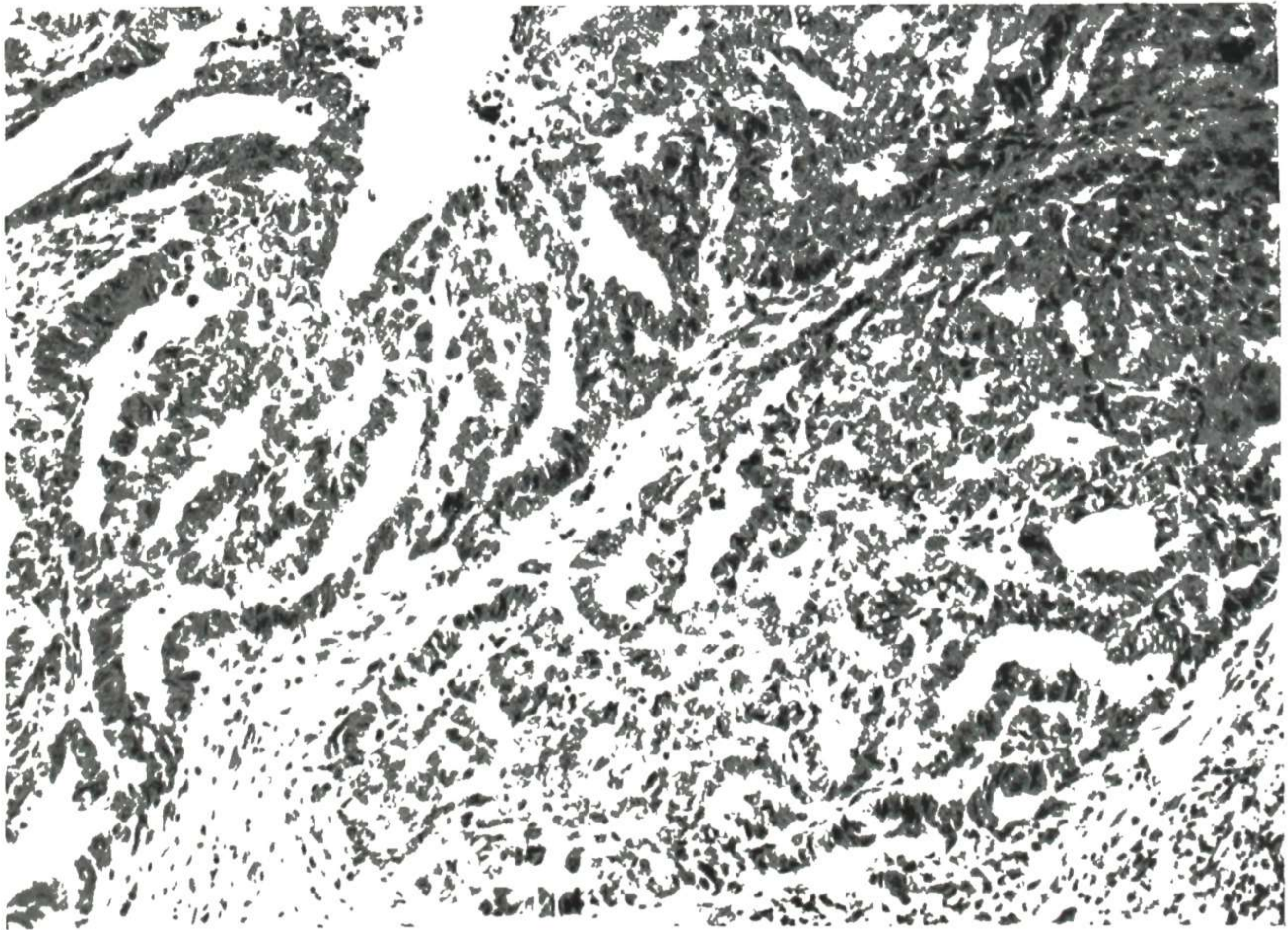
Epithelioma is the most frequent form. This begins usually on the lower portion of the labium majus as a small hard nodule with a bluish tinge, especially about the edge. The nodule grows slowly and at first may produce no symptoms. In some cases, however, even from the first there is severe pruritus. After a time, part of the nodule breaks down, forming a small ulcer which is surrounded by an area of induration (Figs. 320 to 323). There is a watery discharge sometimes mixed with blood. It may begin in the labium minus or in the clitoris (Fig. 320). After the malignant induration breaks down and ulcerates, the progress is rapid. The adjacent surfaces become involved in the destructive process, and in the later stages a large fungating mass may form. Fig. 324 is a photograph of a very extensive case of vulva cancer of three years' duration. This patient had a wide vulvectomy with bilateral gland resection, including those on each side of the iliac vessels as they passed under Poupart's ligament. She is alive and well six years later.

The relation of chronic vulvar irritation, particularly leukoplakic vulvitis, to the origin of cancer is indicated in the illustrations.

The inguinal glands become enlarged early, at first simply from the lymphatic enlargement that always takes place when there is inflammation or persistent irritation of the genital region. Later the glands become infiltrated



A.



B.

Fig. 319.—A, Section showing the adenocarcinomatous gland beneath the squamous epithelium of the vulva. B, Section showing a definite adenocarcinoma of the Bartholin gland. There are many anaplastic cells but there is as yet no evidence of invasion of the basement membrane and very few mitoses. A moderate inflammatory cell infiltration is present. (From Crossen: *Am. J. Surg.*, April, 1948.)



Fig. 320.

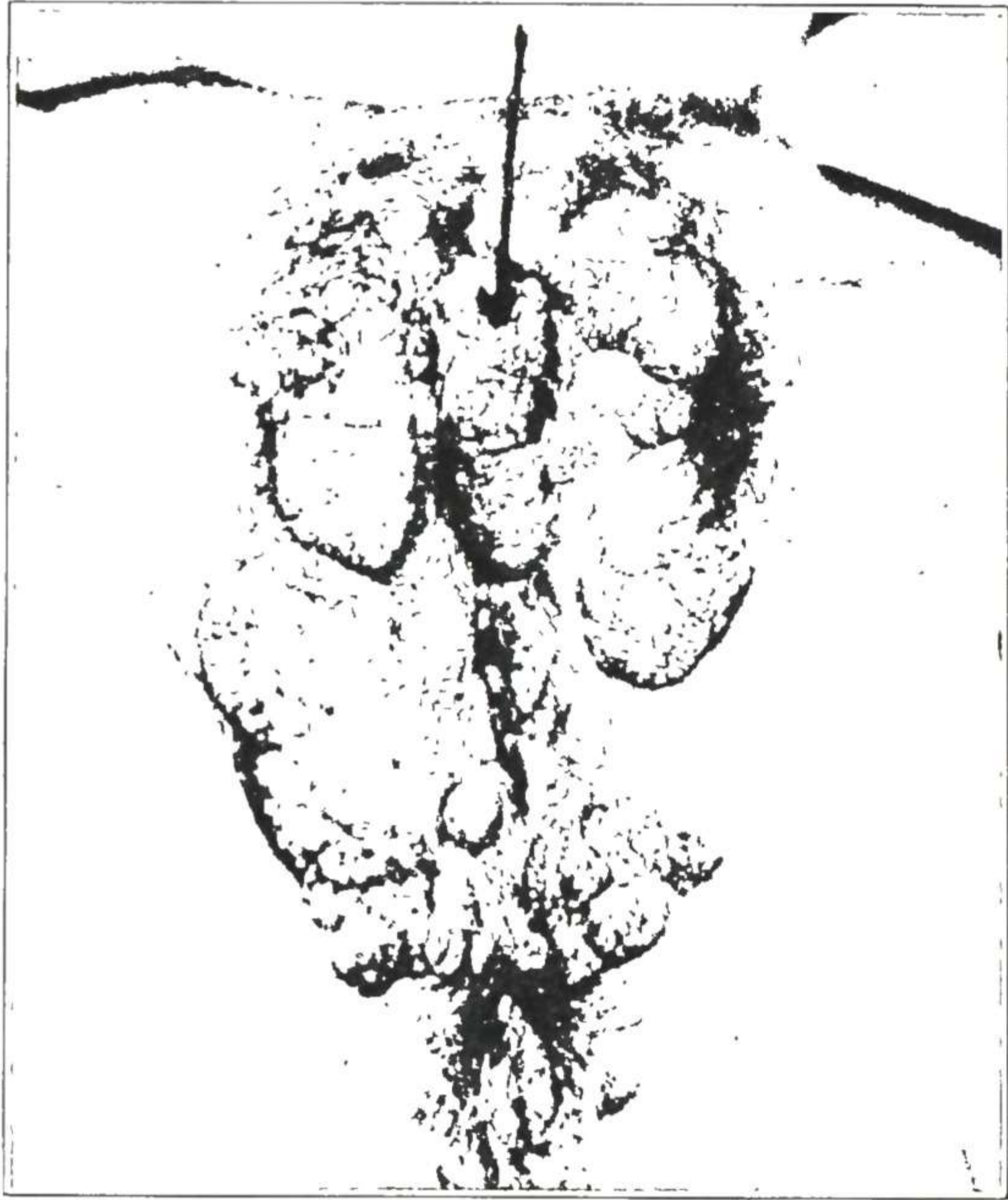


Fig. 321.

Fig. 320.—An epithelioma of the clitoris. (From Hirst: *Diseases of Women.*)

Fig. 321.—Carcinoma of clitoris, starting from condyloma. (From Taussig: *Tr. Am. Gynec. Soc.*)



Fig. 322.



Fig. 323.

Figs. 322 and 323.—Two patients with carcinoma of the vulva starting on a base of leukoplakic vulvitis. (From Taussig: *Tr. Am. Gynec. Soc.*)

with cancer cells and often are greatly enlarged. In the later stage the carcinomatous glands break down and ulcerate externally.

Diagnosis.—The patient may suffer from burning and superficial pain in the early stages, and later there may be severe pain from involvement of the deeper structures. Carcinoma of the clitoris has been observed and may be melanotic. The urinary meatus is another site where cancer occasionally develops after long-continued irritation; and in any persistent infiltration there, this condition should be considered. In all of these forms of growth, treatment in a very early stage gives the only probability of cure. Consequently, in the case of a suspicious ulcer or nodule in which the diagnosis remains doubtful after careful treatment for a short time, a piece of the margin of the area should be excised for microscopic examination (Fig. 315).



Fig. 324.—Extensive carcinoma of vulva mentioned in text. We treated this case by radical vulvectomy plus gland resection.

Treatment.—Early and wide excision with adjacent gland removal is the treatment to employ in operable cases. Taussig from his special study and large experience with vulvar cancer gives the following conclusions:

1. Early recognition and prompt adequate treatment are extremely rare in cancer of the vulva. In spite of this the disease, because of its relatively slow growth, offers a reasonably good prognosis.

2. Prevention of carcinoma of the vulva by early complete excision of the leukoplakic vulva should materially lower the incidence of the disease.

3. Radiologic treatment of the disease gives disappointing results and is usually attended by painful burns.

4. The complete modified Bassett operation gives splendid results in patients with operable lesions who are under sixty-five years of age. In older patients only those in better than average physical condition with relatively early lesions should be subjected to this procedure.

5. Approximately two-thirds of the cases of cancer of the vulva are still operable at the first examination. In those in whom a Bassett operation is done we can expect a five-year survival in about three out of five, even though two out of five already show evidence of lymph gland metastasis.

There have been a number of series of vulvar carcinoma cases reported since Taussig's work; the consensus is in favor of radical vulvectomy and bilateral gland resection, and this has given the best results in our hands.

McKelvey does the gland resection and the vulvectomy in one stage, using local anesthesia. He includes the iliac glands up to the bifurcation of the aorta. He reported the following results to me in a personal communication in June, 1951: of 36 patients treated by this procedure there were 16 alive at the end of five years, a survival rate of 44.5 per cent. Stanley Way of England does the radical procedure in one stage and does not attempt to close the vulvar excision but allows it to heal by granulation. In a personal communication he gave the following results, up to 1951, of 35 cases operated upon more than five years ago: 30 patients were alive and free of disease five years later, or a relative survival rate of 86.6 per cent. These are the best results reported in the literature. His operative mortality in a series of 103 cases was 14 per cent. Stening of Australia is using this procedure but his first operation was done less than five years ago. Mendelsohn and Mansfield have also published a paper of radical groin dissection for malignancies in the pelvis, including vulvar carcinoma. Collins et al. report a potential salvage rate of 55 per cent by radical vulvectomy and radical gland resection.

Sherman and Ruch reviewed 74 cases of cancer of the vulva treated by vulvectomy and node dissection. Of those having involvement of the nodes only 15.6 per cent survived and no case with involvement of the deep nodes survived longer than three years. In the cases in which there was no nodal involvement, 52.4 per cent survived. There were 25 unfavorable cases treated by vulvectomy alone, and in this group the five-year survival rate was 32 per cent. In a personal communication Stanley Way states that only one of his three cases with deep node involvement has survived five years. Smith and Pollack report a survival rate of 47.6 per cent with vulvectomy alone, while with vulvectomy plus superficial gland resection in a series of 224 cases the survival rate was 80 per cent when the glands were uninvolved, and 15 per cent when the glands were involved. Palmer et al. reported five-year survival in 83.5 per cent of cases with no clinical evidence of gland involvement by vulvectomy, while in those who were thought to have involvement of the glands, 55.5 per cent survived after vulvectomy followed by x-ray therapy. The survival rate of those with proved gland involvement was 21 per cent.

These findings would certainly indicate that there is need for further evaluation of the radical procedures in relation to deep gland involvement. Cosbie in an excellent review of 185 cases treated at the Toronto General Hospital from 1929 to 1950, by various methods, states that the results of treatment of cancer of the vulva must be judged by the results in the whole group. He feels that treatment should be individualized to fit the case and that lymphadenectomy above the brim of the pelvis is seldom indicated.

The results of radiation have, on the whole, been disappointing, though the reports of Berven and of Tod have shown that it is of value in some cases. At the Radiumhemmet, Berven states that since 1922 they have had 286 patients with vulvar carcinoma. The lesions have been treated by electrocoagulation followed by telerradium irradiation and, where necessary, surgery. In Stage I cases the survival rate was 60 per cent, in Stage II 27 per cent, and in Stage III only 14 per cent. For the whole series the five-year survival rate was 38.1 per cent.

In summarizing, we feel that the best treatment at present for patients who are good operative risks is wide vulvectomy and superficial gland resec-

tion. When it is felt that the patient cannot stand the gland resection, the wide vulvectomy should be followed by radiation. As yet we are not convinced that the radical lymphadenectomy will increase the survival of those cases with deep involvement, and hence until further evidence is forthcoming, we will confine the gland resection to the superficial nodes.

Prevention.—As such a large proportion (69 per cent) of cases of vulvar cancer are preceded by leukoplakic vulvitis or other form of chronic irritation, the matter of possible prevention assumes much importance. On this point, Taussig concludes as follows:

I am convinced that we have been very remiss in our preventive measures in the past. The incidence of vulvar carcinoma might very possibly be cut in half, if we would adopt the following measures:

1. A complete vulvectomy in cases of well-developed leukoplakic vulvitis, and rigid supervision, at least twice a year, in milder cases where the patient refuses operative treatment.
2. Intensive antisyphilitic treatment in tertiary lesions of the vulva, especially in Negroes.
3. Removal of vulvar warts in women past the menopause.
4. Close observation or excision of enlarged Bartholin glands in women over forty years of age.
5. Cautery excision or radiant treatment of urethral caruncles.

Particularly in leukoplakic vulvitis would I stress the advantages of surgery over nerve resection or treatment with ovarian hormones. The latter undeniably often decreases the pruritus, but the question whether the use of such carcinogenic substances may not at times predispose to the development of a cancer might very well be raised.

Stanley Way found the incidence of preceding leukoplakia in 82 per cent of his cases of vulvar carcinoma, and he states that Berkeley and Bonney found that it was an etiologic factor in 100 per cent of their cases. In a recent study of the relation of leukoplakic vulvitis to squamous carcinoma of the vulva, made by Langley, Hertig, and Smith, leukoplakia was found concomitantly with squamous-cell carcinoma in 88 per cent of the cases (Figs. 322 and 323).

The treatment of leukoplakia by vitamin A therapy has been reported since Taussig wrote the above outline for prevention, and, as mentioned under leukoplakia, this conservative therapy should be tried for a brief period before resorting to vulvectomy, especially in young women. The importance of venereal lesions such as lymphogranuloma venereum and other lesions causing chronic ulceration and elephantiasis as etiologic factors has been emphasized in recent years. In any of these that do not clear up with proper antibiotic therapy, excision or vulvectomy is indicated.

A typical case of basal-cell carcinoma is reported by Thurston, and five cases are reported by Siegler and Greene.

Sarcoma

Sarcoma may arise as a tumor of the subcutaneous tissue in the vulva the same as elsewhere on the body, or it may result from malignant changes in a fibroma. Hellman found that 22 per cent of the sixty-four fibromas reported by him showed malignant changes. Leonard found that 20 per cent of the 103 cases in his series became sarcomatous. The age incidence is much younger than for carcinoma. These tumors are very malignant and are rarely cured.

Melanosarcoma is an especially malignant type. One arising from the region of the meatus is shown in Figs. 325 and 326.

A rare tumor first described by Abrikosoff in 1926 as a myoblastoma because its constituent cells resemble those of embryonic striated muscle cells is occasionally found in the labia and it is sometimes confused with sarcoma. Sadler and Dockerty in a recent report of an interesting case state that only about 20 per cent of these tumors are malignant.

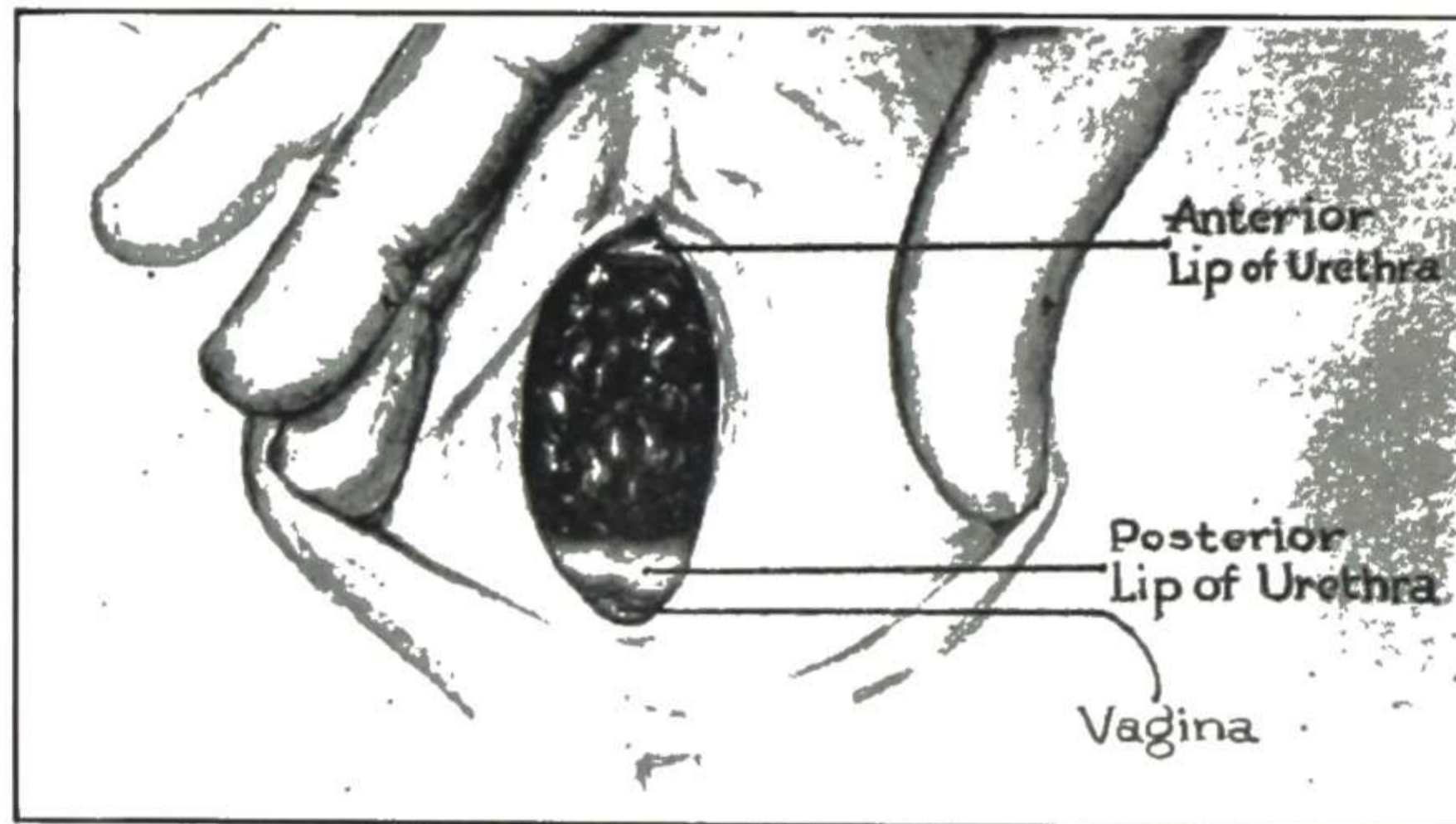


Fig. 325.—Melanosarcoma of urethral meatus. Labia spread apart exposing the tumor. (From Newell and Scrivner: *Am. J. Obst. & Gynec.*)

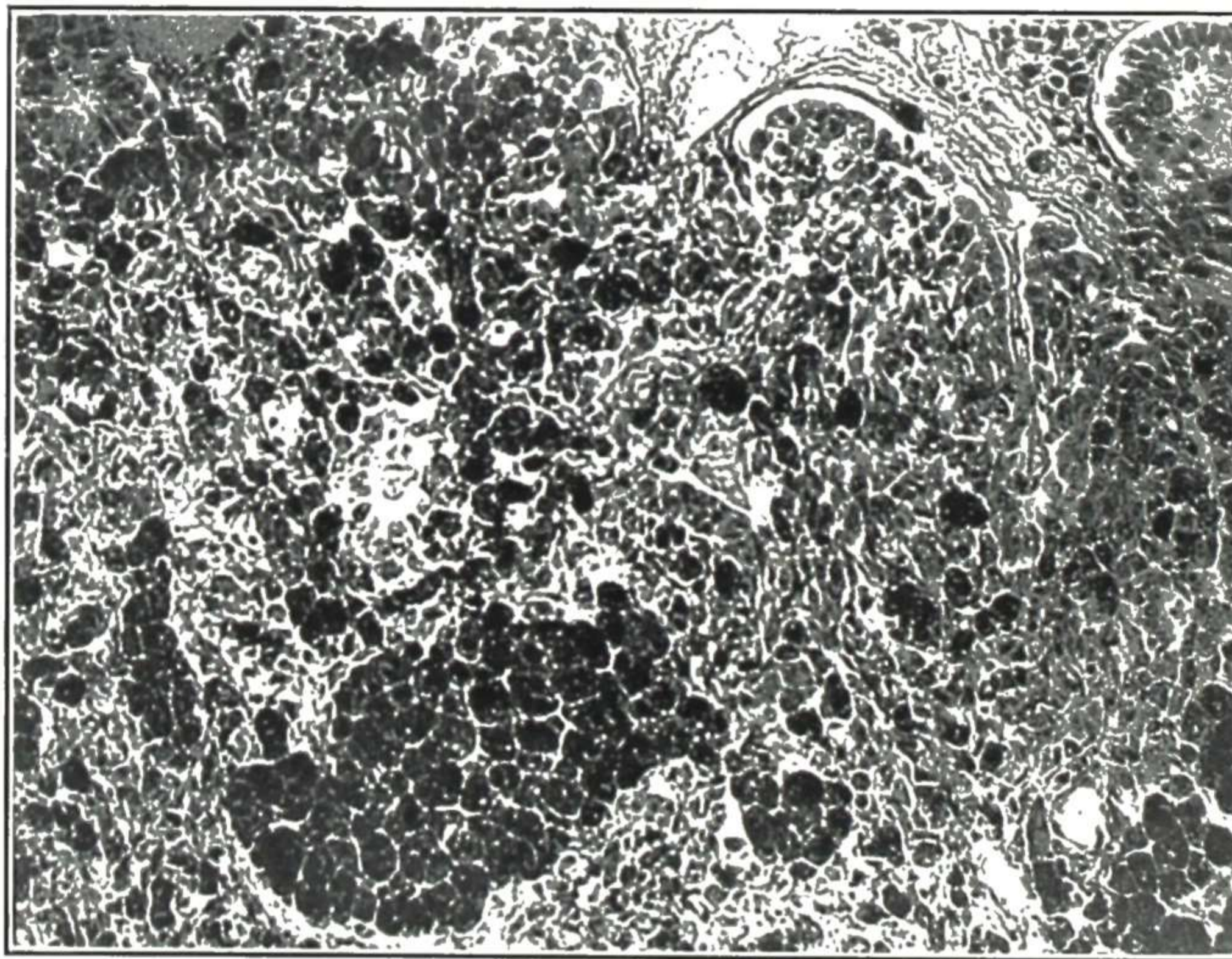


Fig. 326.—Melanosarcoma of urethral meatus. Higher power of Fig. 461, showing the malignant melanoma cells. (From Newell and Scrivner: *Am. J. Obst. & Gynec.*)

The treatment of sarcoma of the vulva is the same as for carcinoma. Prevention by prompt removal of moles on the genitals in cases where they are in an area where they are subjected to trauma is the best plan.

Metastatic Lesions of Vulva and Vagina

Carcinoma metastases are occasionally seen on the vulva or vagina. An interesting case was reported by Martzloff and Manlove in which there were vaginal metastases from a hypernephroma.

VULVOVAGINAL GLAND DISEASES

The nonmalignant conditions include inflammation, abscess, sinus, cyst, and tuberculosis. Cancer of the gland is considered under malignant disease of the vulva.

Inflammation

Inflammation of the duct of the vulvovaginal gland and of the gland proper has been considered under Gonorrhoea. Inflammation in this gland of Bartholin is sometimes referred to as "Bartholinitis."

Abscess

The cause is infection with the gonococcus or ordinary pus germs, or trichomonads. The first is by far the more frequent, and the gonorrhoeal inflammation often persists in the gland long after the vaginal inflammation has disappeared.



Fig. 327.—A typical case of abscess of vulvovaginal gland, right side.

The infection enters at the mouth of the duct and progresses along the duct to the gland proper. The secretion of the gland is increased, the duct becomes obstructed and a collection of pus forms, distending the gland and pointing in the direction of least resistance. Sometimes the duct alone is involved, the gland proper escaping. This is indicated by the swelling being small and confined to the region of the duct.

Pathology.—Microscopically one sees a marked round cell invasion about the gland. In the acute cases, pus is seen in the lumen and duct of the gland. In chronic cases the alveoli are dilated, and the lining mucous membrane shows flattened cylindrical epithelium.

Symptoms and Diagnosis.—The symptoms are a painful swelling at the side of the vaginal opening with some fever. Examination reveals a swelling the size of a small egg situated in the tissues at one side of the vaginal orifice and projecting beyond the median line (Figs. 327). The swelling is tender on pressure and there is fluctuation. The following conditions must be differentiated:

CYST OF VULVOVAGINAL GLAND is a chronic affair, the patient usually giving a history of the swelling having been there for a long time, and the inflammatory signs (heat and pain and redness) are absent.

PUDENDAL HERNIA must always be taken into consideration in determining the character of a swelling of the vulva. Hernia presents one or more of the hernial signs, such as impulse on coughing, reducibility, intestinal obstruction, resonance on percussion. The first evidence of hernia is usually noticed at once after some straining effort or injury, much more promptly than either abscess or cyst would appear.

TUMOR OF LABIA differs from abscess in the absence of inflammation, in growing slowly, and in presenting the signs that distinguish the various kinds of vulvar tumors.

Treatment.—Open the abscess freely by an incision where the pus is nearest the surface, and provide for subsequent drainage that the edges of the incision may be kept separated until the cavity granulates from the bottom.

Sinus

In many cases of abscess of the gland, after the pus is discharged the cavity closes entirely and there is permanent cure. In other cases a sinus persists, giving rise to a constant slight discharge. The outer end of the sinus may close and a reaccumulation of pus take place, forming another abscess. This may be repeated several times in the course of a few years. Again, in inflammation of the vulvovaginal gland, the duct may remain open, giving exit to the pus as it forms and constituting a sinus or discharging tract.

The diagnosis of sinus of the vulvovaginal gland is made by the history of inflammation of the gland associated with a sinus in that locality. By palpating the gland, as explained in Chapter 2, it can often be felt as a small hard lump, indicating infiltration and enlargement. Pressure on this lump will sometimes cause pus to flow from the sinus.

As to treatment of a persisting sinus, the way to effect a permanent cure is to extirpate the sinus tract and the infiltrated gland.

Cyst

A cyst of this gland is due to obstruction of the duct, causing it and the gland to become dilated with retained secretion, as shown in Fig. 328. In some cases of inflammation, gonorrhoeal and otherwise, cyst of the gland results instead of abscess.

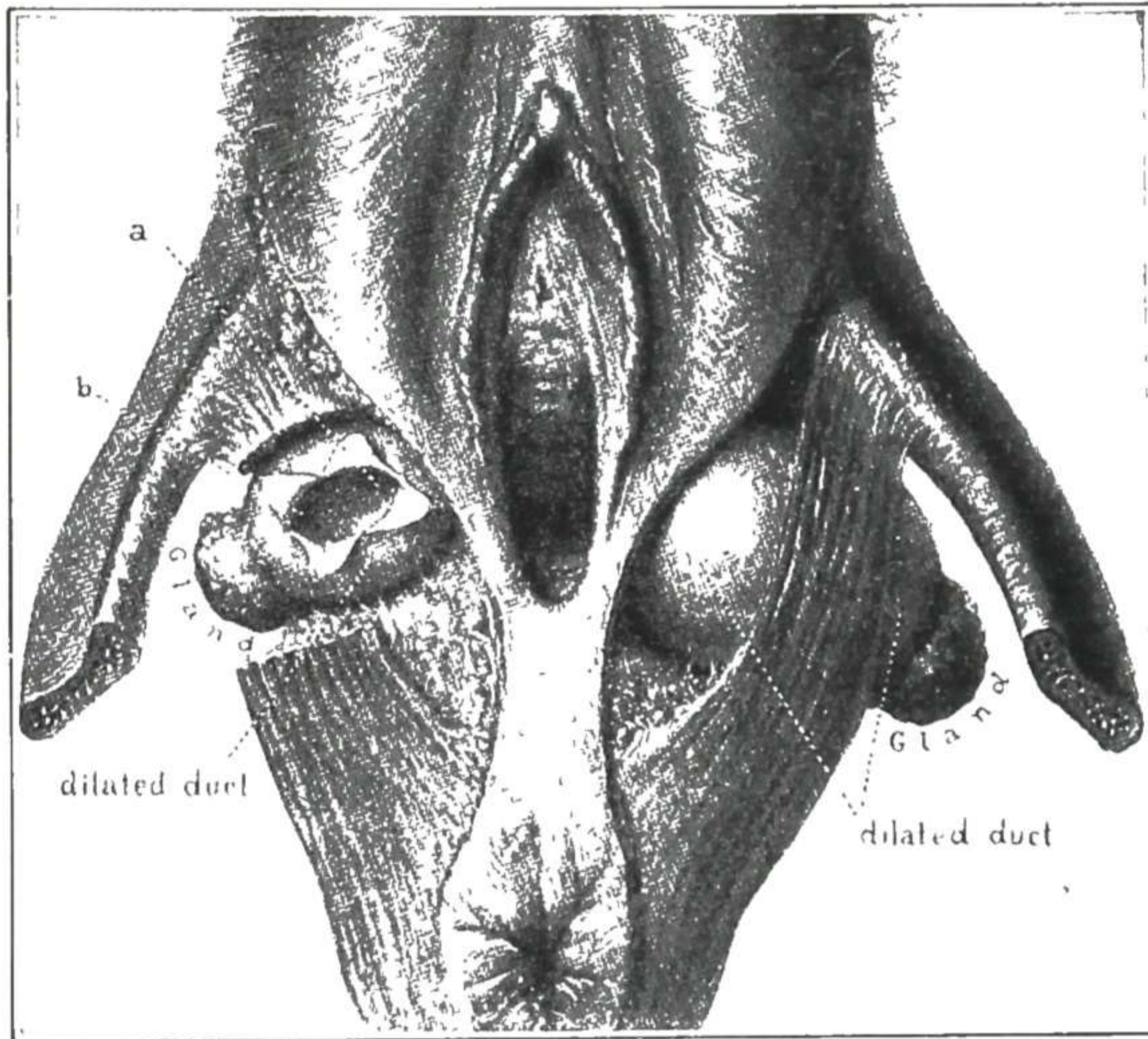


Fig. 328.—Deep relations of vulvovaginal glands when ducts become cystic. (From Cullen, after Hugier: J. A. M. A.)

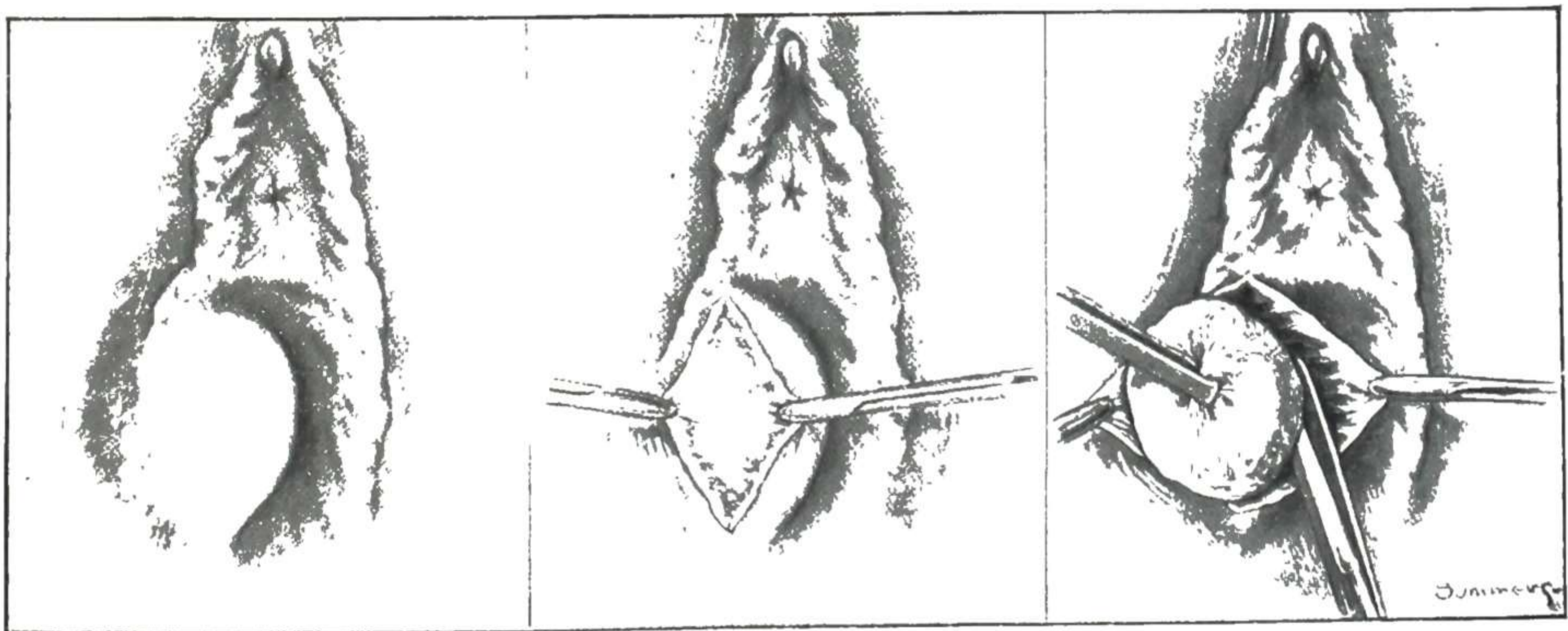


Fig. 329.

Fig. 330.

Fig. 331.

Figs. 329 to 334.—Enucleation of the cyst of a vulvovaginal gland.
 Fig. 329.—Showing the relations of the cyst.
 Fig. 330.—The incision through the overlying tissues.
 Fig. 331.—The cyst almost enucleated.

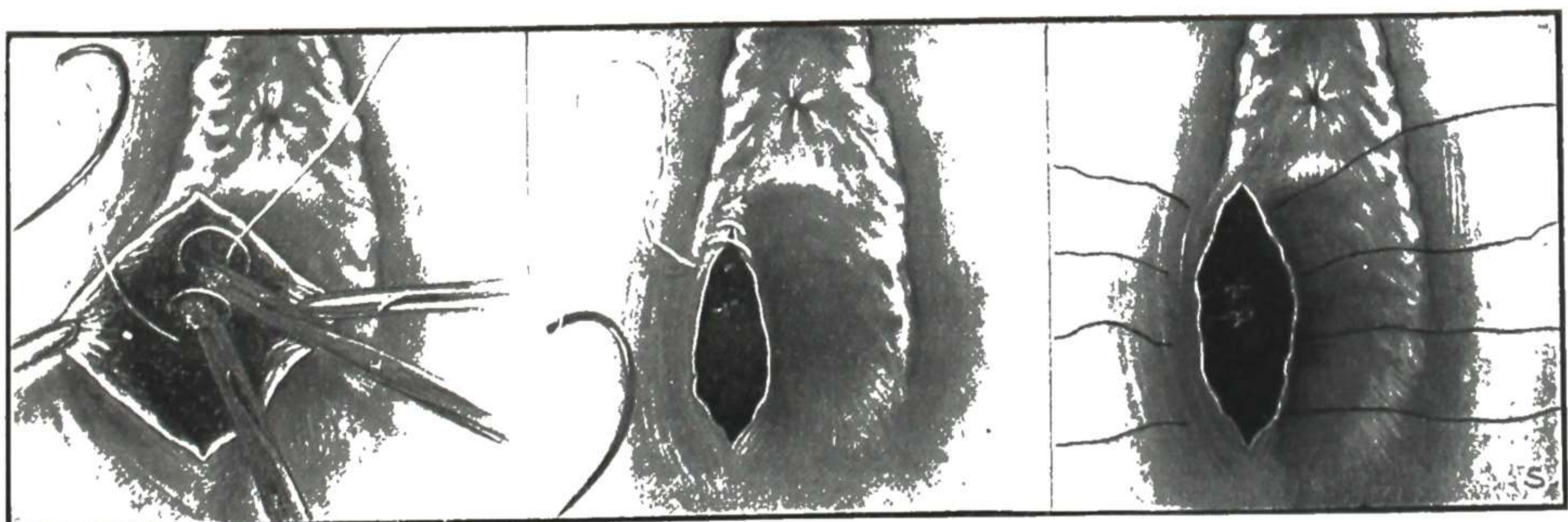


Fig. 332.

Fig. 333.

Fig. 334.

Fig. 332.—Ligating the vascular pedicle.
 Fig. 333.—Closing the wound with a continuous suture of forty-day catgut.
 Fig. 334.—Another method of closing—with silkworm-gut suture.

As to diagnosis, the form and location of the swelling are like that of an abscess of the gland, but none of the acute inflammatory symptoms are present. The only affection that is liable to be confounded with this cyst is pudendal hernia. The distinguishing characteristics of hernia are marked increase of the trouble on straining, obstructive bowel disturbance, impulse in the mass on coughing, tympanitic percussion note over the mass (if containing bowel), and the possibility of partial or complete reduction into the peritoneal cavity.

Treatment.—If the cyst is large enough to give trouble mechanically or is tender at times, extirpation is advisable. Though this may appear to be a small operation, it is really rather extensive, for the enlarged gland extends deeply, the parts are vascular, and much suturing is needed for hemostasis and approximation and to draw in tissue for diminishing the hollow left by removal of the mass. The steps are indicated in Figs. 329 to 334.

Tuberculosis

Tuberculosis of the vulvovaginal gland occurs occasionally and must be kept in mind in any persistent ulceration in this region. Microscopic examination of curetted granulation tissue or an excised specimen will settle the matter. The treatment is the same as for tuberculosis elsewhere in this region, for which see Tuberculosis of Vulva.

DISEASES OF THE VAGINA

INJURIES

Injury to the vagina or vulva may occur in any accident, but it is usually due to a patient falling astride some sharp or firm object. Diddle in reviewing the reports occurring in the past seventy-six years found a total of 133 major tears resulting from coitus, and he added two cases of his own.

Thirty-four subjects were previously virginal; 13 were patients having first sexual contact since delivery; 1 woman was pregnant, 8 were postmenopausal, and 6 were having the first sexual contact subsequent to some gynecologic operation. Thus friability of tissues incidental to pregnancy and puerperium was etiologically involved in certain women. Two-thirds of the tears involved the posterior wall or fornix and only four the anterior wall. Parametrial extension occurred twenty-one times. The peritoneum was exposed thirty times but was broken only six times. Four of these were in girls under the age of 12 years. The rectum was torn in 7, the bladder in 1. Eight incorrect diagnoses were made. They included abortion, carcinoma of the uterus, and functional bleeding. Surgical repair was mentioned in 18 instances and tamponade in 20. Twenty-two of 133 patients died. Five of the 22 were young girls not fully mature, and 2 patients were postmenopausal. Seven died of sepsis and 2 of shock due to hemorrhage. Whether sepsis or shock accounted for the remaining mortalities was not ascertained. When vaginal tears involve the upper portion of the organ they may be overlooked because of inadequate visualization. The discussion emphasizes the value and the necessity of examination with a speculum.

VAGINITIS

Simple Vaginitis

Simple vaginitis is inflammation of the vagina due to irritation or to the ordinary pus germs.

Etiology.—The normal vaginal secretion is destructive to the ordinary bacteria and tends to protect the vaginal wall, as well as the cervix uteri,

from infection. Anything that lowers the nutrition of the vaginal wall interferes also with the protective action of the vaginal contents and hence predisposes to inflammation. Debilitating diseases of every kind have that effect to some extent as have also the exanthemas. An irritating uterine discharge or bacteria introduced from without may cause vaginal inflammation. A pessary or tampon worn too long without care may cause local inflammation or even ulceration. In children, foreign bodies sometimes keep up inflammation over a long period before discovery. Fig. 335 shows the method of investigating for a foreign body in any case of persistent vaginitis in a child. Schaufler found a foreign body in the vagina in five cases out of 267 children examined for vaginal discharge. Hepp and Everhart reported seven cases; in one case there were six safety pins in the vagina. If nothing is found on examining the patient by the method shown in Fig. 335, a Kelly endoscope can be used with ease, even in year-old babies. A nose and throat head mirror furnishes an excellent light.

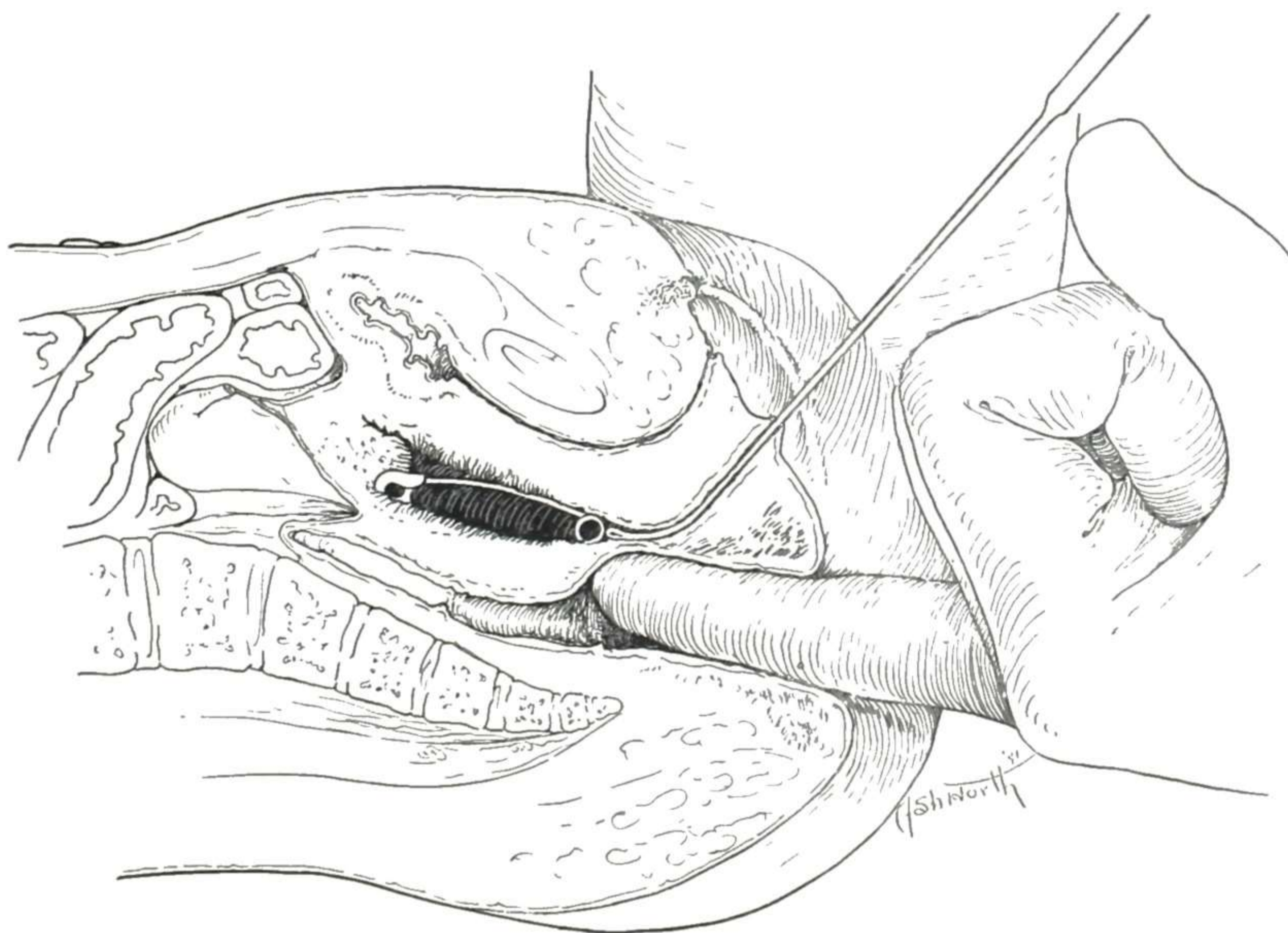


Fig. 335.—Schematic drawing illustrating diagnostic method and methods of removal, with little finger of left hand in the rectum. The rectal finger greatly facilitates location of the foreign body and appears definitely to distract the child's attention from the vaginal manipulation. Small forceps may be used for extraction in the same way. (From Schaufler: California & West. Med.)

The **symptoms** are discharge and discomfort. There is serous and cellular exudate in the vaginal wall, and the superficial layers of epithelium are thrown off and form part of the discharge. The **diagnosis** of simple vaginitis depends on excluding the various special forms of vaginitis, such as gonorrhoeal, trichomonas, monilia, and atrophic (senile, adhesive).

Weaver points out the danger of mistaking a vaginitis caused by *Neisseria sicca* for a gonococcal vaginitis in children. In 1,014 children examined he found inflammatory changes in the genital tract of 25.8 per cent, and of these only four had gonorrhoea and twelve had an infection due to the *Neisseria sicca*. The stain in both infections may show extra- and intracellular gram-negative diplococci and only by culture and fermentation tests can they be differentiated.

In some children pinworms (*Oxyuris vermicularis*) from the rectum invade the vagina, causing a distressing vaginitis. The swab test for eggs or pressing the sticky side of a piece of Scotch Tape firmly over the perianal folds and examining this microscopically for eggs by mounting it in tenth-normal sodium hydroxide will establish the diagnosis. This is also used as a test for cure. The tests should be made in the morning before bathing or bowel movement.

The **treatment** of simple vaginitis consists in removing the cause (see etiology) and giving a mild douche, such as a teaspoonful of lactic acid to two quarts of warm water. In children and in patients past the menopause, estrogenic suppositories assist in restoring the protective epithelial covering and in throwing off the infection. If the condition is persistent, it may be necessary to use triple sulfa cream or penicillin suppositories in the vagina.

In children oral therapy should be tried first, using the sulfa drugs or the antibiotics, either alone or in combination with estrogens. If this is not adequate, creams, suppositories, or solutions may be given vaginally. Of the solutions, 1 per cent gentian violet, 5 per cent Argyrol, or 1:1,000 aqueous Zephiran or half-strength pHisoderm are satisfactory. Suppositories containing drugs or antibiotics should be small enough to be inserted easily. For pinworms Diphenan tablets, one three times a day for ten days, repeated as needed, give excellent results. Bedclothes and underwear should be boiled, fingernails clipped and scrubbed frequently, and other measures taken to avoid reinfection. Enteric-coated gentian violet, one-half grain three times a day, is also effective. This is given for ten days or two weeks and then the patient is checked for worms.

Trichomonas Vaginitis

There is a very troublesome form of vaginitis associated with the presence of the *Trichomonas vaginalis*. This protozoan, which is ordinarily considered nonpathogenic, is frequently found in the vagina. It is found in a considerable proportion of all free vaginal discharges, but of course in less proportion when all gynecologic patients are checked. Johnson and Mayne in 321 pregnant patients found the trichomonads present in the vagina, while Cornell, Goodman, and Matthies found an incidence of 25 per cent in gynecologic patients. Schroeder and Loeser investigated the bacteriology of the vagina in over two thousand gynecologic patients, and found the *Trichomonas vaginalis* in only about 6 per cent. They felt, with previous observers, that the organism came from the intestinal tract. However, Blaud and Rakoff, in a study of two hundred women, concluded that vaginal trichomonads did not originate in the intestinal tract, though other types of trichomonads are found in the intestinal tract. Kessel and Gafford were unable to infect the vagina of women or of monkeys with *Trichomonas intestinalis*, though both are easily infected with *Trichomonas vaginalis*. Recent studies on monkeys have been reported by Johnson et al. and by Williams.

The vaginal type of trichomonads has been found in cervical secretions, in urine of both women and men, and in prostatic secretion and semen. Hees reported ascending *Trichomonas vaginalis* infection and was able to culture it from endometrium, tubal contents, ovarian cysts, peritoneum, and blood stream

of patients, and from viscera of a fetus and from semen. Schroeder and Loeser stated that in most cases of colpitis presenting a large number of trichomonads there is present also the *Micrococcus gazogenes alcalescens* which is responsible for the foamy character of the discharge. They concluded that the *Trichomonas vaginalis* is not essentially pathogenic and that its presence in large numbers in certain cases of vaginitis is simply incidental to the abnormal flora that favors its growth, hence they felt that the term "trichomonas vaginitis" was hardly justified. Carter et al. found many yeastlike fungi associated with the *Trichomonas vaginalis*.

Hibbert and Falls were able to produce clinical symptoms similar to those seen in trichomonas vaginitis by inoculating four women with a culture of *Streptococcus subacidus*. This condition is discussed later. Most writers, however favor retaining the term as expressive of an important clinical type of vaginitis characterized by the presence of large numbers of the *Trichomonas vaginalis* and subsiding when this organism is eliminated.

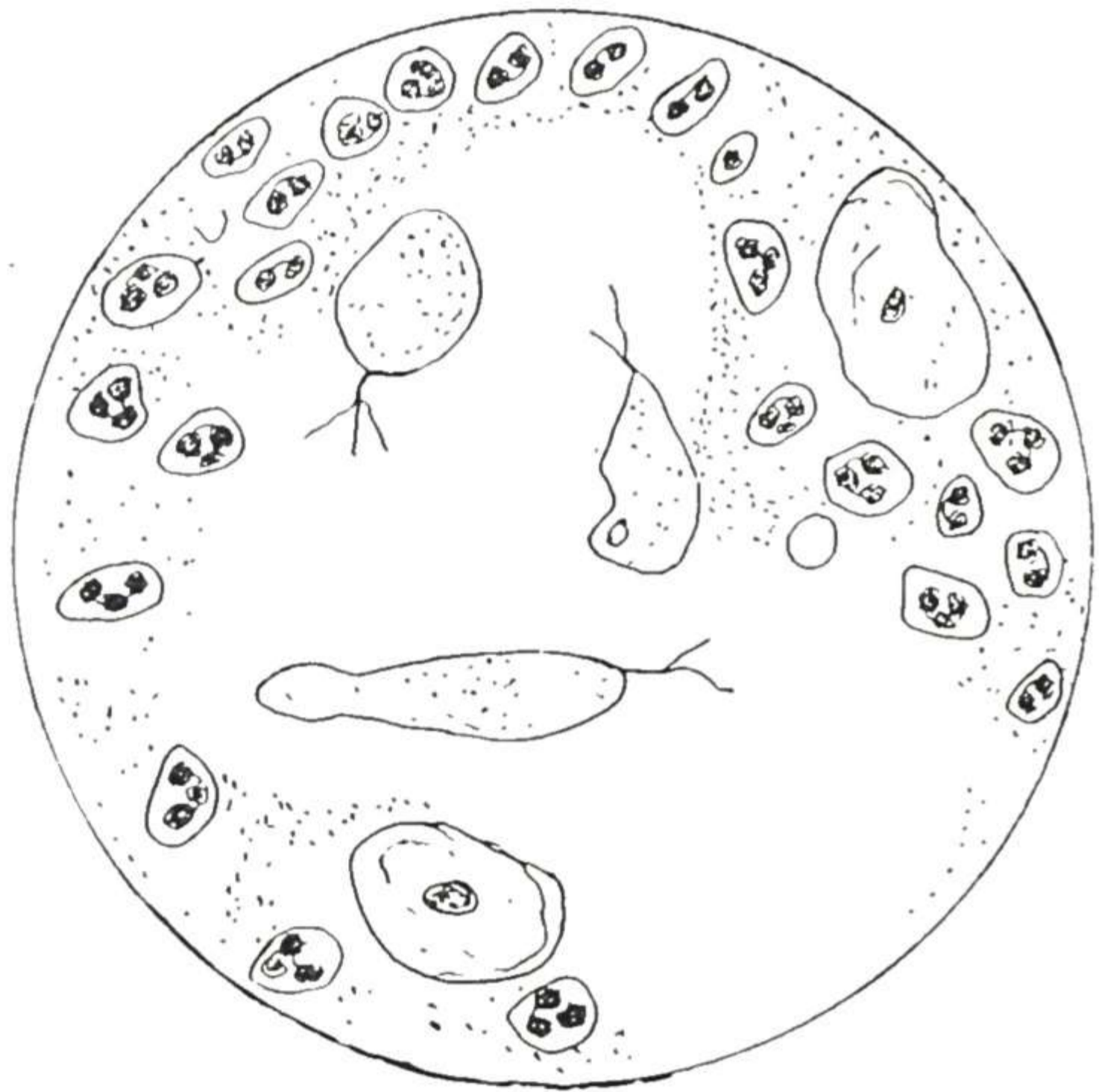
Pattyson, in a carefully controlled laboratory and clinical study of 250 cases of trichomonas vaginitis, states that "the trichomonads are not dependent upon any coexisting organism to produce the symptoms seen in this condition" and that "enough conclusive evidence has been presented by many investigators to prove beyond a doubt the pathogenicity of the *Trichomonas vaginalis*." Later, Trussell and Plass confirmed this, using pure cultures of the vaginal trichomonads.

Symptoms and Diagnosis.—The patient complains of a constant free vaginal discharge, which is usually very irritating. The discharge persists despite ordinary douching and often despite a prolonged course of local treatments, and consequently the patient may be much discouraged as to prospect of cure. Examination shows a yellow discharge, suggestive of gonorrhoea but without the distinct localization in the urethra or vulvovaginal glands or cervix. Speculum examination shows vaginitis, and if acute, usually small hemorrhagic spots may be seen as in the colored illustration, Fig. 254. The vaginal vault contains yellow discharge, which sometimes has some bubbles, giving a foamy character. Microscopic examination of smear eliminates gonorrhoea.

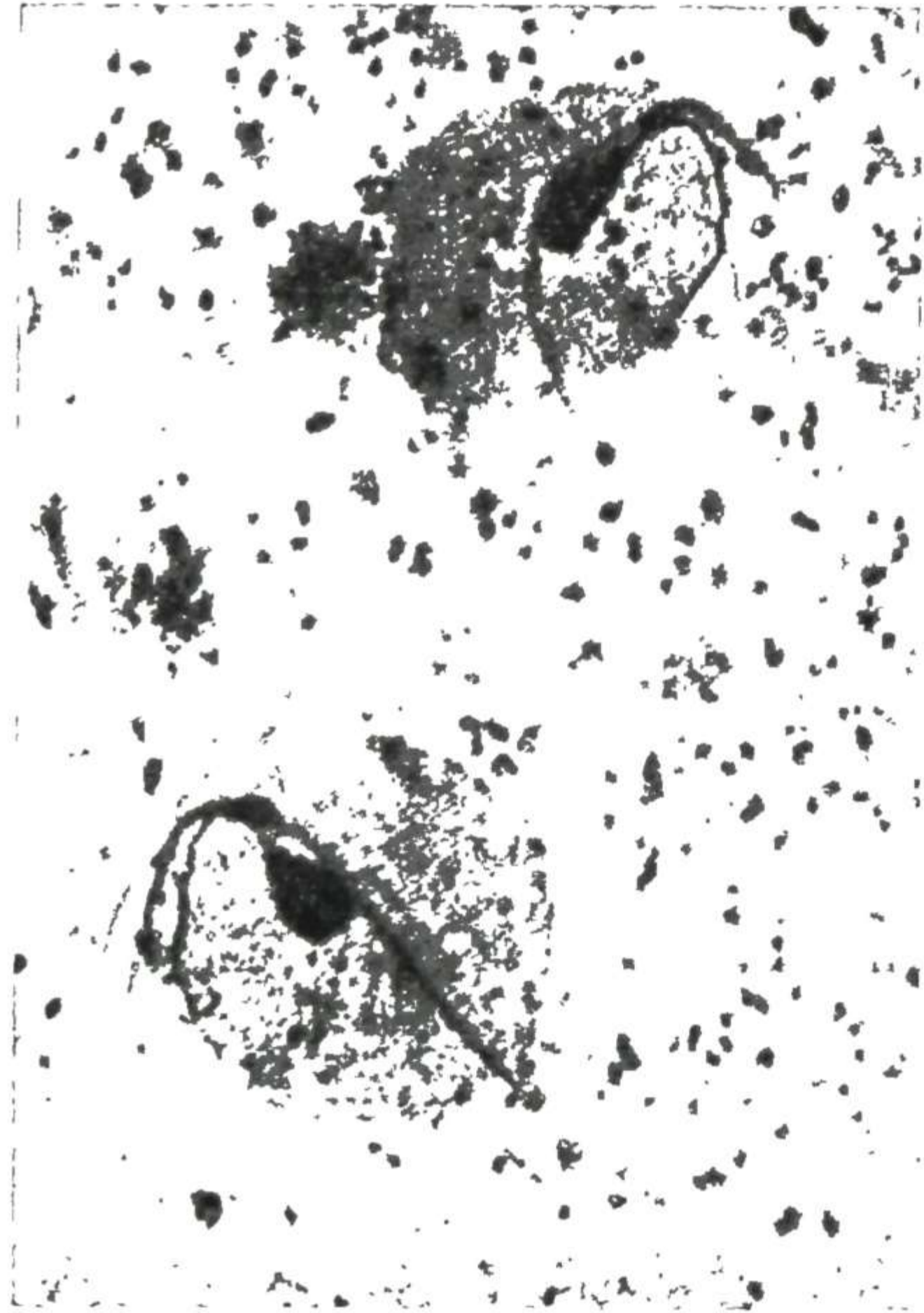
The clinical characteristics mentioned and the elimination of the gonococcus indicate the probability of trichomonas vaginitis. The diagnosis is made by demonstrating the trichomonads (Figs. 336 and 337).

The presence of trichomonads in vaginal discharge may be easily and quickly ascertained by microscopic examination of a warm spread. A drop of warm water is placed on a slide, a bit of the discharge mixed with it, a cover-slip placed over, and the specimen examined before it becomes chilled.

Examined with the light stopped down to show outlines, the field contains pus cells, vaginal cells, and debris. At a thin spot in the field an irregular movement of pus cells and debris may be noticed. This movement is produced by the waving action of the slender flagellum of a trichomonad, and further examination will show the dim outline of the protozoon, as indicated in Fig. 336, A. The outline may be traced by focusing slowly up and down the cell.



A.



B.

Fig. 336.—A, Composite field in a case of trichomonas vaginitis. Three of the organisms stand out well in the center of the field. They are three or four times the size of the adjacent pus cells. The flagellum moves rapidly sweeping particles into the ostium of the organism and at the same time causing the organism to move forward, flagellum-end first. The two upper trichomonads were in the same field, while the lower one was in the next field. The lower one and the middle one varied much in shape while under observation. When moving rapidly, the flagellum is not seen—only the resulting movement of the trichomonad or adjacent cells, as mentioned in the text.

B, Human vaginal trichomonads. (From Wagner and Hess: Zentralbl. f. Bakt, 1937.)



A.



B.

Fig. 337.—Showing the differences between the *Trichomonas vaginalis* and the *Bodo urinaris*. A, *Trichomonas vaginalis*. B, *Bodo urinaris*. (From Karnaky: Urol. & Cutan. Rev.)

Details of structure of the trichomonad may be demonstrated by staining. Of course dead trichomonads, stained or unstained, have the spherical shape of the resting or dead single-cell organism, as shown in Fig. 336, *B*.

The pH of the vaginal contents is shifted markedly toward alkalinity in vaginitis, and this in turn favors additional growth of the pathogenic organisms. With these conditions, the thickness of the protecting epithelium is seriously diminished, as shown by the lines for vaginitis and ulceration in Fig. 338.

Another point in the pathology and diagnosis is that the *Bodo urinaris* (Fig. 337) is present at times in vaginal discharge and may be mistaken for the *Trichomonas vaginalis*. In a doubtful case special staining will bring out the differences, as in Fig. 337.

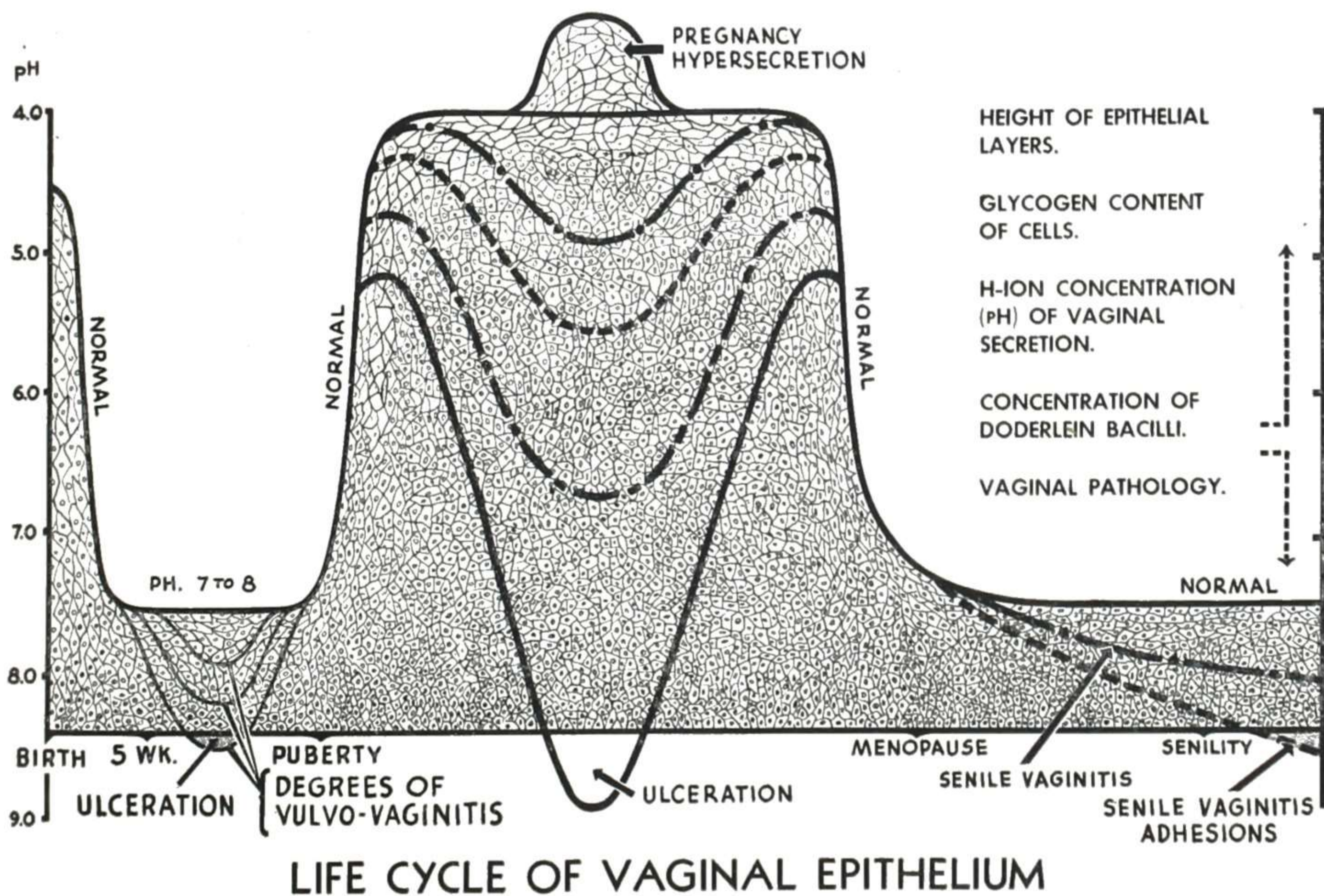


Fig. 338.—Life cycle of vaginal epithelium. (From Karnaky: Med. Rec. & Ann.)

Treatment.—Important in connection with treatment are the extensive investigations made to determine the normal content of the vagina at different ages and the factors which keep it in normal condition. The fundamental work of Cruickshank and Sharman on vaginal acidity and the many other helpful studies on various ramifications of the subject as indicated in the reference list, have brought out the following items of information:

1. In the age of ovarian activity (puberty to climacteric) the normal vaginal contents have a decided acid reaction. This acid reaction is due to the activity of acid-forming bacilli (Döderlein bacillus), and it is ordinarily maintained at such concentration that only acid-resistant bacteria can propagate. This forms a defense-mechanism against pus bacteria, which multiply in neutral or alkaline media, and is usually effective against ordinary moderate contaminations. The activity of the acid-forming bacilli depends on the glyco-

gen content of the vaginal epithelial cells. This normal glycogen content of the vaginal cells is due to the estrogenic activity of the ovaries, and is absent in childhood and after the climacteric. Consequently, in those periods the acid-forming bacilli do not flourish, the contents become alkaline, and even slight contamination often results in prolonged vaginitis (persistent vaginitis of childhood, troublesome and recurrent atrophic or "senile" vaginitis).

2. When the vagina becomes inflamed the normal supply of glycogen in the cells is diminished, the acid-forming bacilli die off, the contents shift toward alkaline reaction, and pus bacteria multiply rapidly and dominate the picture. As the acid hydrogen-ion content diminishes, the pH rises, producing first diminished acidity and finally distinct alkalinity of the discharge. The chemical and bacteriological work has progressed sufficiently to permit correlation of the pH (tendency toward alkalinity) with the growth of various pathological organisms. In round numbers, pH 3 to 4 is normal for the vaginal contents, and at pH 5 to 6 trichomonads and monilia flourish. This increases the tendency toward alkalinity and opens the way to pus bacteria (staphylococci, streptococci, *B. coli*) which grow especially well at pH 6 to 8. At pH 7 the discharge becomes neutral, and beyond that it is distinctly alkaline. In this connection, see Fig. 193.

Trussel in his monograph found that the maximum population of pure culture of *Trichomonas vaginalis* developed between pH 5.5 and 6.0 and no growth occurred below pH 5.0 or above pH 7.5. Shelanski points out that these findings did not hold where there were contaminating bacteria. Where contaminating bacteria were present, Westphal was able to culture the organisms in a pH range from 4.0 to 8.8, and Shelanski, by varying the culture media, was able to adapt the *Trichomonas vaginalis* to a pH range from 4.0 to 8.6.

The bloody menstrual flow lowers the acidity of the vagina and hence there is a tendency to recrudescence of trichomonas or other inflammation at that time. This alkaline tendency during menstruation, with resulting increase in activity of any remaining trichomonads, is utilized in testing for cure. When it is thought a cure has been effected, have the patient stop all treatment at the onset of menstruation and then come a few days after cessation of the flow for checkup as to clinical and microscopic evidence of trichomonads, having taken no douche in the meantime.

There are two main schools of thought on treatment: the one championed by Hesseltine, Karnaky, and others is based on acidification of the vaginal secretions and supplying of carbohydrates in order to increase the population of the normal vaginal Döderlein bacilli; and the other, championed by Gellhorn, Hundley, Shelanski, and others is dependent upon the use of protozoacides to kill the *Trichomonas vaginalis*.

The first method of treatment of trichomonas vaginitis requires (1) acidifying of the vaginal contents to discourage the growth of pus bacteria and trichomonads and (2) supplying of material for the acid-forming bacilli to utilize in their growth until the vaginal cells recuperate sufficiently to furnish again the normal supply of glycogen. The first objective is attained by giving vinegar douches (three tablespoons of a good grade of white vinegar to two quarts of warm water) or lactic acid douches, once or twice daily, depending on the severity of the discharge, and then less frequently as the dis-

charge diminishes. The lactic acid douche is a teaspoonful of U.S.P. lactic acid to two quarts of water. There are also a number of acid jellies which may be used, in combination with other douches such as a tablespoonful of salt to a quart of water or a teaspoonful of powdered alum to a quart of water. Some advise the nightly use of the douche, others recommend douching once a week.

White found that a douche composed of a teaspoonful of detergent (Fab) to a quart of water, followed by a regular vinegar douche was effective against both trichomonas and monilia.

The second objective is attained by the frequent introduction of suitable carbohydrate material (glucose, glycogen, beta lactose or alpha lactose). These can be used as 4 or 5 gram tablets or the powder can be put up in No. 11 or No. 12 veterinary capsules. The use of a powder blower which occludes the vagina has been largely discontinued since six deaths after this type of treatment have been reported in the literature (Martland).

The other method of treating this form of vaginitis is dependent upon the action of protozoacides, such as acetarsone, Aldarsone, carbarsone, Vioform, Cinquarsen. Silver picrate was found to be successful used as a powder or suppositories. In a recent article, Hundley, Diehl, and Shelanski report on the use of Tetronyl powder and jelly. The powder was applied at the office and the patient used two applicators of the jelly daily at home. Ninety-four per cent of their patients were cured. Devegan and Floraquin tablets are also recommended by some workers.

In recent years antibiotics are being used. McVay et al. used insufflations of aureomycin and Greene used suppositories of terramycin. With any of the methods used the treatments should be continued through the menstrual period. Fiorino, Arrigoni, and Tozer obtained rapid cure in 96 per cent of their patients, using a combination of pH regulation, beta lactose, and a trichomonacide. The acid douche had the following composition:

R		
	Glycerin	120 c.c.
	Lactic acid	15 c.c.
	Phosphoric acid	15 c.c.
	Solution phenylmercuric nitrate 1:1,000 q.s.	500 c.c.
	Sig. One tbsp. to quart of warm water night and morning. Local use only.	

The douche shown above was followed by a vaginal tablet of the following formula:

	Potassium phosphate monobasic	200.00 c.c.
	Phosphoric acid 85%	15.00 c.c. or q.s. pH 3.6
	Carbamide hydrochloride	0.04 c.c.
	Beta lactose	200.00 c.c.
M.	Compress into tablets of 2.75 Gm.	
	Sig. One tablet inserted deeply as directed every six hours. Use two tablets at night. Local use only.	

The authors state: "In addition to possessing high buffer capacity these inserts also have adequate trichomonacidal power, are nontoxic, highly hygroscopic, and exhibit marked tissue penetrability due to the incorporation of a wetting agent which reduces the surface tension of the vaginal fluids."

McVay found vaginal application of aureomycin, either by insufflation or capsules, to be a very effective method of treating trichomonas vaginalis.

The patient is considered cured if no trichomonads are found after discontinuing treatment for three months. The test is made just after a period and no douche is taken for a month prior to the test.

In persistent cases possible foci for reinfection are: the husband, Skene's glands, Bartholin glands, the cervix, or the bladder. It is thought that many of the husbands of infected patients harbor the organism without symptoms. Whittington found *T. vaginalis* in semen samples of 27 per cent of the husbands whose wives were infected with the organism. If the focus is found in the Skene's glands, they should be coagulated; if the cervix is involved, conization is the preferred treatment. Eradication from the Bartholin gland usually requires removal. The patient should be instructed to exercise care in cleansing after a bowel movement and to avoid contamination in douching or taking an enema. If the bladder or urethra harbors the organism, the sulfonamides are given orally and local instillations of 10 per cent Argyrol or other adequate antiseptic are indicated. Davis and Grand after reviewing the numerous treatments for trichomonas vaginalis concluded that Icthyol-glycerin tampons and acid douches at home gave just as high a percentage of cures as the newer pharmaceuticals.

STREPTOCOCCUS SUBACIDUS VAGINITIS

Hibbert and Falls present an instructive study of the *Streptococcus subacidus* as a cause of vaginitis, and perhaps a large factor in many cases of vaginitis associated with trichomonads. They employ a vaccine made from this organism in treatment. They were able to show this gram-positive coccus in profuse growth in vaginal discharge before treatment and the absence of pathogenic bacteria and the presence of the normal Döderlein bacilli after successful treatment. From their investigations they reach the following conclusions:

1. The *Streptococcus subacidus* found in patients presenting the clinical picture of *Trichomonas vaginalis* vaginitis is pathogenic, as shown by its fulfillment of Koch's laws.
2. It produces an immune reaction (agglutination) when injected intradermally.
3. Local clinical improvement was more rapid and apparently more lasting when general antibody reaction was stimulated by the vaccine in addition to the local antibody stimulation by the filtrate.
4. The pH of the vagina was found to be relatively high when there were large numbers of *Streptococci subacidus* present, and to be lower as they disappeared, irrespective of the presence or absence of the trichomonads.
5. The disappearance of the clinical picture and symptoms with the disappearance of the *Streptococcus subacidus*, occurring in the presence of the trichomonads, suggests the former as the chief factor in the production of the lesions.
6. Further efforts to eradicate this streptococcus from the genital tract, and to raise the general immunity to this organism, seem the logical way to attempt the control of this infestation.

OTHER ANIMAL PARASITES

There are other parasites of the ameba type which occasionally cause trouble in the vagina. These are the *Ameba urogenitalis*, which invades the bladder, causing hematuria, and the *Distoma hematobium* which also infests the urinary

tract. The latter is found in a large percentage of Egyptian women. It may propagate in the vulvar epidermis and cause condylomas. It may cause chronic inflammation of the vaginal wall with infiltration, while on the cervix uteri the papillary outgrowths from it may resemble carcinoma.

Weinstein and Weed in a report of vaginitis due to *Endamoeba histolytica* state that, though a search of the literature from 1916 to 1946 revealed only ten cases of vaginitis due to this organism, their four cases were discovered in a period of nine months. In addition to the symptoms and signs found in trichomonas vaginitis there are ulcerated lesions on the vaginal walls and frequently on the cervix. The treatment they used consisted of Vioform powder in the vagina and emetine or streptomycin systemically. Other workers report success with aureomycin and with bacitracin.

Monilia Vaginitis

Monilia vaginitis is the term applied to inflammation of the vagina caused by various yeast fungi. It is known also as "aphthous vaginitis" and by other terms. The infection is carried to the genitals usually by the fingers of the patient, who has been handling some organic substance on which the fungus was growing. A mother whose baby is suffering with thrush may infect herself. It usually occurs in nursing women or in pregnant women or in cases of prolapsus uteri. The sexual partner may transmit the disease.

The findings are the same as those seen in oral thrush. There are white patches of cottage-cheeselike material on the walls of the vagina and these can be scraped off easily. The patient usually complains of a burning, itching, or smarting, and there is usually a watery discharge.

Numerous studies have shown that many women who harbor the Monilia are asymptomatic and about 10 per cent of women have yeast of some kind in the vagina. In a gynecologic practice it is estimated that 20 per cent of the patients complaining of leukorrhea have a monilial vaginitis. While about 45 per cent of pregnant women harbor the organism, only 10 per cent have symptoms referable to the infection.

Diabetic patients because of the sugar in the urine are frequently infected with monilia. In recent years there have been reports of this condition developing as a complication of antibiotic therapy, especially aureomycin (Wood et al.).

Though there are several yeasts which may cause these signs and symptoms, the *Monilia albicans* (*Candida albicans*) is by far the commonest organism responsible for yeast vaginitis.

Diagnosis.—This is made by scraping off a small piece of the white membrane and putting it on a slide with a drop of 10 per cent solution of sodium hydroxide. The fungus appears as interlacing mycelium of long, branched filaments of hyphae, and occasionally buds may be seen along these stems (Fig. 339, A). If there is doubt as to the organism, a culture should be made on Sabouraud's media containing 15 units of penicillin per cubic centimeter. Fig. 339, B shows a suspension stained with methylene blue, from a report by Campbell and Parrott.

Treatment.—As with trichomonas there are many new methods of treating monilial vaginitis. For the office treatment 1 per cent gentian violet

aqueous or in glycerin is applied over the entire vagina and the introitus, three times a week for two weeks. In persistent cases Karnaky uses a 5 per cent gentian violet in 50 per cent alcohol. Cornell obtained prompt and lasting results using a tampon soaked in a solution containing two drams of sodium perborate in an ounce of glycerin. The tampon is placed high in the vaginal vault and is removed by the patient the next day just prior to the office visit. The treatment is given daily for four days and this is usually all that is needed. For treatment at home there have been numerous jellies and inserts recommended. Alter, Jones, and Carter advise Propion Gel (Wyeth).

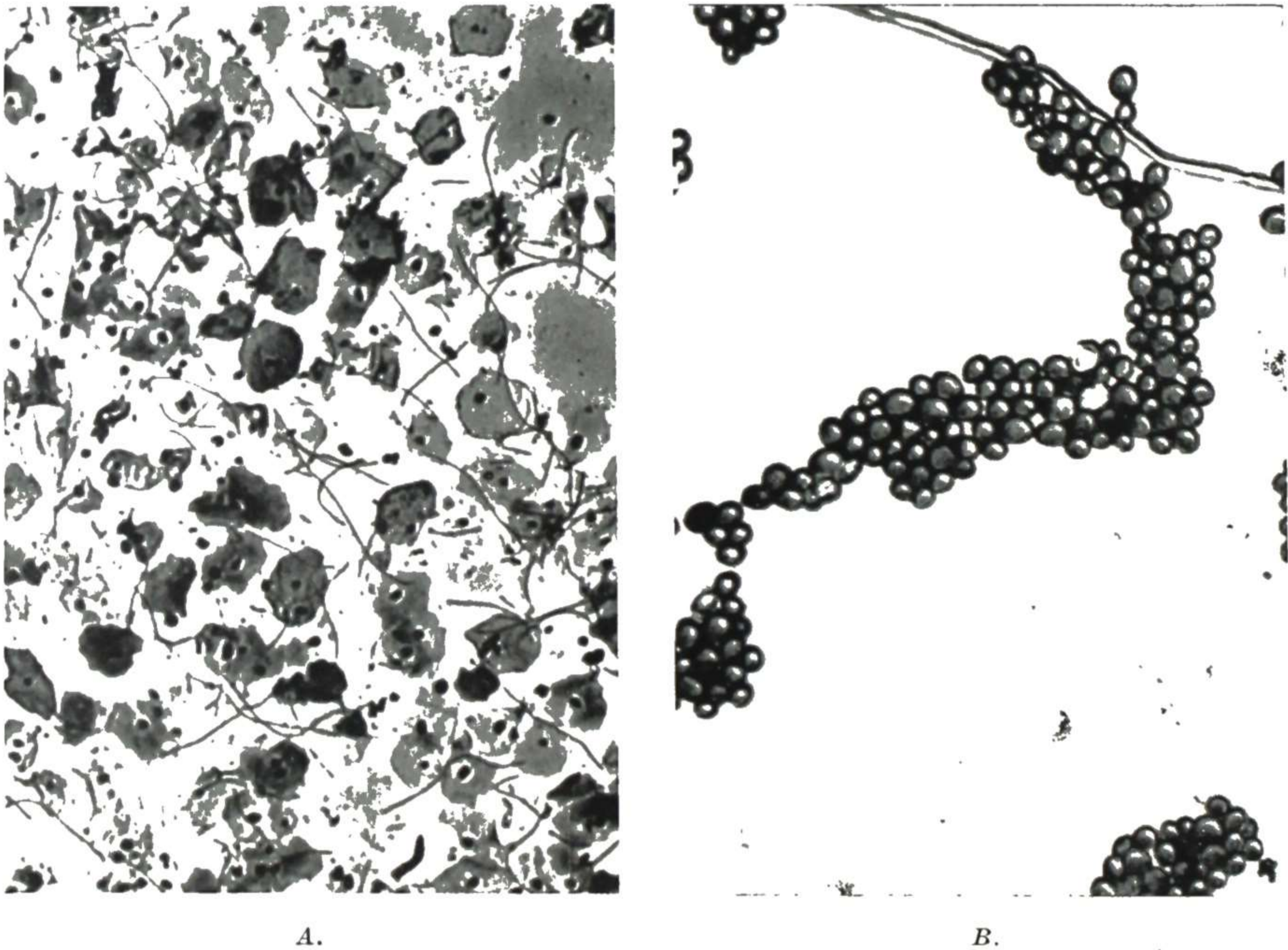


Fig. 339.—A, Mycelia of *Monilia albicans* seen on suspension of vaginal exudate. Silver carbonate stain. ($\times 100$.) B, *Monilia albicans*. Suspension made from colony and stained with methylene blue. ($\times 450$.) (From Campbell and Parrott: *Am. J. Obst. & Gynec.*, May, 1950.)

Hesseltine and Beckett studied the fungicide properties of numerous compounds and found that 3 per cent ricinoleic acid in a buffered acid jelly gave excellent results. Other preparations which have been found helpful are Gentia-Jel (Westwood), Naprylate (Strasenburgh), which is in suppository form, Ceepryn suppositories (Merrell), Allantomide Vaginal Cream (improved) (National Drug), and Metasert (Brayten) vaginal tablets. When douches are used they should be alkaline, such as a tablespoon of baking soda to a quart of water.

Reinfection may occur from the sexual partner or contaminated douche nozzles or fingers. Reich and Nechtow report an interesting case which resisted treatment for a year. On careful investigation it was found that the

patient kept her dogs in her tub when she was away from the house so that they could urinate without ruining the rugs. The dogs were found to harbor canine monilia and the same organism was found in the patient. When the patient was isolated from the dogs and the tub used for human baths only, the patient cleared up promptly on treatment.

Atrophic Vaginitis

Atrophic vaginitis occurs almost exclusively in women past the menopause, hence the term "senile vaginitis," by which it is at times designated. There is considerable destruction of the covering epithelium, and such denuded areas may unite by adhesions, hence the designation "adhesive vaginitis."

The predisposing cause is the thinning of the protective vaginal epithelium from the diminishing estrogenic hormonal influences. The exciting cause is probably a slight discharge, which macerates the vaginal epithelium and favors bacterial growth. A certain amount of atrophic vaginitis is very frequent and often produces no symptoms. In fact, it is probable that a considerable proportion of women over sixty have some of this disturbance, with slight adhesions.

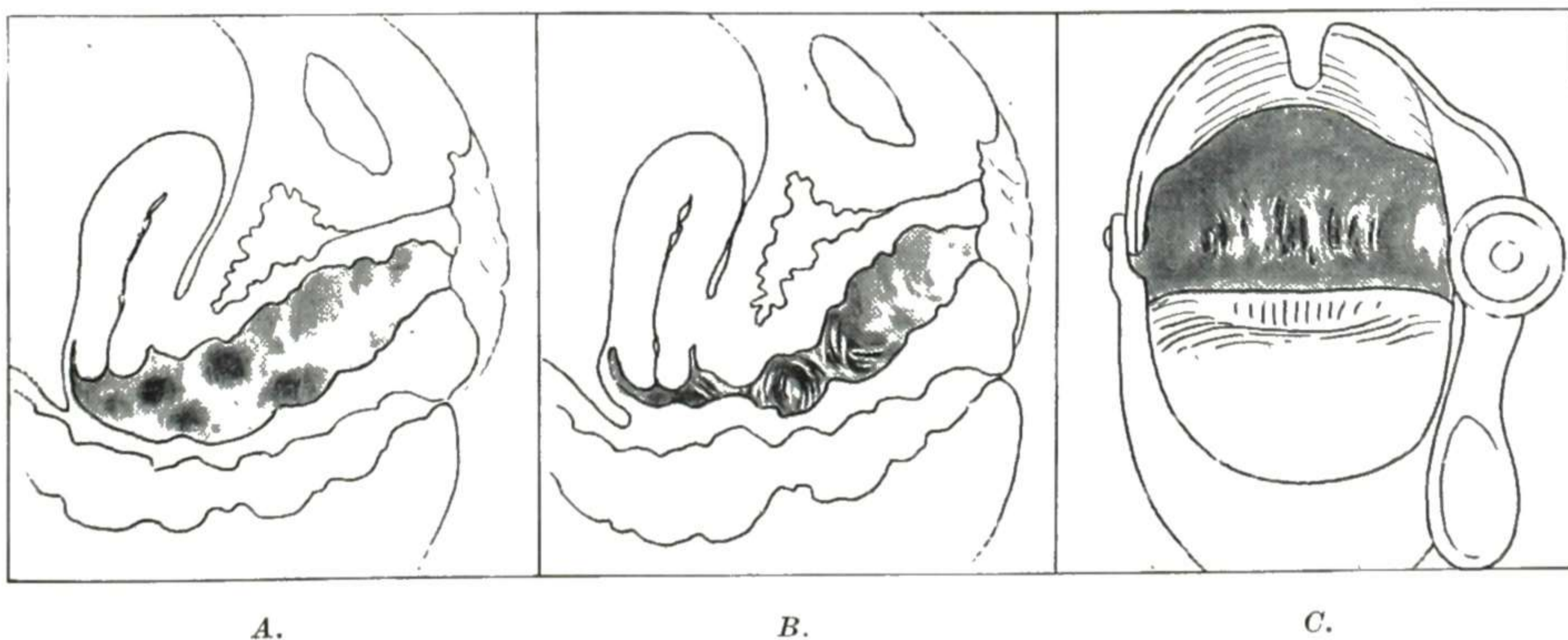


Fig. 340.—Atrophic (senile) vaginitis. A, Indicating scattered areas of adhesive vaginitis; B, adhesions resulting later from adhesive vaginitis; C, appearance of adhesions through the speculum.

Over irregular patches the superficial layers of epithelium are thrown off (Fig. 340), forming erosions from which there is a scanty secretion. The eroded areas are tender and usually bleed on manipulation. When such areas develop on opposed surfaces of the vaginal walls, adhesions take place between them. For a long time the adhesions are weak and the surfaces may be easily separated. If the process of adhesion is allowed to go on undisturbed, the adhesions become organized and firm (Fig. 340) and in the course of time may become so extensive and strong that the vagina is practically obliterated. Atrophic vaginitis is accompanied by a slight "gluey" discharge, small in amount but irritating.

The **symptoms** are vaginal discharge, sometimes bloody, with some pain in the pelvis and vaginal burning and discomfort. There may be some burning or smarting on urination, from irritation of the vulva by the discharge.

On digital examination, the vaginal walls may be adherent in places, especially at the upper portion of the vagina, and the separation of the walls causes some pain and bleeding. Examination of the vagina through the speculum shows hemorrhagic areas of denudation and inflammation, principally in the upper part of the vagina.

Diagnosis.—The evidence of subacute vaginitis with marked tendency to adhesion of the walls in spots establishes the diagnosis of atrophic vaginitis. Vaginitis occurring after the menopause is usually of this form. Be careful to distinguish gonorrheal vaginitis, which may complicate the atrophic form as may also trichomonas and monilia vaginitis. Serious disease of the uterus causing discharge, particularly cancer, must be excluded.

Treatment.—If the trouble is slight and causes no symptoms, it needs no treatment. The adhesions in themselves cause no trouble and consequently need no treatment, except when they become so extensive as to interfere with coitus.

When there is persistent irritation, giving rise to an irritating discharge or bleeding, or pain, then the following treatment is indicated:

1. Put the patient in the best possible general health.
2. Keep the vagina free from the irritating discharge by the use of a lactic acid douche, which favors the growth of the normal vaginal flora. At office treatment, make application of soothing solution to relieve surface discomfort, such as 10 per cent Argyrol.
3. The special treatment advisable depends somewhat on the type of case, that is, whether ovarian hormone deficiency or vitamin E deficiency or vitamin A deficiency predominates.

OVARIAN HORMONE DEFICIENCY TYPE.—These patients often have general climacteric disturbances for which they are receiving endocrine treatment, and this may help the atrophic vaginitis. For local effect in building up a protective epithelial covering, however, administration of some potent estrogenic preparation by vaginal suppositories or cream also is advisable.

M. Edward Davis studied a series of cases of atrophic vaginitis treated with the estrogenic hormone. The results were very carefully checked by excision of specimens of the vaginal mucosa at various stages in the treatment, and the photomicrographs shown in Figs. 341 and 342 are from his paper. The typical conditions found in atrophic vaginitis are shown in Fig. 341. This and the succeeding photomicrograph are from the same patient, aged sixty-five years. The effect of four weeks of treatment is shown in Fig. 342. For accurate comparison, the magnification is the same.

VITAMIN E DEFICIENCY OR EXCESS ESTROGEN TYPE.—Shute described a type of senile or atrophic vaginitis which he attributed to an excess of estrogenic substances in the circulating blood. That estrogenic activity should still be apparent after the menopause at first seems paradoxical. Salmon and Frank, however, using the vaginal smear method, found 60 per cent of a group which included twenty-four surgical castrates, ten women during natural menopause, and eleven who had had a sterilization dose of deep roentgen ray, still positive for estrogen. Shute studied the estrin level in women who suffered from vaginitis following the menopause and

found that in those who were not relieved or were made worse by administration of estrogenic substances there was either a constant excess of estrogen in the blood or a true estrus cycle. Since this type of vaginitis gives the same symptoms and findings as the other two types, it can only be differentiated from them by hormone studies and the failure to improve on the estrogenic therapy.

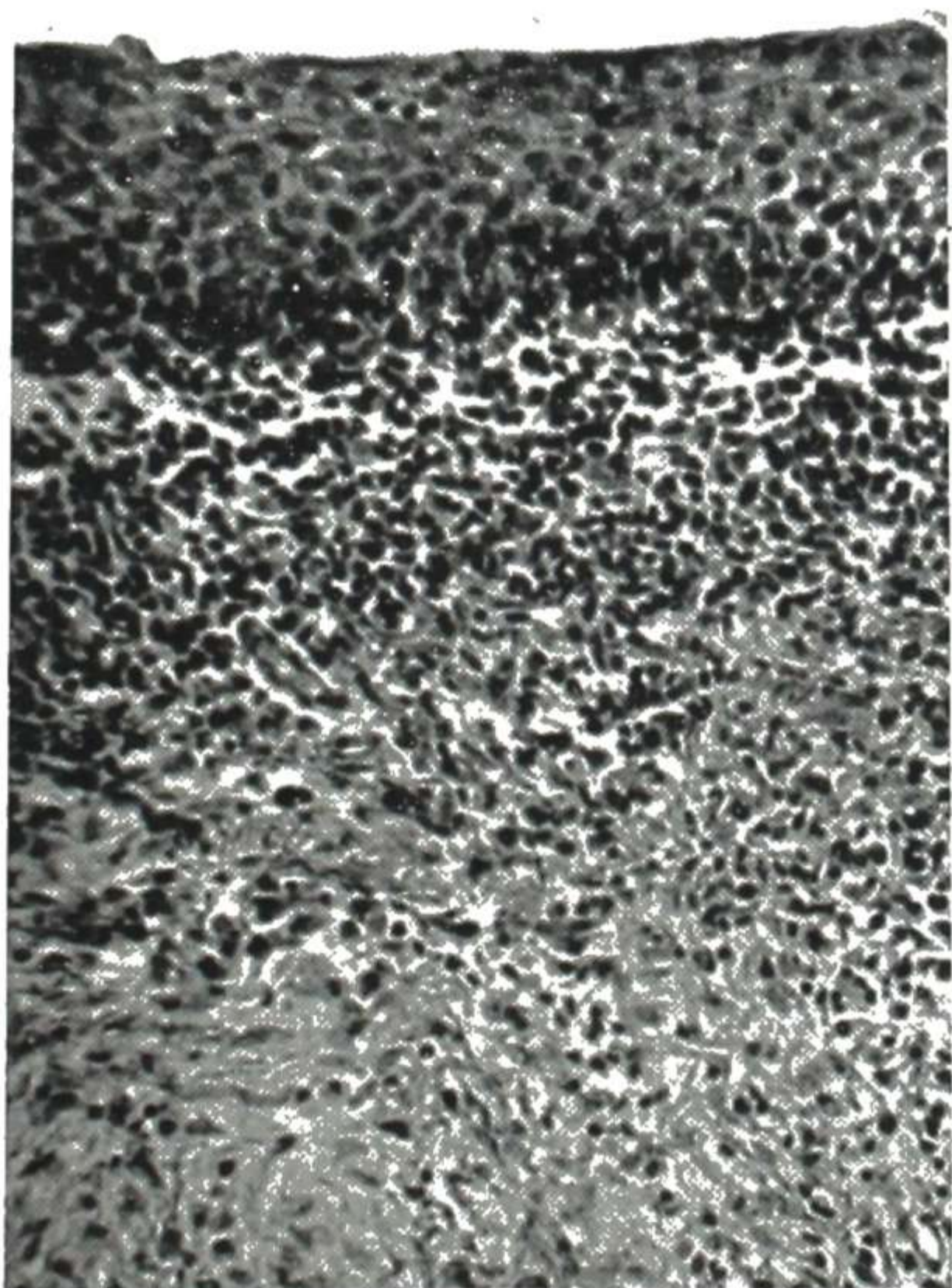


Fig. 341.

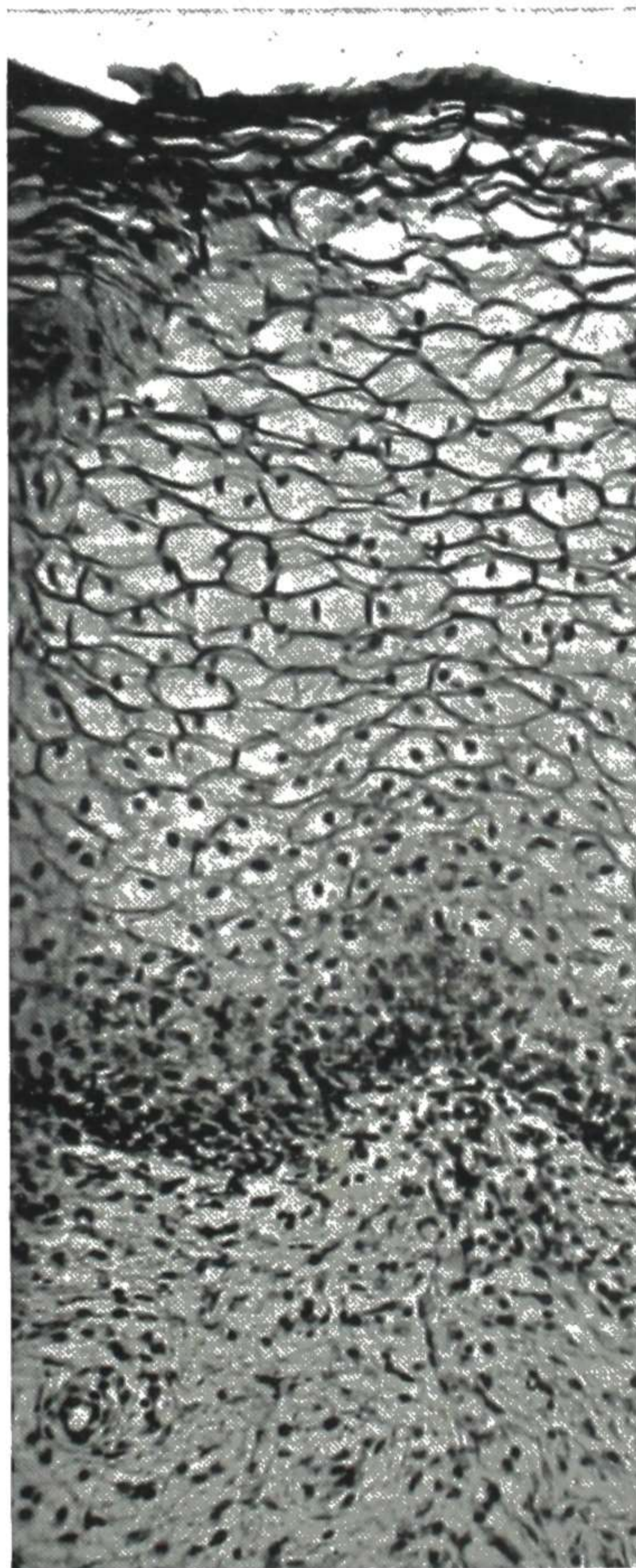


Fig. 342.

Fig. 341.—The atrophic squamous epithelium merges indefinitely with the subepithelial tissue. The basal layer of cells is irregular and moth-eaten in appearance. A dense infiltration of inflammatory cells, consisting chiefly of round cells, can be seen beneath the squamous epithelium. Figs. 341 and 342 were magnified 100 times for accurate comparison of the squamous epithelium. (From M. Edward Davis: *Surg., Gynec. & Obst.*)

Fig. 342.—After four weeks' treatment. The squamous layer has been rebuilt to several times the previous thickness. The basal layer of cells is arranged regularly and shows signs of activity. The large clear cells of the basal layer contain an abundance of glycogen. (From M. Edward Davis: *Surg., Gynec. & Obst.*)

There are a number of potent vitamin E preparations on the market. Some contain a mixture of the natural tocopherols and synthetic ones, others are the synthetic vitamin E such as ethyl acetate. The dose depends on the case and the preparation used and varies from a daily dose to 30 mg. to 200 mg.

VITAMIN A DEFICIENCY TYPE.—This type, which was described by Simpson and Mason, has symptoms and signs similar to the types of vaginitis described above. These workers in a study of fifty patients suffering from atrophic vaginitis found that their diets were low in vitamin A. Also in some of the patients the absorption of vitamin A was impaired because of chronic digestive disturbances or the habitual use of mineral oil. A dose of 25,000 to 50,000 units of vitamin A daily for two to four weeks is usually adequate in these cases.

Diphtheritic Vaginitis

Diphtheritic vaginitis may be found in a child suffering with throat diphtheria or it may be even a primary lesion. It may occur also in an adult in the home with a diphtheritic child. Many years ago when diphtheria was frequent, in examining a patient brought into the hospital with puerperal fever some small patches of membrane were noticed in the vagina. It was a question whether they were streptococcic or diphtheritic. Microscopic examination showed the latter, and the disease responded promptly to antitoxin.

In diphtheritic vaginitis in a child, atresia of the vagina may follow. We had one such case, in which there was almost complete occlusion of the vagina by a circular scar in the upper third. Careful dissection under the guidance of rectal palpation, followed by treatment with estrogenic suppositories, gave a good result.

Emphysematous Vaginitis

In emphysematous vaginitis, small collections of gas appear under the epithelium or in the meshes of the connective tissues. It is a rare form of vaginal inflammation and occurs almost exclusively in pregnant women. Its seat is the upper part of the vagina and the vaginal portion of the cervix. The little air vesicles vary from the size of a pinhead to several times as large. They are frequently surrounded by an area of hyperemia, but the inflammatory reaction is slight. When punctured the air escapes and the vesicle collapses. There is rarely any secretion from them. The gas contained in them is, in part at least, trimethylamine. The vesicles show little tendency to re-form after puncture. The affection is due to a mild gas-producing bacillus. Apparently, however, it bears no relation to infection with the gas-forming bacillus known as the *Bacillus aerogenes capsulatus*, for this deadly germ gives rise to a severe and rapidly spreading phlegmonous inflammation.

As to the treatment of emphysematous vaginitis, nothing more is usually required than puncturing the air vesicles and washing the vicinity with an antiseptic solution. If there is an irritating discharge, mild antiseptic douches may be given. If the patient is pregnant, great care must be exercised not to cause much irritation, as an abortion might result.

Ingraham and Hall presented an instructive study of emphysematous vaginitis, with sections of vaginal wall showing the gas vesicles. H. L. Gardner made a complete study of a case and concluded that the gas contained in the cystoid spaces was of endogenous origin (Figs. 343 and 344). Bender and Jeffecoate recently reported two cases, both occurring in pregnant women.

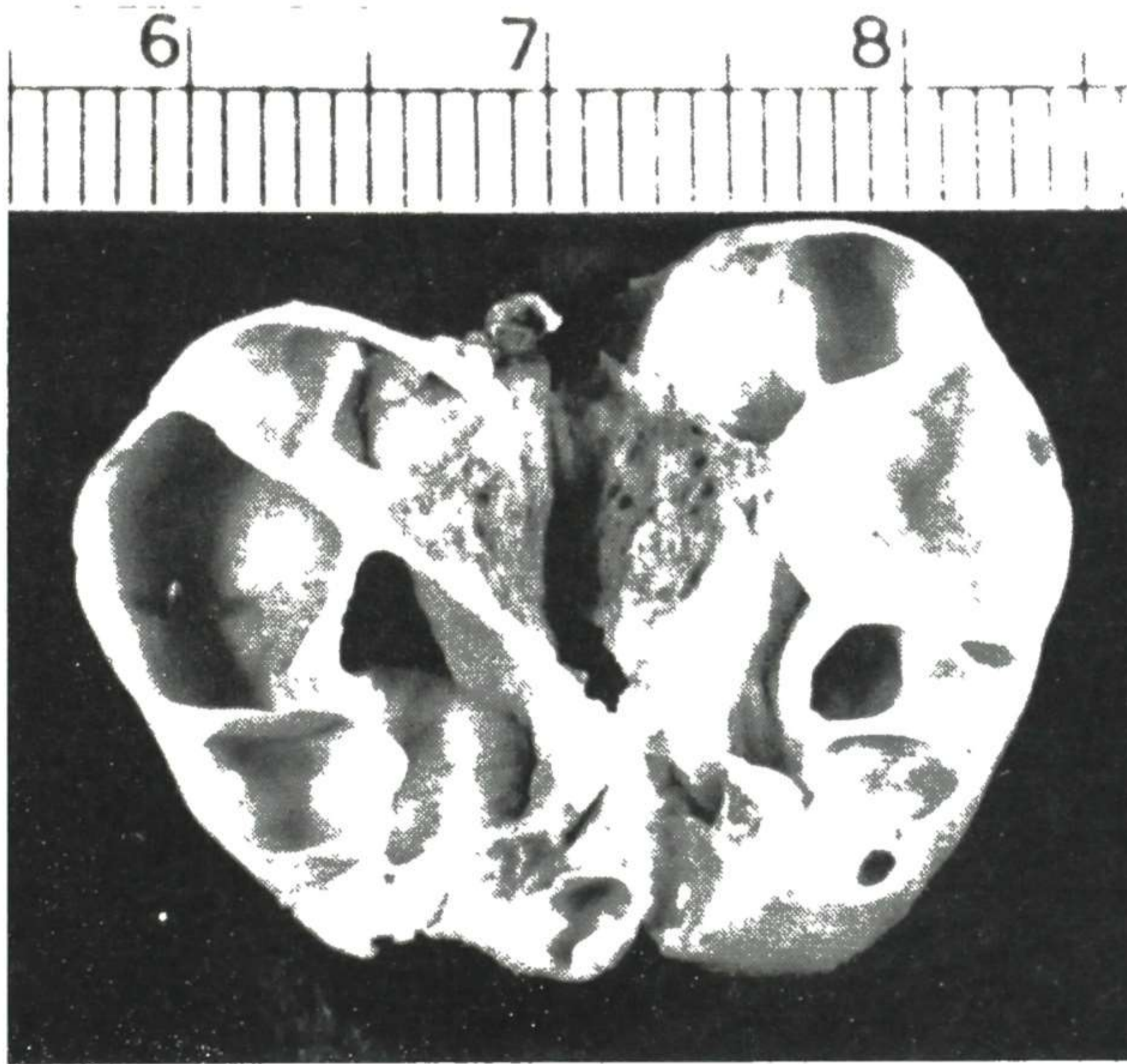


Fig. 343.—Gross appearance of tissue removed from cervix in case of vaginitis emphysematosa.
(From Gardner: *Am. J. Obst. & Gynec.*, July, 1948.)

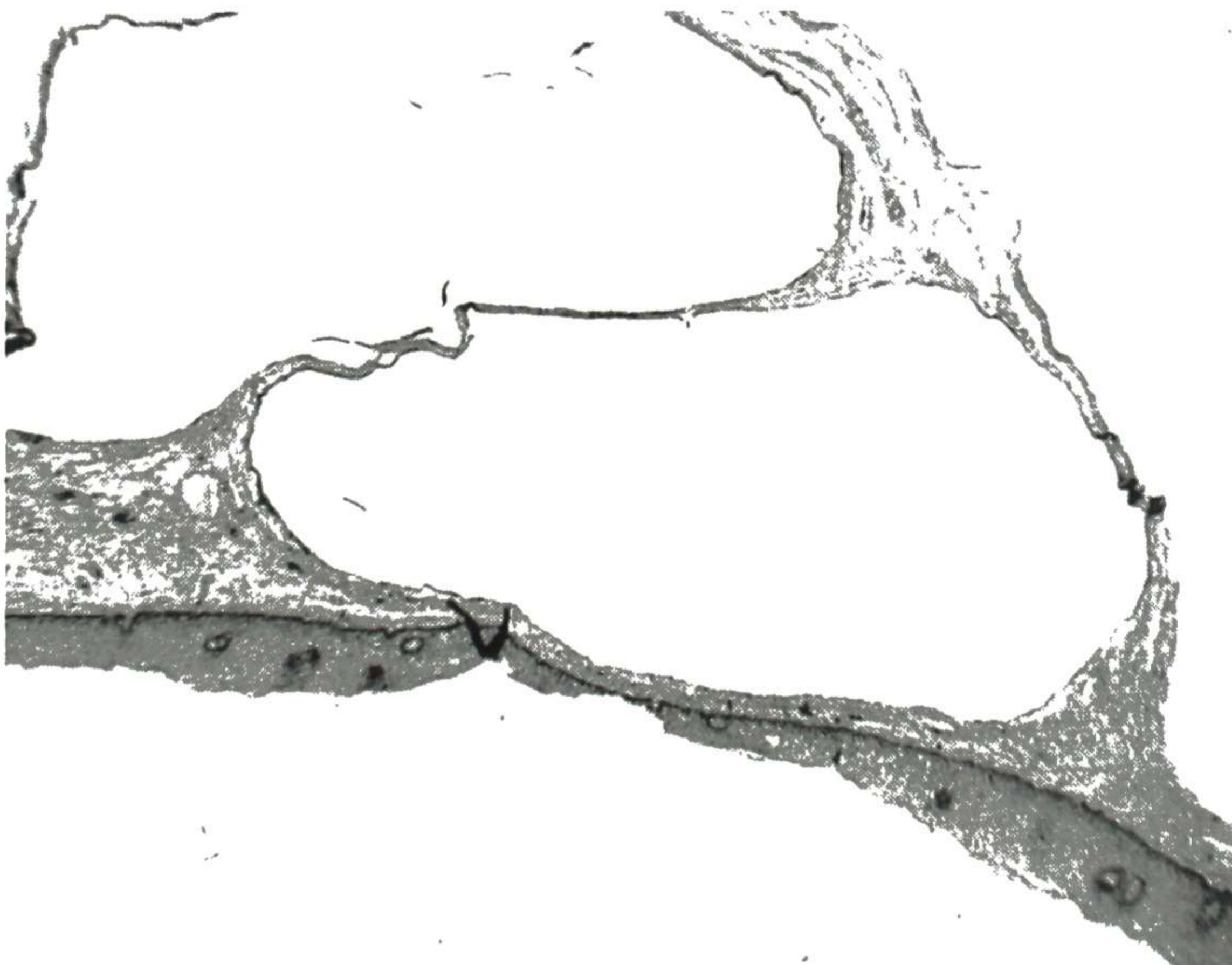


Fig. 344.—High-power photomicrograph showing thin partition separating gas-filled cavities.
(From Gardner: *Am. J. Obst. & Gynec.*, July, 1948.)

NONMALIGNANT GROWTHS AND SWELLINGS IN VAGINA

Colpocele, cystocele, and rectocele are considered along with pelvic floor relaxation in Chapter 4. A less common type of swelling in the vagina is the cul-de-sac hernia (Figs. 304 and 305) which is considered in detail under

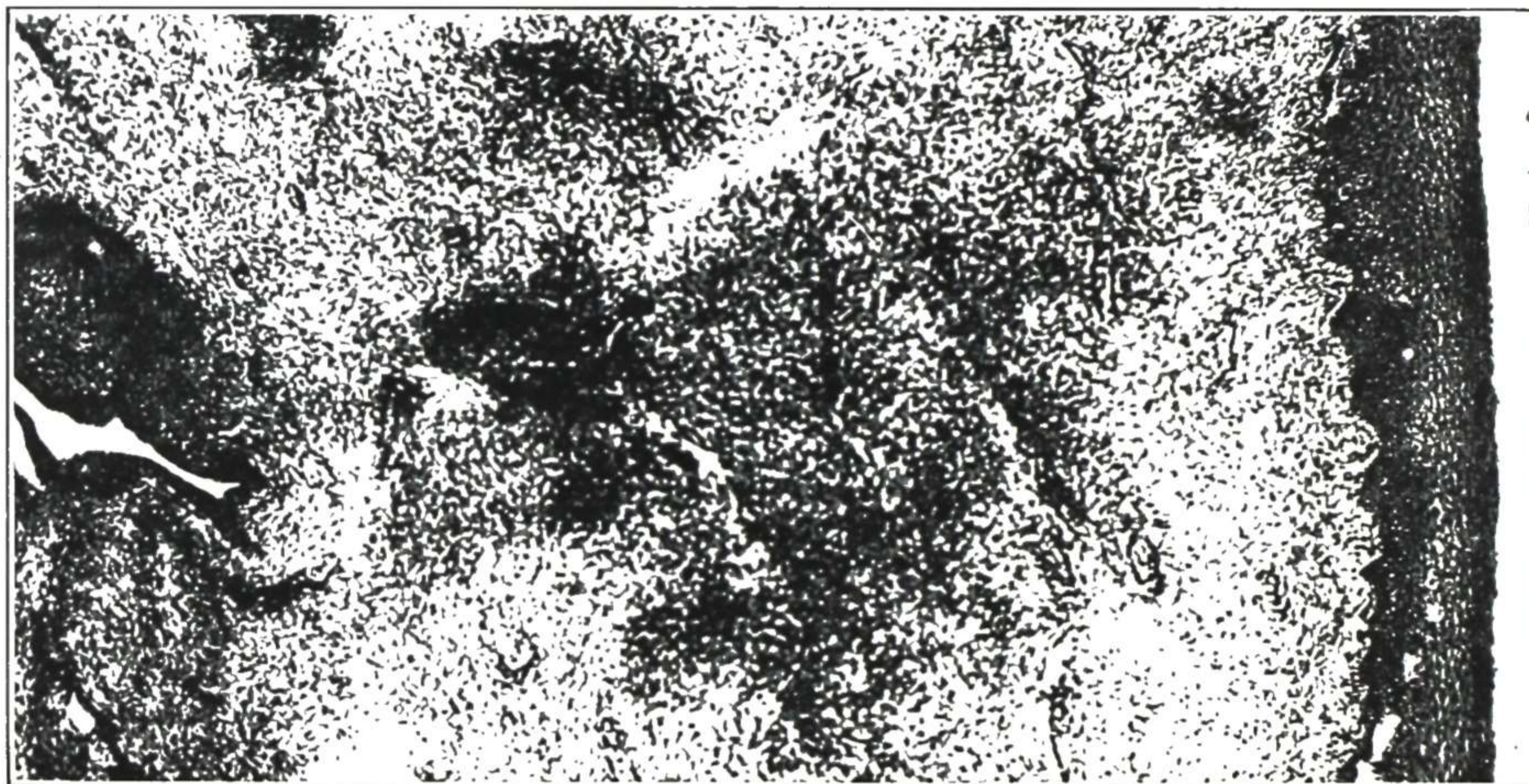
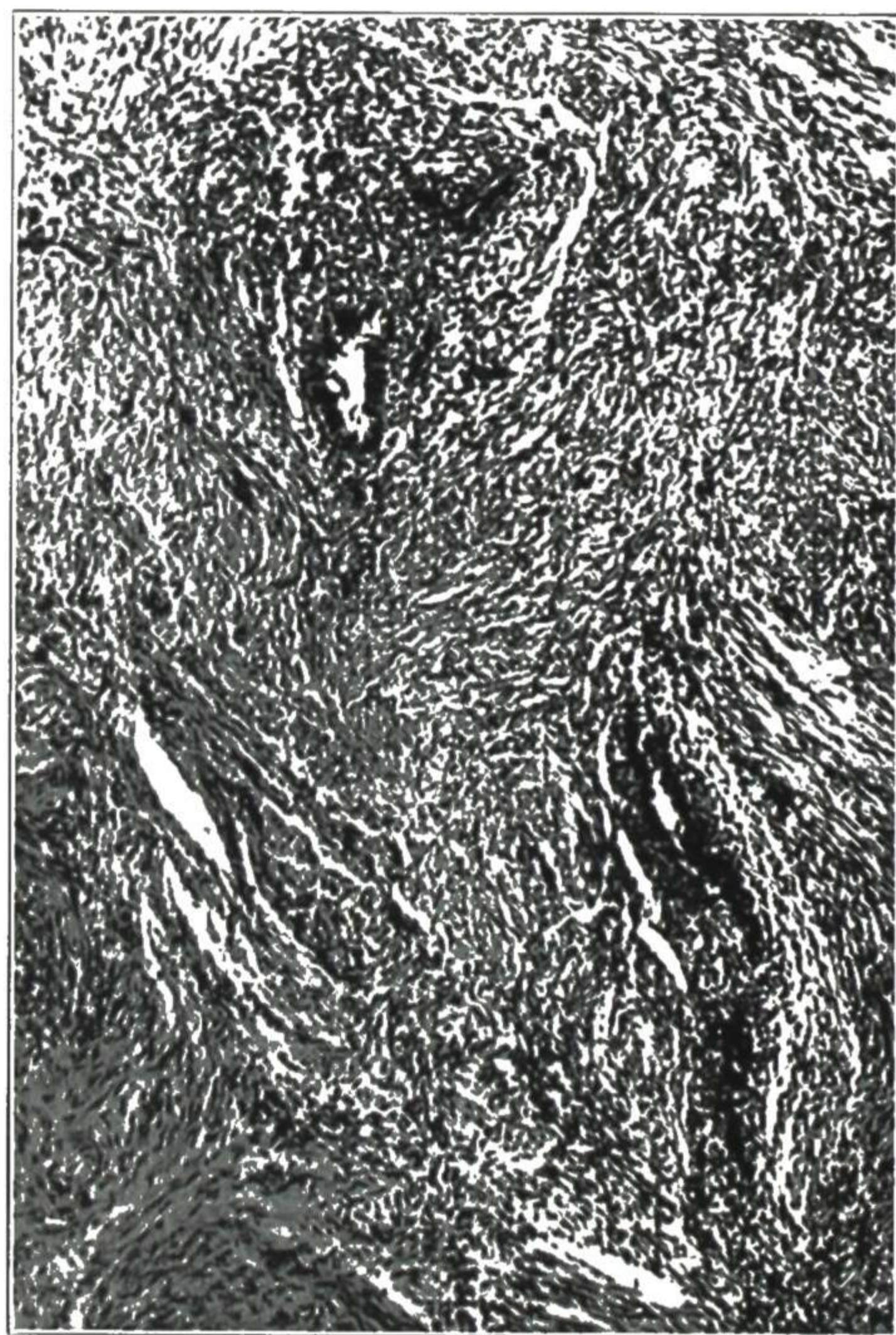


Fig. 345.—Endometriosis of the rectovaginal septum. On the right edge is seen the squamous epithelium of the vagina and on the left edge is an endometrial gland deep in the muscle. Gyn. Lab.



A.



B.

Fig. 346.—Endometriosis of rectovaginal septum. The tumor was a small nodule about 1 cm. in diameter and was removed by vaginal incision. A, Showing smooth muscle in which are embedded glands surrounded by a definite mantle of stroma. B, High power showing gland with surrounding stroma and muscle. Gyn. Lab. (From Schwarz: *Tr. Am. A. Obst. Gynec.*)

uterine prolapse with which it is usually associated. **Obturator hernia** and other rare types of swelling, such as **pelvic lipoma**, must be kept in mind when making differential diagnosis of an uncertain soft mass in the vagina.

Endometriosis of the posterior peritoneal cul-de-sac involving the vaginal wall in that region presents the same features as endometriosis elsewhere. Figs. 345 and 346 show the microscopic features by low power and high power. Papillomas and also fibromas occur occasionally in the vagina.

Solid tumors (fibroma, myoma, adenomyoma) occasionally develop in the vaginal wall. Such a tumor may be mistaken for hernia, rectocele, cyst, or a malignant tumor. Solid tumors in this situation are so rare as to require no detailed consideration, but the possibility of their existence must be kept in mind when endeavoring to determine the character of the swelling in this region. The tumor shown in Fig. 347 is from one of our cases.

Vaginal cysts are not especially uncommon. Since the vagina normally contains no glands, the question of the origin of the cysts is naturally of interest. Most pathologists feel that they are remnants of Gartner's duct, carried over from embryonic life. Gardner et al. give the following classification of tumors arising from mesonephric remnants:

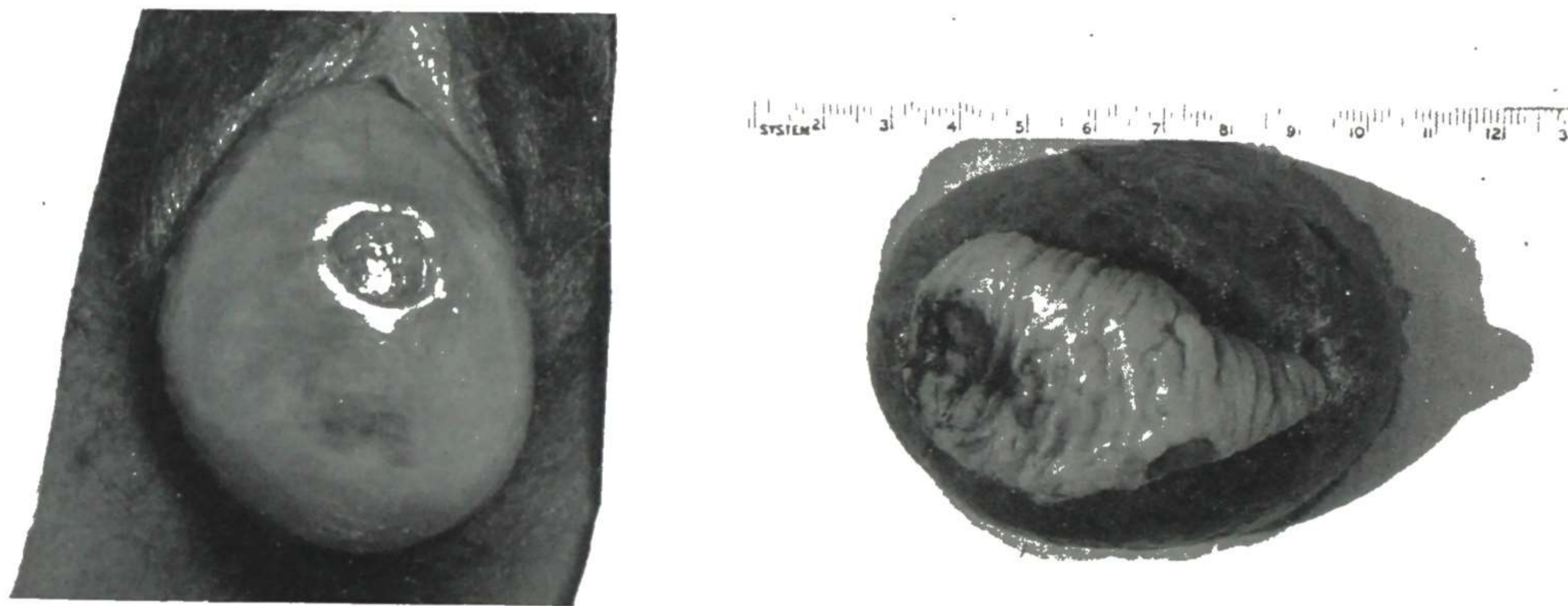
1. Vagina. Mesonephric duct cysts
2. Uterus.
 - a. Cervix:
 - (1) Mesonephric cysts
 - (2) Mesonephric adenomatous hyperplasia
 - (3) Mesonephric adenocarcinoma
 - b. Corpus: Mesonephric uterine cysts
3. Broad ligament.
 - a. Mesonephric duct cyst:
 - (1) Intraligamentous
 - (2) Pedunculated
 - b. Mesonephric tubule cyst:
 - (1) Intraligamentous
 - (2) Pedunculated
 - c. Paramesonephric cyst:
 - (1) Intraligamentous
 - (2) Pedunculated
4. Ovary. Mesonephroma (?)
Hypernephroma (?)

Vaginal mesonephric remnants are usually seen in the form of retention cysts. Fig. 642, Chapter 7, from an article by Huffman, shows the usual location of cysts of this type in the uterus and vagina.

The cysts are usually small and are rarely of importance, but occasionally they become very large. Frank has reported a case of large multiple vaginal cysts accompanied by large varicosities requiring cesarean section for delivery. Microscopically, the lining of these cysts may be low cuboidal epithelium or there may be several types of lining cells: ciliated, nonciliated, columnar, or squamous. Vaginal cysts are shown in Fig. 348. In some cases the vaginal

wall is separate from the cyst and moves freely over it, while in other cases the vaginal wall is closely adherent to the cyst, apparently forming part of it.

The contents of the cyst may be like serum or may be milky or may be dark and thick, the color and consistency depending on the amount of hemorrhage into the cyst cavity.



A.

B.

Fig. 347.—A and B. This is a tumor directly below the urethra which was first thought to be cystic but on removal proved to be a soft tumor of myoma tissue 3 cm. in diameter. On the surface of the removed cyst there was an area of ulcerated vagina. Cystoscopic examination before operation ruled out a diverticulum.

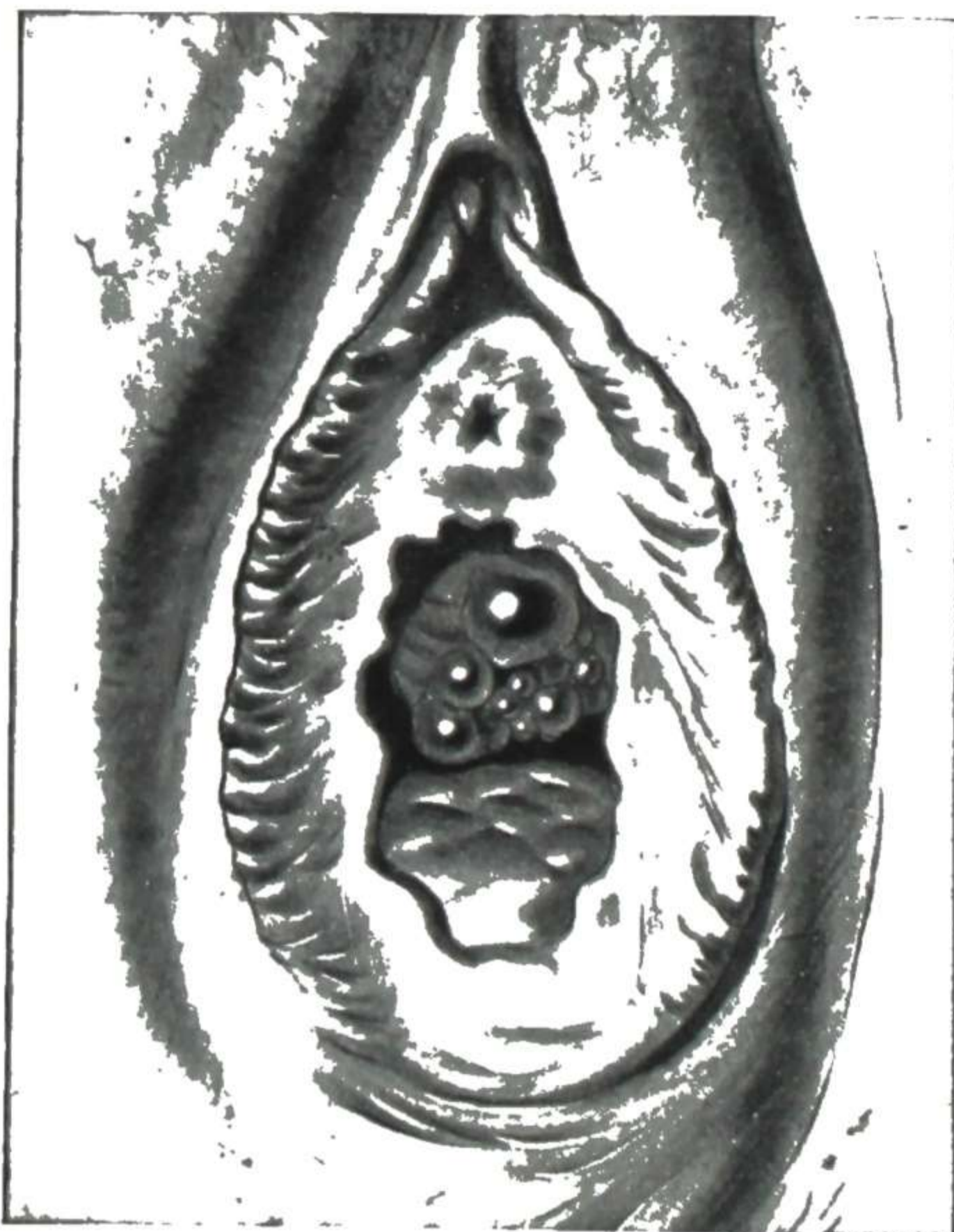


Fig. 348.—A group of small cysts of the vaginal wall. (From Montgomery: *Practical Gynecology*.)

Diagnosis.—The cyst differs from vaginal HERNIA in that it is of gradual development without apparent cause, gives, on coughing, no impulse separate from that of the adjacent vaginal wall, cannot be reduced, and is not associated with intestinal disturbance. The cyst differs from vaginal ABSCESS in that inflammatory symptoms are absent. In some cases, infection of the cyst contents

takes place and the cyst becomes an abscess. In such cases it is distinguished from a simple abscess by the presence of a swelling long before the inflammatory symptoms developed. In some cases a swelling that appears to be a vaginal cyst is simply a pocket from the urethra (suburethral abscess).

Two other conditions that should receive attention in the differential diagnosis of vaginal cyst are: double vagina and double ureter. In a case of **double vagina**, the second vagina may be completely shut off and filled with old menstrual blood. It would usually be somewhat larger and less tense than the ordinary vaginal cyst, though the latter is frequently of considerable size. There would be double uterus and the relation of the mass to the uterus would point to one-sided hematocolpos. From **hydroureter** or a **supernumerary ureter**, the differentiation would also be rather difficult and depend principally on the shape and tension of the swelling. In a case of double ureter, if one ended blindly alongside the vagina and became distended with urine, it would form a mass which would be more sausage-shaped and have less tension than a vaginal cyst. A puncture of the mass with an aspirator needle, of course, aids greatly in differentiating between these conditions—the presence of blood speaking for hematocolpos, and of urine for hydroureter.

Hernia must be carefully excluded before aspirating, or fatal peritonitis may result. If it is intended to remove the cyst by operation, only a small amount of fluid should be removed for diagnostic purposes, for the extirpation is more easily carried out when the cyst is distended than when collapsed.

Treatment.—If the cyst is large and troublesome, the most satisfactory way of dealing with it is by extirpation, provided it is situated in the lower part of the vagina where complete extirpation is practicable. A cyst due to remains of Gartner's duct may extend up into the broad ligament, a point to be kept in mind in attempted removal. If a cyst is so situated that it cannot be completely extirpated, remove a large part of the wall, curette the remaining portion, pack with gauze, and treat as an abscess cavity. If the patient is averse to operation, the cyst may be simply emptied by aspiration. There is a possibility that it will remain collapsed for some time or even permanently. The probability, however, is that it will refill in a short time and that extirpation will be necessary.

If the cyst is first discovered during pregnancy, do not disturb it until labor begins. When labor comes on and the child's head is beginning to press into the pelvis, empty the cyst with an aspirator, to give room for the passage of the child. Do not attempt extirpation of the cyst or incision and drainage until the patient has recovered from parturition.

MALIGNANT DISEASE OF THE VAGINA

This occurs in three forms: namely, ordinary carcinomas (epithelium, adenocarcinoma), chorionepithelioma which is a form of carcinoma but is derived from fetal tissue instead of from the mother's tissue, and sarcoma.

Carcinoma

Carcinoma of the vagina is usually secondary to carcinoma of the uterus or rectum or bladder or external genitals, and the treatment depends on the location and extent of the principal lesion. Primary carcinoma of the vagina

is rare. Messelt found it comprised 2.6 per cent of all cancer of the female genital organs treated in the Norwegian Radium Hospital.

Squamous-cell (epithelioma) is of course the usual form. It appears as a papillary or nodular condition, usually first at the vaginal vault and later spreads downward toward the opening. The usual origin at the posterior fornix fits in well with acceptance of chronic irritation as an etiological factor, for this is the site of chronic irritation from retained discharge and also from pressure of pessary when it causes irritation.

In primary cancer of the vagina, as in cancer elsewhere, a positive diagnosis in the early stages must rest upon microscopic findings in an excised piece. The treatment is complete extirpation, if seen early enough, followed by x-ray therapy. The results thus far have been unsatisfactory. There is usually recurrence. If at all advanced, radium followed by x-ray is the preferable form of treatment.

Chorionepithelioma

This variety of carcinoma sometimes occurs in the vagina, representing an early metastasis. This curious form of tumor will be considered in greater detail under Malignant Diseases of the Uterus. It arises from chorionic villi and may develop after normal parturition or after abortion or after mole pregnancy. It usually develops in the uterus, but occasionally one of the chorionic villi transported to the vagina (pieces of chorionic villi are normally transported to various parts of the body in probably all pregnancies) takes on the peculiar change and forms a malignant growth. As it grows, it breaks into the veins, and particles are carried to the lungs and form metastases there. Hence the advisability of x-ray examination of the lungs in any case of suspected chorionepithelioma. Occasionally the lung symptoms are the first noticed. Since such a growth in the vagina or in the vulva is usually metastatic from a similar growth in the uterus, the condition of the uterus should be investigated.

A carcinoma of the thyroid gland located in the rectovaginal septum occurred in a case of ours (Figs. 349 to 351).

Sarcoma

One form in which sarcoma of the vagina occurs is as a diffuse infiltration and degeneration of the lining membrane. This is the form sometimes found in young children. It occurs most frequently in the posterior vaginal wall. It begins as a small indurated area which slowly increases in size. After a time the epithelium covering the area is lost and an ulcer forms. The ulcer bleeds easily and is surrounded by an area of induration. A large part or even the entire circumference of the vagina may become involved in the sarcomatous infiltration, which may be mistaken for carcinoma or tuberculosis. In another variety grapelike masses form in the vagina and may project outside, as in the case shown in Figs. 352 and 353. The treatment for sarcoma of the vagina is the same as for carcinoma. These are mixed tumors called sarcoma botryoides. They occur usually as a polyp on the anterior wall of the vagina, either present at birth or appearing shortly afterward. When removed they promptly recur and enlarge. They occur almost exclusively in children and sometimes do not exhibit their malignant qualities until after puberty. Micro-

Tumor in
Pouch of
Douglas



Rectum

Fig. 349.—Sketch showing large carcinoma of the thyroid growing in the rectovaginal septum. No demonstrable tumor found in the thyroid at autopsy. No struma of the ovary found in the ovaries removed at operation.

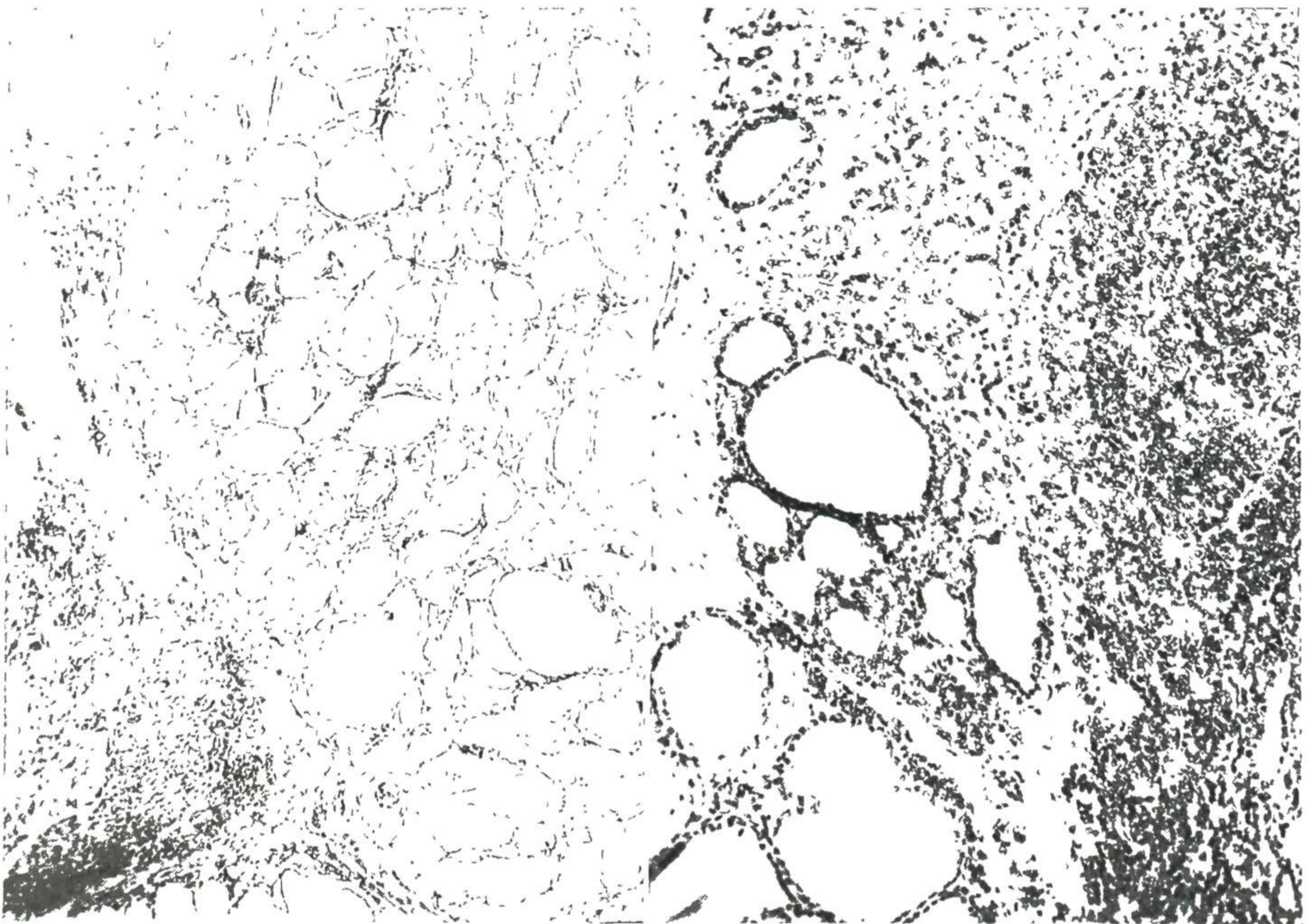


Fig. 350.

Fig. 351.

Fig. 350.—Microscopic section of carcinoma of the thyroid tissue from a metastasis in the liver.

Fig. 351.—Section from mass in the rectovaginal septum showing typical follicles filled with eosinophilic colloid in another area. The tissue is more homogeneous with incomplete follicle formation. This case will be reported in full later.

scopically there is a marked variation in the findings. Myxomatous tissue, striped and unstriped muscle, giant cells, round cells, and cartilage are some of the components found. Shackman in a recent report collected from the literature fifty-four such tumors occurring in children and added one of his own.

The symptoms of sarcoma of the vagina are leukorrhea, hemorrhage, pain, and obstruction of the vagina by the infiltration. Slight hemorrhage may appear in the early stages, particularly after coitus or exertion. In the late stages, profuse hemorrhages occur, and there is also a mucopurulent or watery discharge that may cause pruritus. The pain is slight at first but gradually increases in severity. It is usually worse at night. Examination reveals a nodular tumor or an area of induration or ulceration and more or less narrowing or obstruction of the vagina, and a microscopic examination shows the nature of the mass. The treatment is the same as for carcinoma.



Fig. 352.



Fig. 353.

Fig. 352.—Sarcoma of vagina in child, aged five years. This specimen protruded from the vagina as a reddened cauliflower mass. Microscopic diagnosis, myosarcoma.

Fig. 353.—Microscopic section of specimen shown in Fig. 352. High power, showing the margin of one of the grapelike masses. Gyn. Lab.

URETHRAL CONDITIONS

These are eversion of urethral mucosa, prolapse of urethral mucosa, urethral caruncle, Skene's gland infections, periurethral abscess, urethral diverticulum, ureterocele, female prostate, and cancer of urethra.

Widening of Meatus

This condition of widening of the urethral meatus, so that a considerable area of red urethral lining shows, is due usually to stretching from childbirth.

It is not of much clinical importance, rarely giving rise to discomfort, though the exposed mucosa is of course liable to irritation from any irritating vaginal discharge. The appearance is shown in Fig. 354. It is to be distinguished from prolapse of the mucosa, caruncle, skenitis, or other definite chronic irritation requiring elimination.

Prolapse of Urethral Mucosa

Prolapse of urethral mucosa is known also as "procidencia urethrae." It consists of a prolapse of urethral mucous membrane, accompanied by more or less proliferation of the submucous connective tissue.

The red projecting membrane surrounds the meatus (Fig. 355). It often bleeds easily and is somewhat sensitive to the touch, though not nearly so sensitive as a caruncle. It usually gives rise to considerable irritation, with frequent painful urination and some discharge. It is distinguished from polypus and caruncle by the fact that it surrounds, or almost surrounds, the meatus.

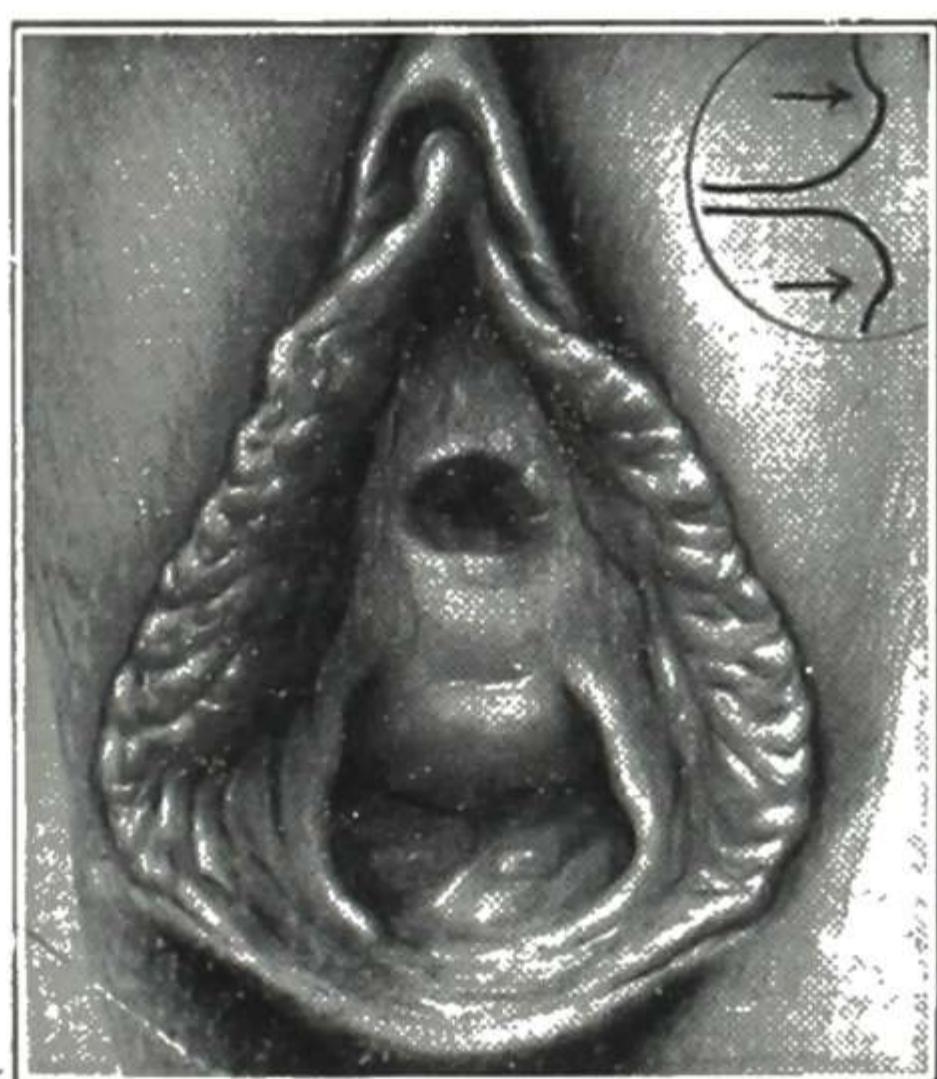


Fig. 354.

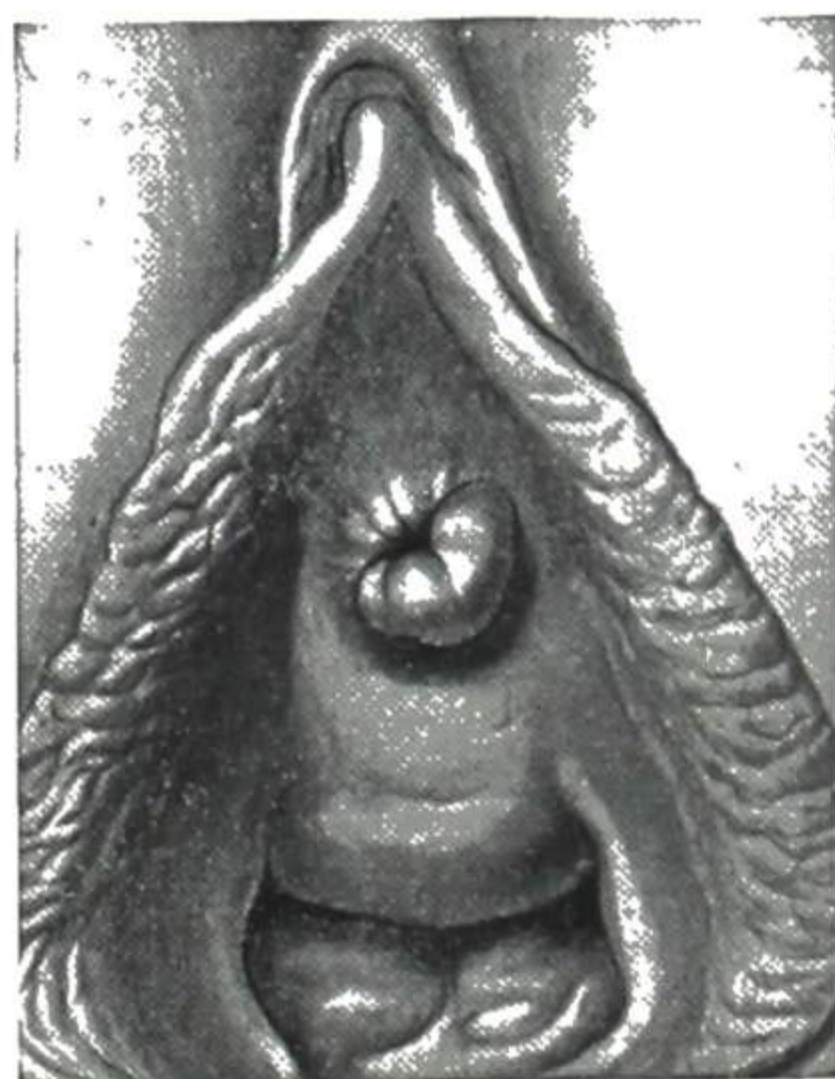


Fig. 355.

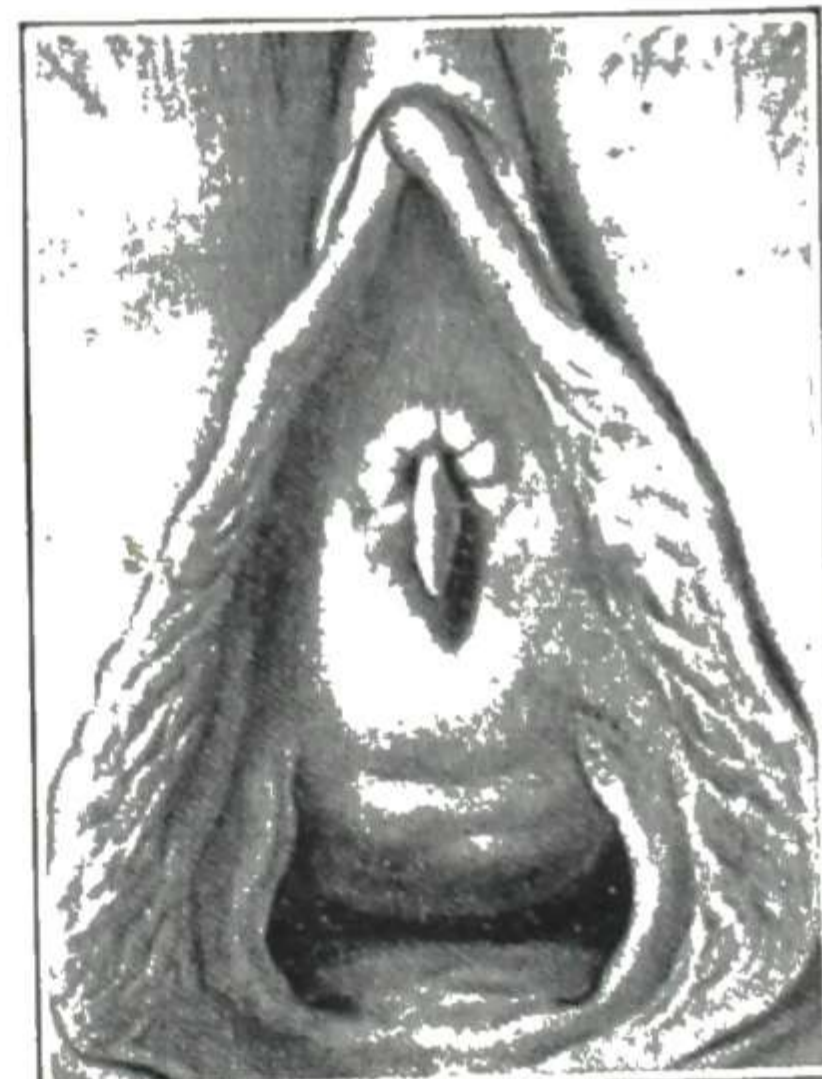


Fig. 356.

Fig. 354.—Relaxation of urinary meatus, with slight eversion of mucosa. A rather common condition in multiparas.

Fig. 355.—Prolapse of the urethral mucosa. (From Montgomery: Practical Gynecology, The Blakiston Company.)

Fig. 356.—Urethral caruncle. (From Montgomery: Practical Gynecology.)

Marked prolapse of the urethral mucosa is not a common affection, though slight gaping of the urethra, through which the mucous membrane may be seen (eversion of urethral mucosa, Fig. 354), is very common in women who have had urethritis or have passed through several labors. Moffett and Banks report four cases in children.

If symptoms are absent or slight, no treatment is necessary. If the prolapse is marked enough to be troublesome, the part may be cocainized, or the patient anesthetized, and the redundant portion of mucous membrane excised and the wound closed by sutures.

Urethral Caruncle

Urethral caruncle is a small papillary growth occurring about the meatus, most frequently near the lower portion. It is usually very sensitive and often gives rise to excruciating pain on urination. It is known also as "irritable caruncle" and "urethral angioma." The cause of urethral caruncle is not

known. Probably chronic inflammation of Skene's glands has some influence in its causation, as it usually occurs in the neighborhood of the gland openings. Inflammation of the urethra, particularly gonorrheal inflammation, is supposed to be a causative factor. Hodges reported twenty-five cases of chronic posterior urethritis in girls, and he found the incidence of this condition in the pediatric cases reporting to the urologic clinic to be 10 per cent. The most frequent symptoms were frequency, urgency, burning on urination, and enuresis. All of the positive cultures contained coliform organisms. Treatment consisted of dilatation of the urethra, with adjunctive treatment with sulfonamides and antibiotics.

The growth is seen as a deep red mass at the meatus (Fig. 356) or just within the canal. It is sensitive when touched and may bleed easily on manipulation. It may have a distinct pedicle or a broad base. Usually there is but one growth, but sometimes there are two or more. The principal symptom is pain on urination. It may be slight or it may be very severe.

Polyps of the urethral mucous membrane and prolapsed mucous membrane differ from caruncle in being less vascular and less sensitive. Also, polyps are attached higher, while in prolapse of the mucous membrane the base of the mass includes the larger part, if not all, of the circumference of the meatus (Fig. 355).

The treatment for caruncle is removal, preferably by electric current.

Skene's Gland Infection

The anatomy of these small urethral glands, described long ago by Skene, is shown in Figs. 110 to 112. It will be readily appreciated that infection in these may be harbored there indefinitely unless exposed and eradicated. Such infection is usually due to the gonococcus, but not always. The diagnosis is made by finding swelling or tenderness of the glands, and pressing out discharge, as explained in Figs. 142 to 144. The treatment of inflammation of Skene's glands is given under gonorrhea, with which urethritis also is considered.

Suburethral Abscess

This term is applied to an abscess due to infection from the urethra and located in the tissues about it, such abscess being situated under the urethra (either primarily or gravitating there), between it and the vaginal wall, as shown in Fig. 357. The pocket of pus may communicate with the urethra or may be shut off from it, and be pointing toward the vagina.

The treatment for this condition is to drain the cavity at the most dependent part, that is, where it comes closest to the vaginal wall. At this point a large opening should be made and the incision should be kept open by gauze packing or a drainage tube until the cavity heals from the bottom.

Urethral Diverticulum

This condition should always be kept in mind when a cystic mass is found beneath the urethra. Usually there is a long history of pain and frequency of urination with occasional leakage. Occasionally the chief complaint is dyspareunia and vaginal mass. On examination, pressure on the mass will

cause expulsion of fluid or pus from the meatus if the orifice of the diverticulum is open. Urethroscopy will usually reveal the orifice, and injection with an opaque medium and x-ray will aid in outlining its size and direction. Treatment of urethral diverticulum is excision, and Counseller reported 71 cases of diverticulum of the female urethra which were treated surgically.

Ureterocele

Campbell reported a study of 94 cases of ureterocele occurring in 80 infants and children, with an outline for surgical correction. In a case of ours the ureterocele protruded through the urethral meatus when the child voided.

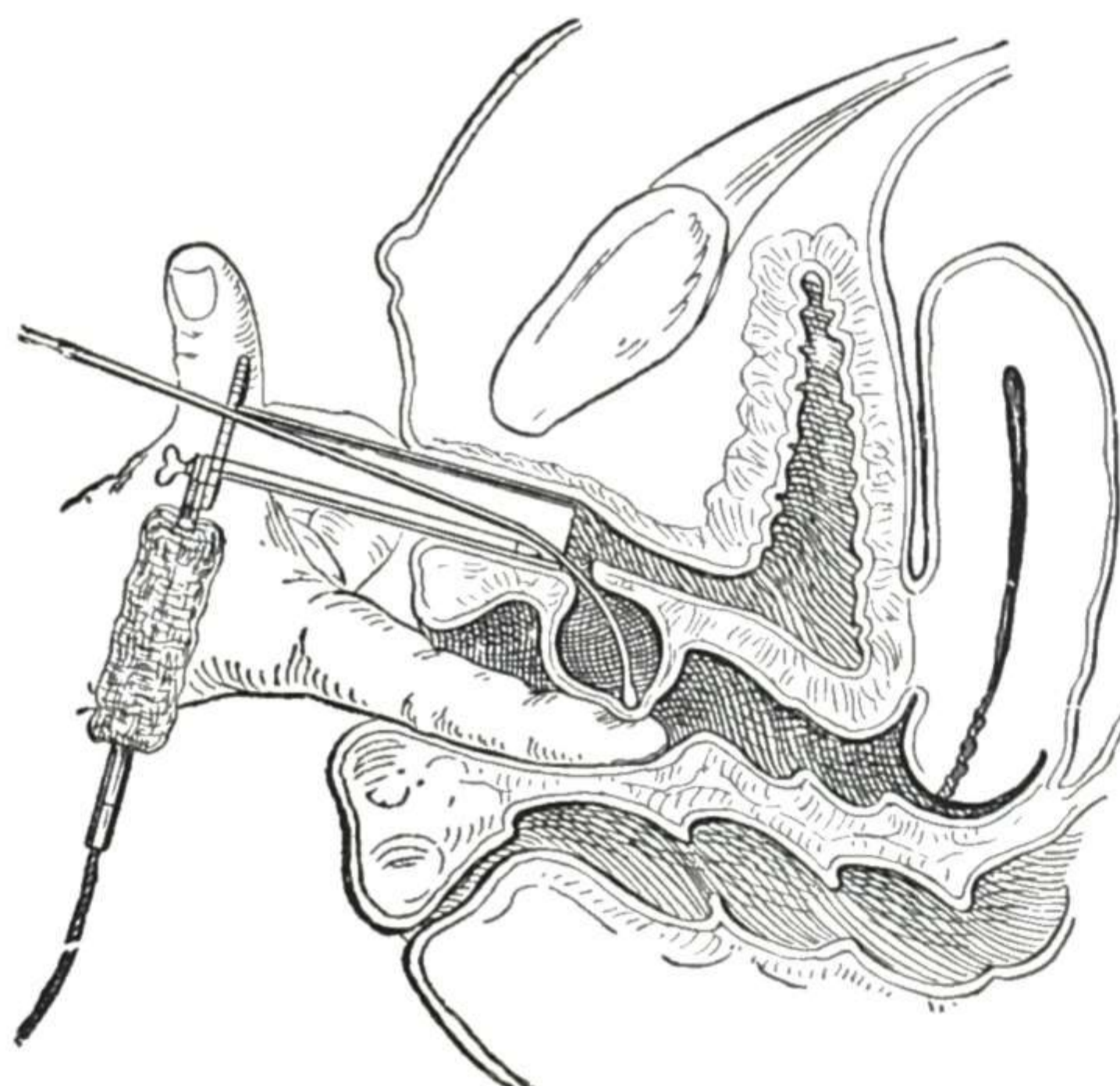


Fig. 357.—Testing for suburethral abscess. (From Ashton: Practice of Gynecology, W. B. Saunders Co.)

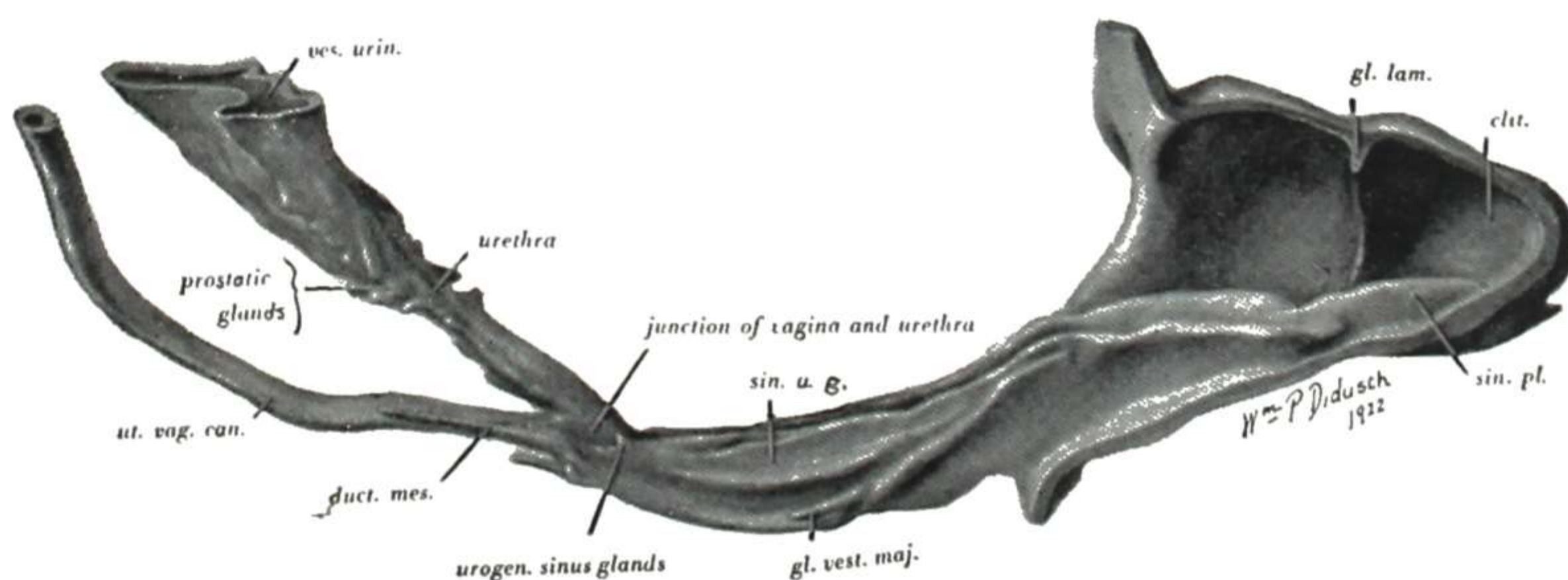


Fig. 358.—Lateral view of a wax reconstruction of the urethra and associated epithelial structures of female embryo of 60 mm. $\times 33$ diameters. The right half of the clitoris has been dissected away, showing a concavity filled with mesenchymal tissues. The urogenital sinus is much shorter, but broader than in the corresponding stage of the male. Its only glands are the major vestibular or Bartholin's glands, the homologues of Cowper's. At the junction of the uterovaginal canal and urethra is seen the distal remnant of the Wolffian duct. The urethra shows numerous glands which are true homologues of the prostatic glands. A few of these glands are also found at the junction of the urethra and uterovaginal canal. (After Johnson, from Young: Genital Abnormalities, Hermaphroditism and Related Adrenal Diseases, Williams & Wilkins Co.)

Female Prostate

As early as 1853 Virchow suggested that the urethral glands of the female were homologous with the prostate gland in the male. Pallin in 1901 pointed out that these embryonic glands were homologous with the cranial and ventral

portions of the male anlagen, for the glands in the female were only present about the urethra in the area between the bladder and the opening of the müllerian ducts. Johnson confirmed this work, and Fig. 358 shows a wax reconstruction of the findings in a 75 mm. female embryo. Hugh Young in his book, *Congenital Abnormalities: Hermaphroditism and Related Adrenal Diseases*, has a chapter on the female prostate with a summary of the embryology literature and adds a case report of his own. Deter, Caldwell, and Folsom made a clinical and pathological study of the posterior urethra in women and concluded that the glands were distributed about the urethra approximately the same as in the male prostatic tissue. These workers refer to the work of Korenchevsky. He injected a derivative of the male sex hormone into ovariectomized rats, and on dissecting the vagina and uterus of these rats he found that glands not normally seen were present at the base and in front of the bladder. Microscopically these glands had the appearance of the ventral lobe of the male prostate. The genetics of the female prostate has been summarized by Mahoney and Witschi, and Huffman has made an excellent study of the detailed anatomy of the paraurethral ducts in the adult human female.

Carcinoma

Carcinoma of the urethra is rare, representing 0.016 per cent of gynecologic malignancies. It usually arises in the meatus at the junction of the transitional epithelium of the urethra and the squamous epithelium of the vulva. The average age of occurrence is over fifty, but, as in a case of ours, it can occur under thirty. There is no agreement on the best treatment, though most reports favor radiation. For a more complete discussion of treatment see *Operative Gynecology*, or a recent article by Eisenstaedt.

MISCELLANEOUS DISTURBANCES

The miscellaneous disturbances of the external genitals and vagina include leukoderma (vitiligo) of the vulva and vicinity, adhesions of prepuce, adhesions of labia, and hyperesthesia of vaginal entrance.

Leukoderma of Vulva

Leukoderma or vitiligo is a condition characterized by the loss of pigment in certain areas of the skin. As the term signifies, the skin is simply whitened. There is no infiltration, stiffening, or hypersensitiveness. The skin of the affected areas retains its normal softness and flexibility, the only appreciable change being the loss of color. It may affect only a small area or may be extensive, with perhaps areas elsewhere on the body.

As there are no symptoms, local or general, the condition is seldom of clinical importance. It should, however, be watched to make certain that the small white area is not part of a developing leukoplakic vulvitis.

Adhesions of Prepuce

Not infrequently in infants, adhesions are found between the glands of the clitoris and the prepuce. In some cases the adhesions are extensive (Fig. 359) and much irritation is produced by retained secretion, not so rarely forming the underlying cause for the habit of masturbation acquired by a child. In

such a case the adhesions should be separated. After applying a local anesthetic solution for five minutes, the adhesions are broken, the glans thoroughly exposed, as in Fig. 360, and then the parts are coated with some bland ointment, such as zinc oxide or petrolatum.

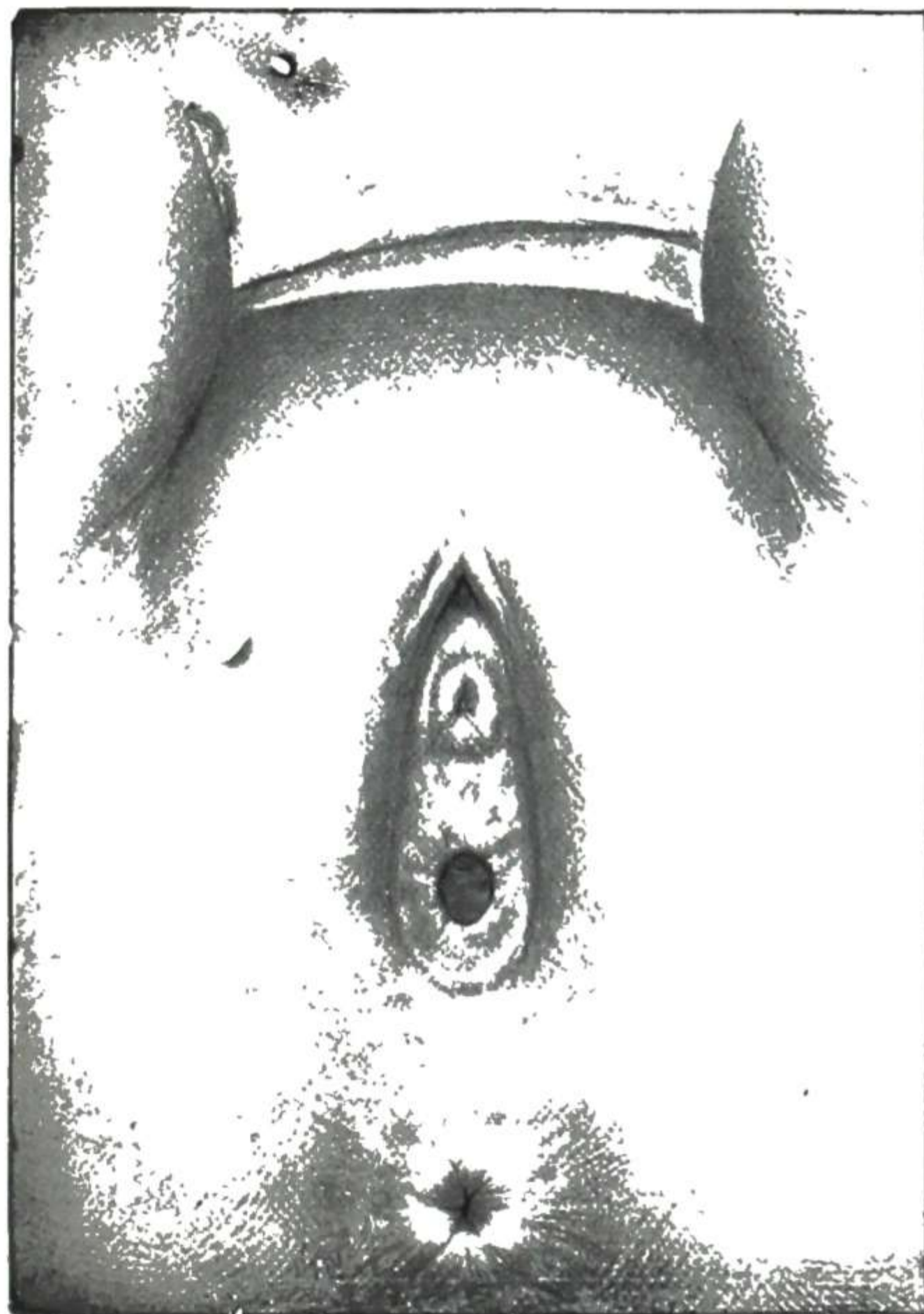


Fig. 359.

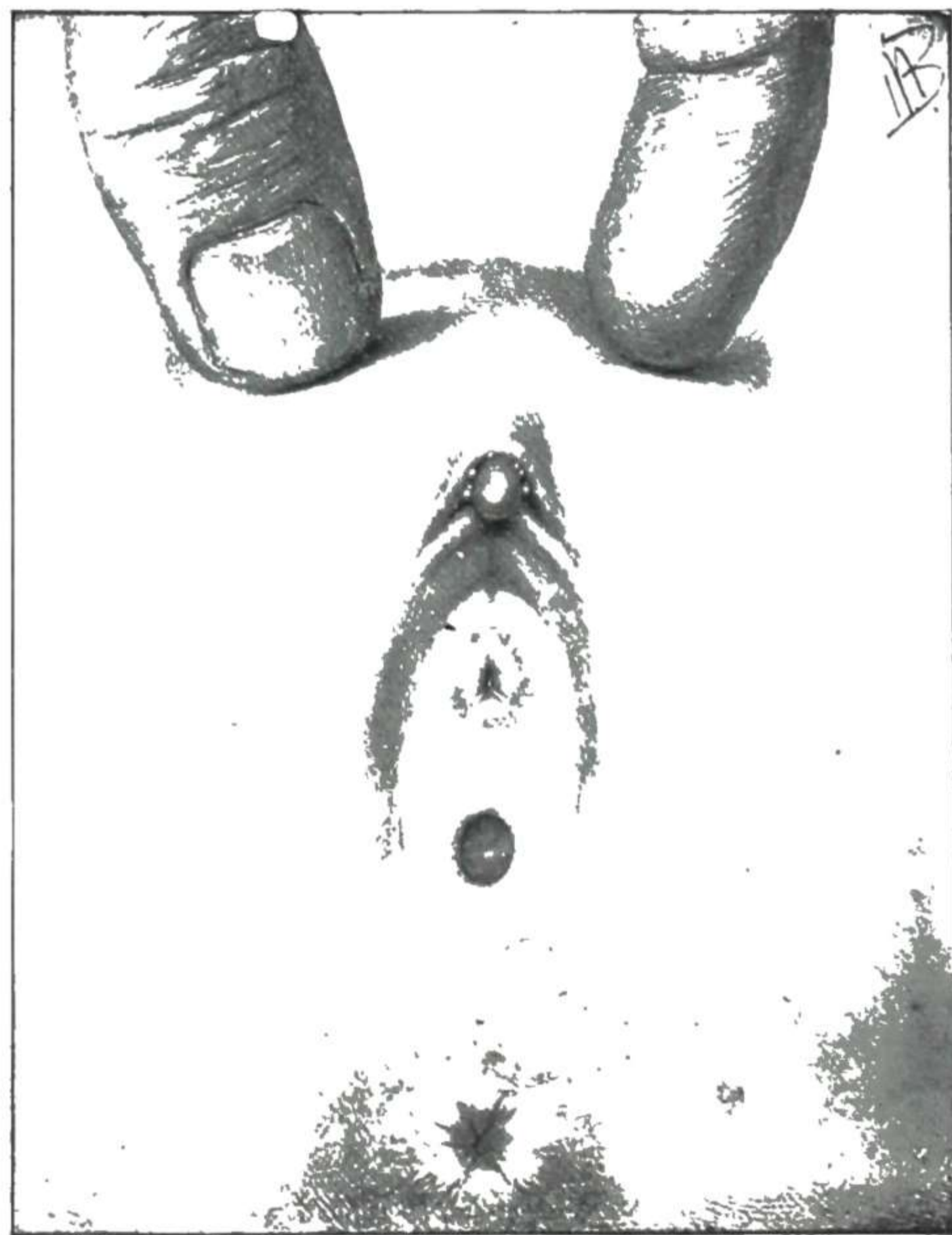


Fig. 360.

Fig. 359.—A case of adherent prepuce, the clitoris being entirely hidden.

Fig. 360.—The same case, with the adhesions separated and the prepuce pushed back and the clitoris exposed. Notice the smegma concretions which had formed under the adherent prepuce.

(From Kelly: Operative Gynecology.)

Adhesions of Labia

The labia minora are occasionally found adherent. This condition may be congenital or acquired. In the latter case, the cause is inflammation or ulceration of various kinds, producing raw surfaces which come in contact and grow together. The adhesions are usually found in the unmarried, and especially in children and in the aged, when considerable irritation may persist without attracting notice. Campbell states that the condition in children is frequently confused with hermaphroditism. In the nine cases which he had seen, all patients but one were under two years of age, the youngest being four months. The condition may be either congenital or acquired. In the former there is a fusion of the labioscrotal folds but the fusion lacks the density it has in the male; the latter is due to some local inflammation or to acute infectious disease such as scarlet fever, diphtheria, or pneumonia. Figs. 361 to 363 from his article show the condition before and after separation of the labia.

The adhesions between the labia are easily broken if recent, but later the adherent surfaces become firmly united by connective tissue and can be separated only with a knife. The treatment, when the adhesions are recent and

weak, is to break them with a probe or other blunt instrument, separate the labia and keep them apart with pledgets of cotton. Treat the affected surfaces as indicated by the inflammation or ulceration present.

In rare cases, as in the one of ours shown in Fig. 364, the labia majora fuse firmly. This patient was married and had had three children, without difficulty. When first seen the introitus was closed except for a tiny opening



Fig. 361.

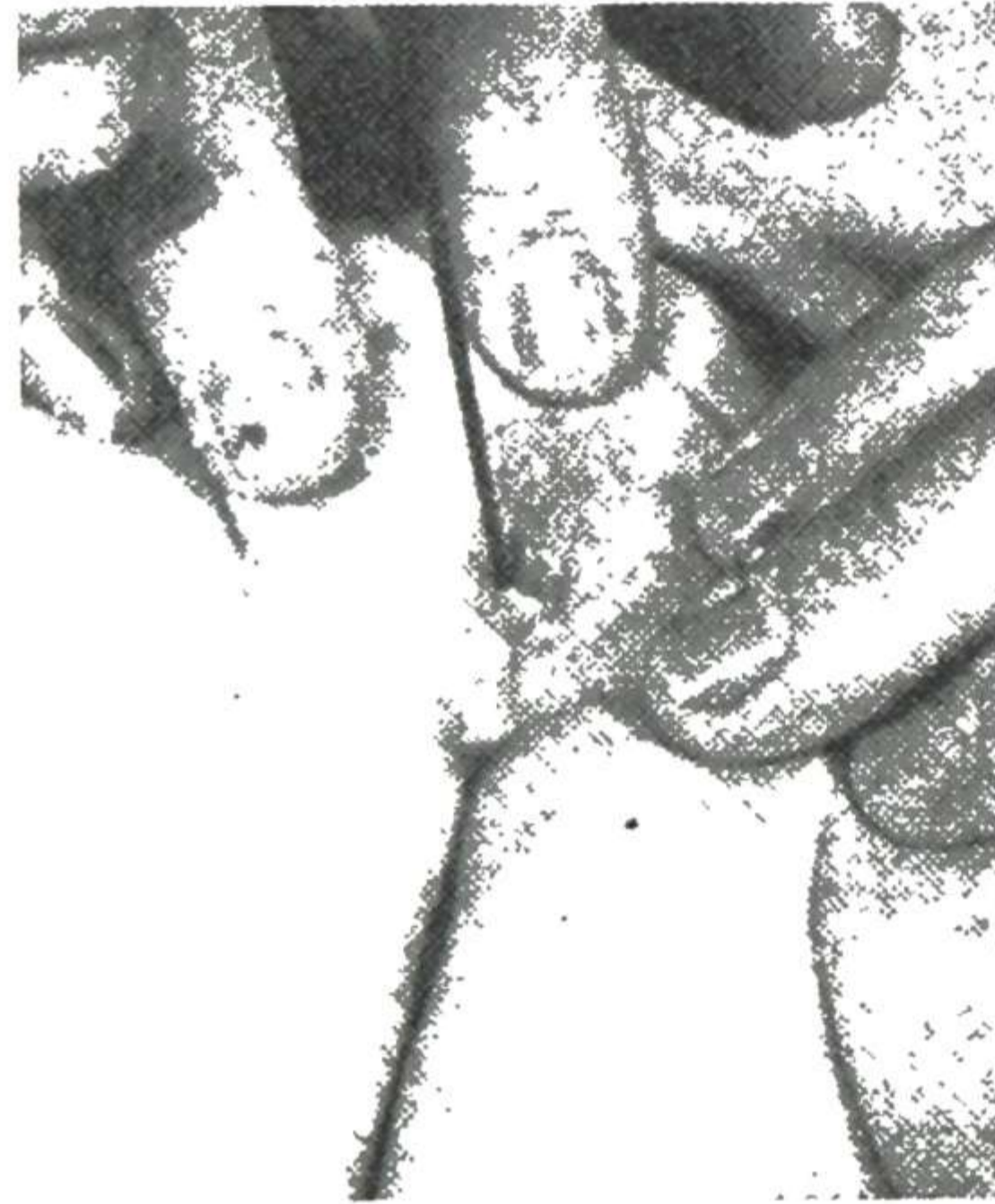


Fig. 362.

Fig. 361.—Characteristic appearance of fused labia minora. The minute dimple into the introitus is the exit of the urine and menstrual flow. Note that the clitoris also is completely covered by the midline fusion.

Fig. 362.—Probe in the orifice of case shown in Fig. 361.



Fig. 363.—Appearance following midline division of the fused labia minora. The probe shown in Fig. 362 was used to accomplish the separation; the clitoris above is inadequately exposed. Hymen, vagina, and cervix are normal.

(Figs. 361 to 363 from Campbell: *J. A. M. A.*, Aug. 17, 1940.)

and the urethral meatus was also almost completely covered by adhesions of the labia minora and majora. Under anesthesia complete separation of the labia was done, and the labia were held apart, until healing occurred, by means of several silk stitches from the lateral surface of the labia to the skin lateral to this. Premarin cream was applied several times a day and a role of cotton

was kept between the lips for about ten days. Healing was complete. The patient is now two years postoperative and the labia and introitus are normal. The pathological examination of biopsies removed at operation showed merely chronic inflammation of the skin, which certainly does not give us an explanation as to why in this case the labia became adherent to each other.

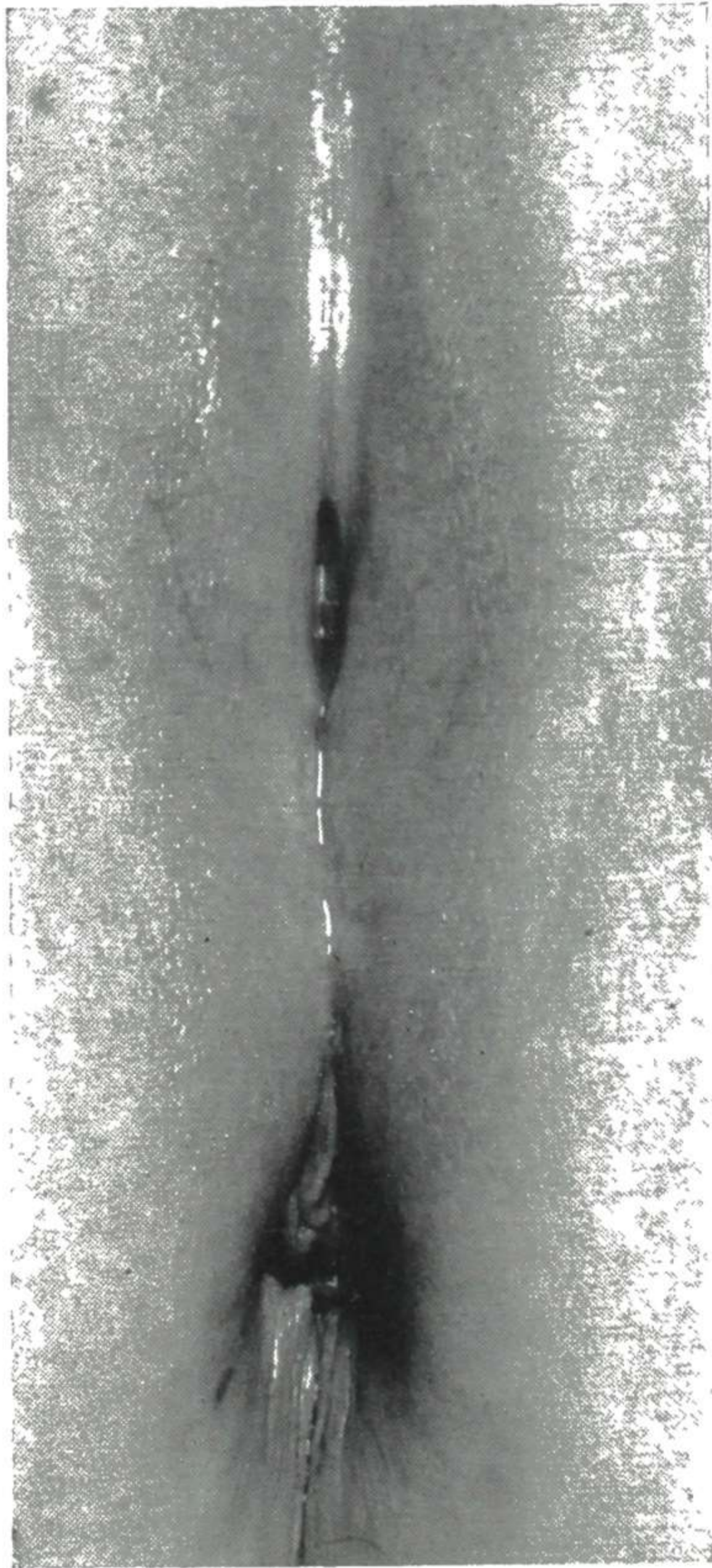


Fig. 364.—Fusion of vulva in case of ours (see text).

Hyperesthesia of the Vaginal Entrance

The structures surrounding the vaginal orifice may be so hyperesthetic that coitus is very painful and in some cases impossible. Occasionally the parts are so tender and the nervous irritability so marked that attempts at sexual intercourse cause a spasm of the muscles surrounding the vaginal opening, including the levator ani. This spasmodic condition is known as “vaginismus.”

There may be also a definite stenosis of the vaginal entrance due to rigidity of the hymen or adjacent tissues, making the opening so small that normal coitus is not possible and attempts cause pain.

Causes.—Hyperesthesia of the vaginal entrance occurs most frequently in nervous young women, newly married, or in women near the menopause. The cause of this marked hypersensitiveness may be as follows: (a) Urethral

caruncle or inflammation about the meatus or along the urethra. (b) Painful fissures about the vaginal orifice or about the anus. (c) Inflammation of a rigid hymen or remnants of a hymen. (d) Neuromas on remnants of the hymen. (e). Neuroses. In some cases, especially in women near the menopause, the hypersensitiveness of the nerve endings is apparently due to atrophic thinning of the protective epithelial covering, which indicates treatment as for atrophic vaginitis. (f) Organic stenosis.

Treatment.—The treatment may be presented in the following steps:

1. Reduce the general nervous irritability by sedatives and relieve the pelvic congestion by laxatives, if needed, and attention to other possible causes of undue pelvic congestion.

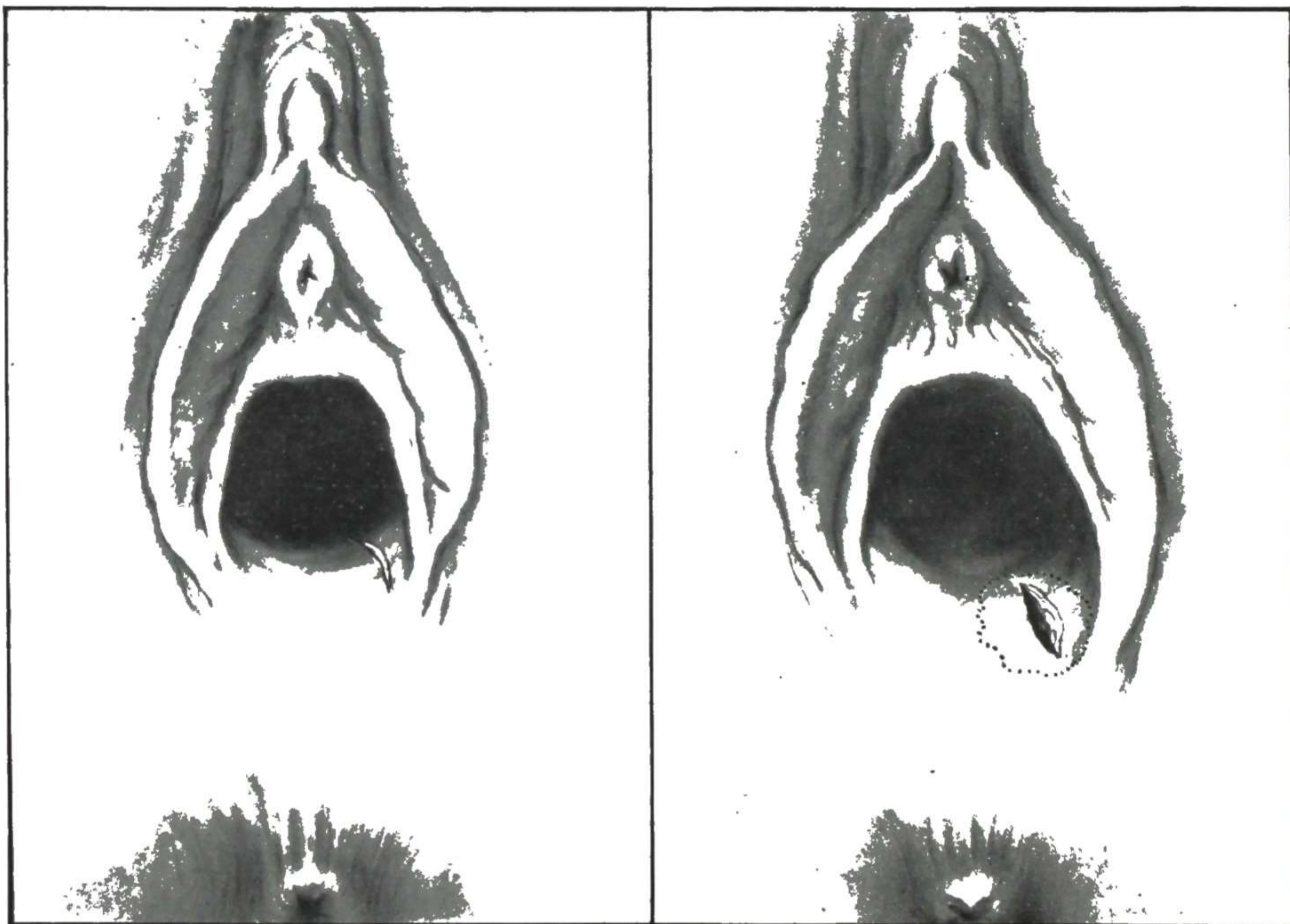


Fig. 365.

Fig. 366.

Figs. 365 to 368.—Submucous division of the constricting levator sling in stenosis of vaginal opening.

Fig. 365.—The short incision through which the deeper tissues are divided.

Fig. 366.—Through the short incision the constricting portion of the musculo-fibrous levator sling has been divided with knife or scissors under guidance of the finger. The divided deep tissues are spread apart, as indicated by the dotted line, until all resistance is overcome.

2. Remove all local lesions that cause irritation. Abrasions, fissures, and areas of inflammation must be made to heal: The various therapeutic measures for these conditions have been described.

3. Employ local sedative applications and stretching. Hot douches usually diminish the sensitiveness of the parts, and also the various soothing measures mentioned under Vulvitis and Pruritus may be employed. In some cases of small opening or spasm, considerable relief may be given by moderate stretching treatments. When the trouble occurs in a young married woman,

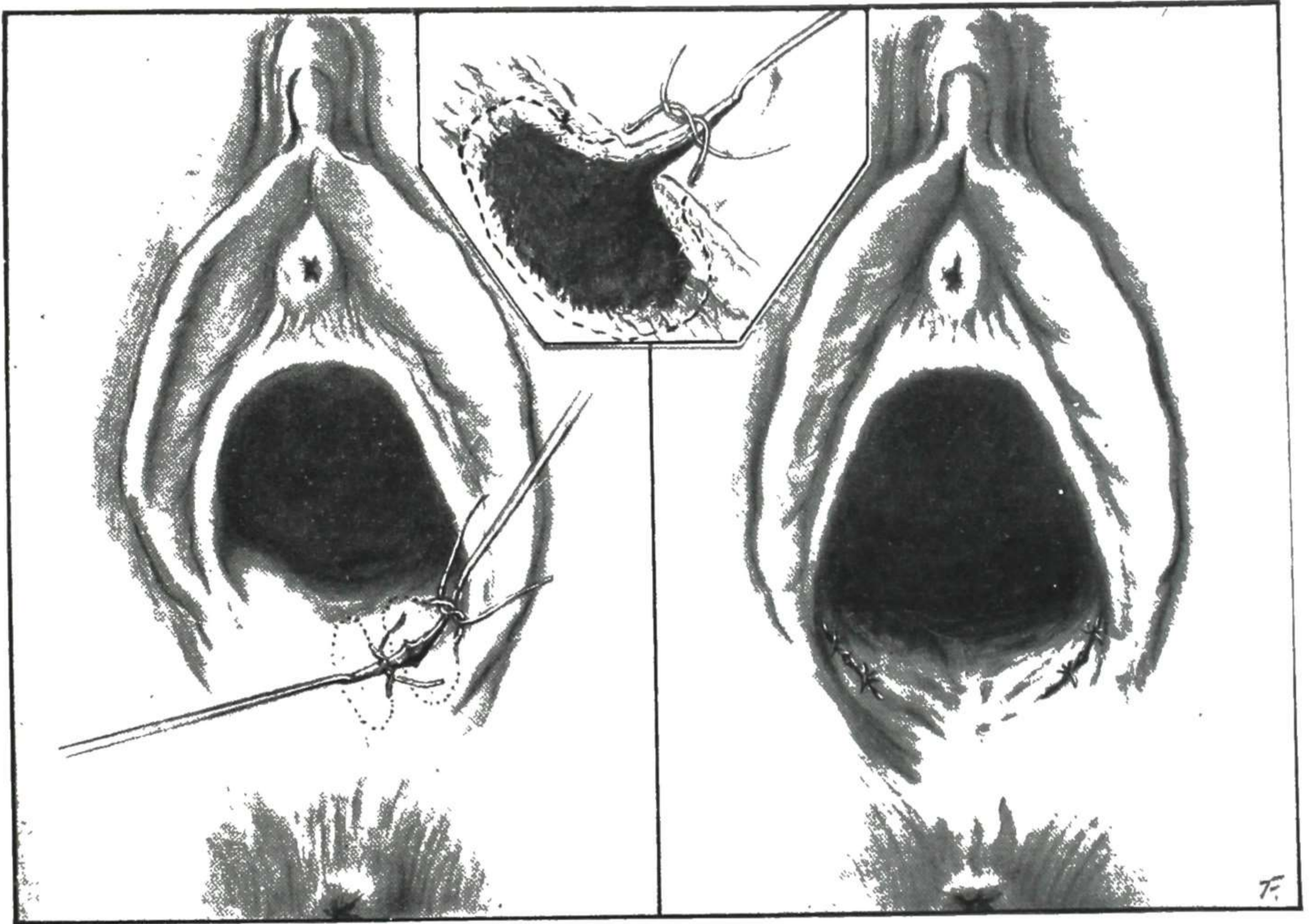


Fig. 367.

Fig. 368.

Fig. 367.—Submucous division of constricting levator sling, third step. Through-and-through hemostatic sutures are placed as shown in the inset. These include all tissue likely to bleed, and when tied they close the wound (both deep and superficial portions) in the opposite direction to which it was made.

Fig. 368.—The operation completed.

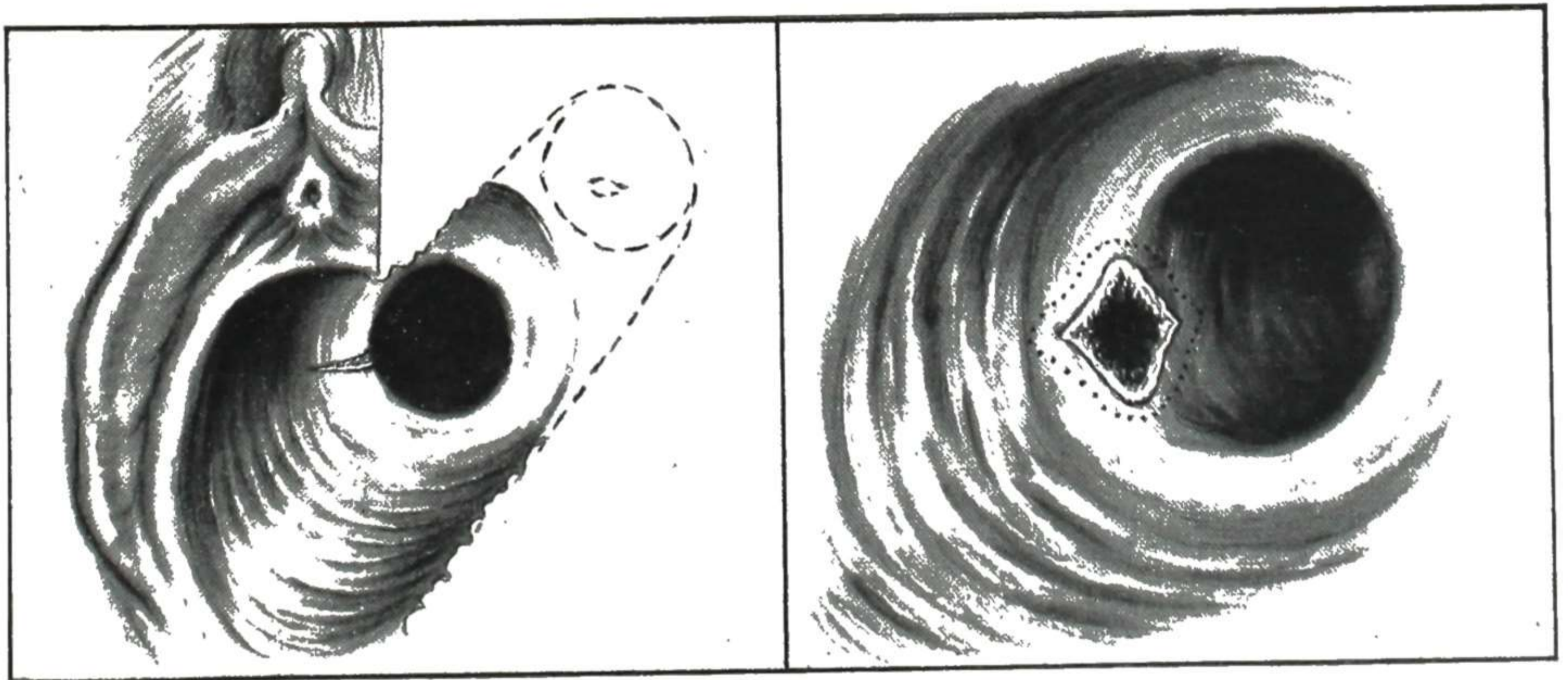


Fig. 369.

Fig. 370.

Figs. 369 and 370.—Submucous division of constricting tissues in stenosis higher in vagina.

Fig. 369.—Showing a stenosis of the vaginal canal about halfway from the vulva to the cervix. The lateral incision through the mucosa has been made in the patient's right side.

Fig. 370.—By means of a finger introduced into the incision, the deeper tissues are spread apart as indicated by the dotted outline.

if temporary relief can be given pregnancy may ensue, with permanent cure of the stenosis and spasm after delivery. The rectal type of dilator which the patient uses at home is the most satisfactory means of stretching the introitus, until large enough to permit coitus without pain.

4. Operative treatment. A rigid hymen that gives persistent disturbance despite stretching treatments requires to be incised or excised. Neuromas sometimes develop in remnants of the hymen, requiring excision. When there is stenosis or persistent spasm or a combination of the two, seriously interfering with coitus, regular plastic operation for enlargement of the opening is indicated.

In the severe cases, especially if the spasmodic element is decided, particular care must be taken to divide the anterior portion of the levator sling sufficiently to give a good wide opening—wide enough to permit some spasm and yet not interfere seriously with coitus. The steps in the operative procedure are shown in Figs. 365 to 370.

Edema of Vulva

A rather infrequent but very distressing condition which sometimes occurs in pregnancy is edema of the vulva. It was seen more frequently in the not too distant past, when we used to place our toxemia cases on a protein-free

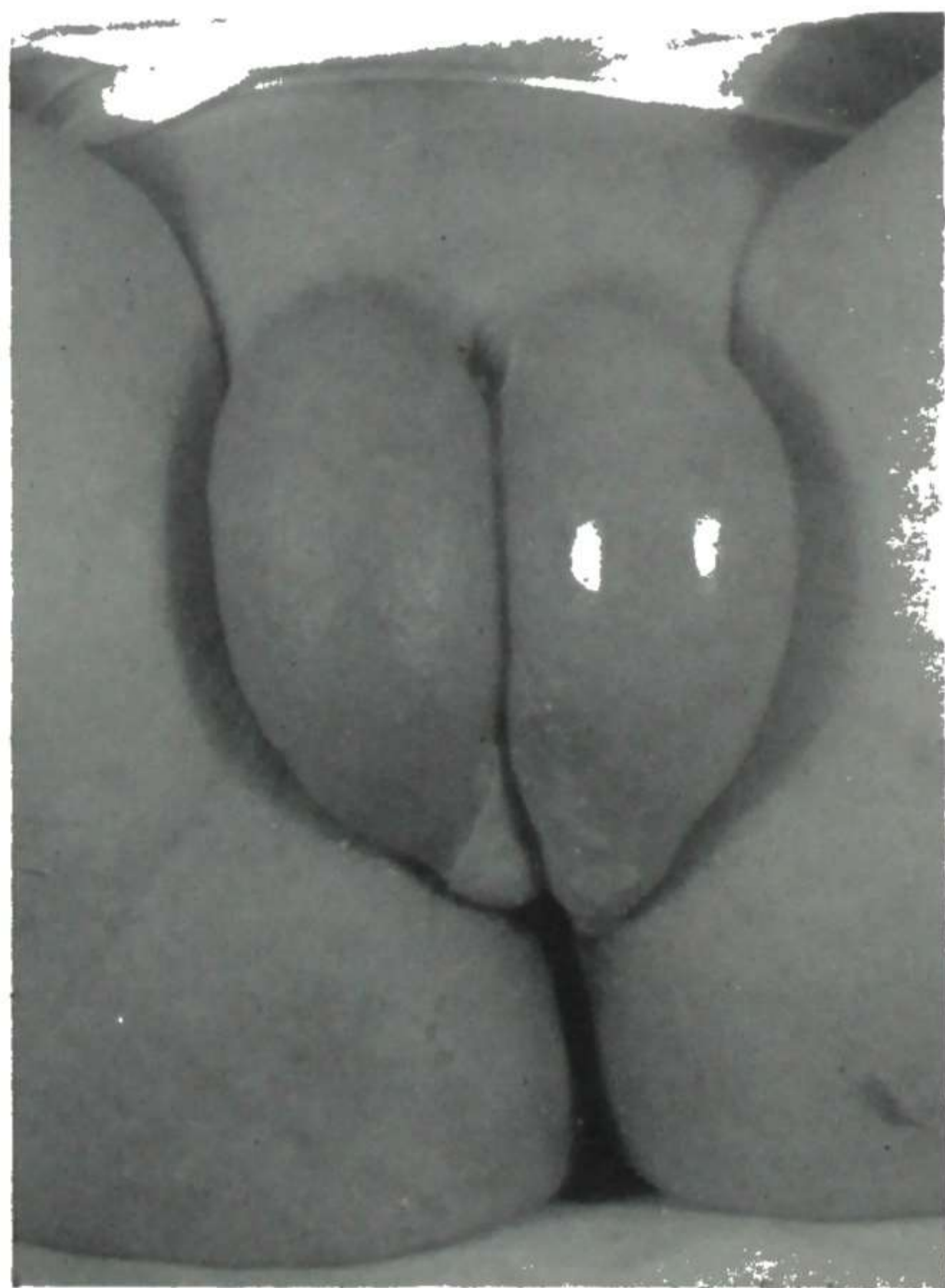


Fig. 371.



Fig. 372.

Fig. 371.—Marked edema of the vulva during pregnancy due to hypoproteinemia.

Fig. 372.—Same case after therapy with transfusions of blood, plasma transfusion, and a diet high in protein and vitamins.

(From Arnell et al.: *J. A. M. A.*, April 28, 1945.)

diet over many weeks. I saw two such cases, in consultation, in which the vulva was so edematous that small areas of gangrene of the skin were present. The only advice I could think of, in the preprotein balance era, was hypertonic glucose, magnesium sulfate and multiple incisions. Since the newer knowl-

edge of hypoproteinemia and the importance of the colloid osmotic pressure of the serum protein in water balance, the underlying cause of this condition is better understood. Eleven cases were reported by Arnell. In addition to bed rest, with glucose containing vitamins C and B, and a high-protein diet, these patients received an average of 2,000 c.c. of whole blood and additional plasma if needed. In a few of his very severe cases, multiple punctures were required for immediate temporary relief. Figs. 371 and 372 show the vulva before and after treatment.

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Chapter 4

RELAXATION AND FISTULAE

of the Pelvic Floor, Perineum, External Genitals, and Vagina

Points in Anatomy

The term "pelvic floor" is applied to that group of structures which closes in the pelvic outlet and supports the organs above it. The principal supporting structures are the levator ani muscles and associated fasciae. They are indicated diagrammatically in Fig. 373. The levator ani muscles, arising from each side of the pelvis and joining in the median line, form a sling which holds up the vagina and rectum and at the same time holds their lower ends forward under the pubic arch.

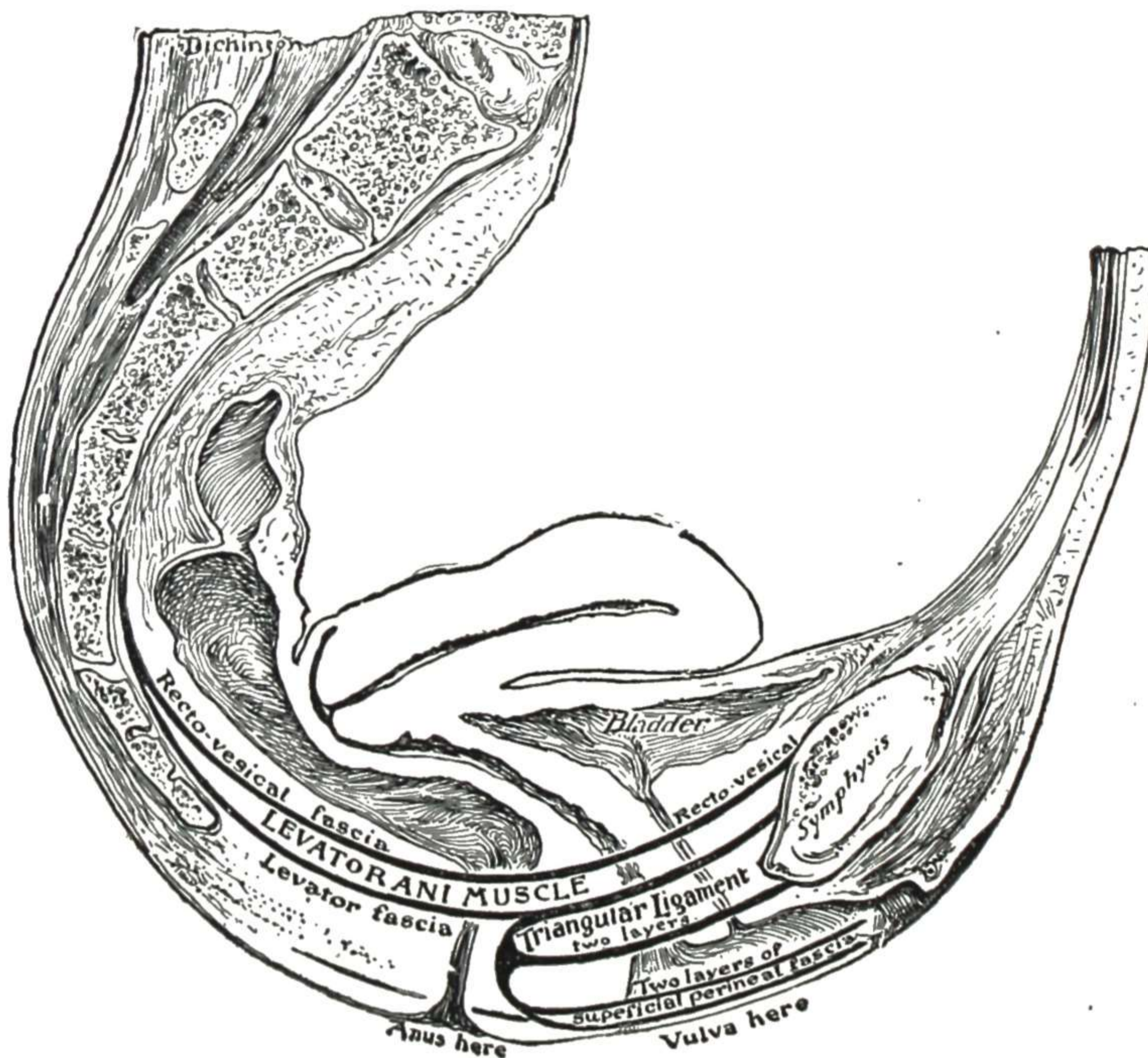


Fig. 373.—A diagrammatic representation of an anteroposterior section of the pelvis, showing the various fascial layers of the pelvic floor. (From Dickinson: American Textbook of Obstetrics.)

Each levator ani muscle arises in front from the posterior surface of the pubic bone, behind from the spine of the ischium, and between these points from the "white line" that marks the division of the pelvic fascia. The anterior portion of the muscle passes downward and toward the median line and unites with a corresponding portion of the muscle of the opposite side. Some