condition should be suspected in every case of general peritonitis occurring in young girls between the ages of four and seven, and examination of the vaginal secretions should be made in every case. The prognosis is favorable if the abdomen is promptly opened and the intestines are washed with decinormal saline solution and argyrol (two to five per cent.).

Causes.—It most frequently occurs in weak or strumous subjects, and results from lack of cleanliness. It may arise from "taking cold." In the light of our present knowledge, however, we must understand by this simply a lowering of vitality which affords opportunity for some infectious germs already present to secure a foothold. Seat-worms are a frequent cause, owing to the intense itching they excite, which induces the patient to rub and scratch the parts, usually with dirty hands and finger nails. Or these parasites may find their way into the vagina and inflame the parts by their presence. Self-abuse must also be reckoned among the causes of this disorder and should be ever present in the mind of the physician when he is consulted for this trouble, especially if the case is an aggravated one or persistently does not yield to treatment.

Gonorrhœal poison is also the occasional cause. Dr. J. Lewis Smith records the case of a young man who was under treatment for gonorrhœa, when his two nieces, four and six years of age, respectively, both became infected with specific vaginitis, probably from the towels.

Purulent ophthalmia, which is usually considered the accidental accompaniment of specific vaginitis, may itself be the origin of the vaginal affection. They are reciprocally dependent.

The exanthemata are frequently accompanied and followed by a vaginal catarrh, due either to the direct action of the disease upon the membrane, as occurs in otorrhœa, or to the reduced condition of the vital powers.

Treatment.—The parts should be bathed frequently in warm water and all excoriated surfaces smeared with a protective ointment. Astringent injections thoroughly administered with a glass or hard-rubber syringe are usually necessary, and in some instances must be continued for days and weeks. Tannin or alum solution (five per cent.), sulphate of zinc (two per cent.), nitrate of silver (one per cent.), are all efficient injections and should be administered twice each day. I have found a combination of iron and potash in the usual proportions for a gargle very satisfactory: Tinct. ferri chlorid., ʒ ij.; potass. chlorat., ʒ i.; glycerinæ, ℥ ss.; aq. ad ℥ iij.

When ascarides are present a dose of castor oil should be given, to be followed for several days by daily injections of salt water, lime water, or infusion of quassia, in both rectum and vagina. In the mean time the general hygiene and nourishment of the child, together with appropriate tonics, must not be neglected. Caution must also be given regarding the danger of purulent conjunctivitis and ophthalmia from the infectious discharge. When masturbation is present, of course the child must be put under proper surveillance and restraint.

Vaginitis in Unmarried Women.—Simple vaginitis is rarely a primary affection, being secondary to some inflammatory condition in neighboring organs of the pelvis. As a rule, it begins and continues in a subacute form, but this may at any time take on the character of a violent acute inflammation. On the other hand, the acute form may be excited primarily by some special cause and may gradually pass into the chronic. It is important to determine early in the treatment of the case whether the inflammation be primarily in the vaginal mucous membrane or whether it be induced there by the irritating qualities of a discharge coming from some source beyond the vagina; viz., the cervix, the uterus, the Fallopian tubes, or even a pelvic abscess. Thomas mentions the fact that he has seen two cases of profuse and obstinate vaginal discharge, regarded as the result of vaginitis, which were in reality produced by pelvic abscesses which emptied their contents into the upper part of the vaginal canal. He says: "An element in such cases calculated to mislead the superficial examiner is the fact that vaginitis does really exist to a limited extent as the result of the purulent flow from the abscess."

Etiology.—When the disease is primary, in unmarried women, the most frequent cause is "taking cold." It may arise from undue retention of the menstrual discharge behind a too constricting hymen, where, through contact with the air, it undergoes decomposition and so becomes a source of irritation. Self-abuse is an occasional cause.

Anæmic young women, with a nervous erotic temperament, will often have a constant leucorrhœa with an irritated condition of the vulva and vaginal walls. In these patients the affection is due simply to the vitiated condition of their general health. In our large cities the shop-girls or clerks are the class of patients in which this condition is most often found. The custom of compelling these girls to stand constantly, long hours in succession, in the cramped and narrow spaces behind the counter in crowded stores in which the air is vitiated, produces most disastrous results. Finally, tight lacing, by crowding the viscera down toward the pelvis and by keeping them in a constant state of passive congestion, greatly favors the perpetuation of the disease which we are now considering.

Diabetes is an occasional cause of vulvitis and vaginitis. Accompanying this disease is usually an intolerable itching of the vulva and mons veneris. Through scratching for its relief and the repeated bathing of the labia with urine there is set up an inflammation of the vulva that extends sometimes well into the vagina. It is very intractable, on account of the ever-present irritant.

Vaginitis in Married Women.—In married women, especially those who have borne children, simple vaginitis is not uncommon. In addition to the causes common to all women, as chilling of the body, want of cleanliness, pediculi, ascarides, diabetes, etc., they are much more frequently subject to uterine affections than are the unmarried. Among such affections may be mentioned lacerations of the cervix and the diseased conditions resulting therefrom, the disorders dependent upon rough or excessive intercourse, upon the use of pessaries, which abrade the mucous membrane or simply act as irritants, and upon the accidental contact of irritating substances used for application to the uterus, *e.g.*, chromic acid. Boroglyceride, which is universally employed for saturating vaginal tampons, may, if used in too great strength, not only set up a general vaginitis but cause deep abrasions. The author in consultation recently has had occasion to point out to a colleague the fact that his boroglyceride tampons (fifty per cent. boroglyceride) were the cause of deep and extensive abrasions in the posterior vaginal fornix.

The most frequent cause of a vaginitis is an irritating discharge from the cervix or uterus. In these cases the irritation usually commences at the vulva, where the secretions come in contact with the air, and undergo decomposition, which renders them still more irritating. From this point the inflammation gradually travels back throughout the entire extent of the vagina.

Symptoms and Treatment.—The subjective manifestations vary with the intensity of the inflammation. In very mild cases the patient is conscious simply of a leucorrhœa with slight itching or burning.

A careful examination both by touch and by sight with a Sims speculum is most important. The vagina should be carefully swabbed out and dried with absorbent cotton. By this means the amount and extent of the inflammation can be learned, its primary or secondary nature ascertained, and the cause usually determined. Treatment can then be directed with intelligence and some degree of scientific accuracy. As the affection in this mild form is usually secondary, it demands only palliative treatment, the main efforts being directed to the original cause. Cleanliness and the soothing and astringent effect of heat, both of which are obtained by the hot-water douche, are usually sufficient to relieve

the symptoms. Recovery is hastened by brushing the inflamed tract thoroughly with a solution of nitrate of silver, twenty or thirty grains to the ounce. A vaginitis, it must be remembered, is frequently aggravated and, indeed, sometimes induced, by the poor quality of the glycerin used on vaginal tampons. This is frequently a source of great annoyance, as it is not generally understood.

In an acute attack the clinical features differ very little, and in some cases not at all, from the specific form of the disease. The description of both is therefore embraced in the one account given under the head of Specific Vaginitis. The treatment is also the same for both affections.

Specific Vaginitis.—Synonyms: Gonorrhœa in the female, Gonorrhöe, Vaginite, Blennorrhagie, Blennorrhœa, Elytritis.

Definition.—Gonorrhœa in the female is an inflammation of the genital and urinary passages, characterized by a purulent discharge which has been produced by contact with an infecting substance, as the result usually of sexual intercourse. It may run a very acute course and then become chronic. It may be subacute in its inception, and may slumber in this relatively inactive state for years or until aroused to an acute manifestation by some disturbing element. In an acute case, when first seen, the inflammation is usually coextensive with the entire visible mucous membrane of the genital tract, but it may be limited in extent and confined to the vulva, the urethra, the vagina, or the cervix uteri.

Hardy, Rémy, and, more recently, Bumm, have pointed out the fact that the membrane lining the canal of the cervix uteri may be the original seat of the disease, the virus being absorbed by the cervix directly from the penis during the copulative act. Indeed, the last author maintains that the cervix is, as a rule, the primary seat of all gonorrhœal inflammation. He says: "Gonorrhœa never occurs primarily in the vagina, but usually spreads thence from the cervix, or, more rarely, from the urethra. The stratified pavement epithelium forms so good a protecting tissue that the gonococci cannot effect an entrance unless changes which render the more delicate layers accessible have occurred. Surfaces covered with cylindrical epithelium, viz., the interior of the cervix, are not so resisting."

The frequency with which the cervix is involved and the persistence of the affection in this locality mark it as a most favorable ground for the inception of the disease. The anatomical structure of the mucous membrane, as pointed out by Bumm, makes his *a priori* argument seem reasonable. This view is now accepted by the best observers.

The tendency of the disease, whatever locality it may invade first, is to extend throughout the entire tract of mucous membrane, from the vulva through the vagina, passing through the uterus, into and through the Fallopian tubes to the ovary, and invading the ducts of all the glands opening on all these surfaces.

Sources of Contagion.—There is no doubt regarding the identity of the disease in the two sexes. The gonorrhœal discharge from an individual of one sex, when applied to the genital mucous membrane of the opposite sex, produces a similar discharge, with the same intense and protracted symptoms. But cases occur in men after intercourse with women who, upon subsequent examination, present no sign of the disease. Furthermore, Ricord (and all his host of admirers and followers have insisted on the truth of his statement) declared that a man could acquire gonorrhœa by intercourse with a woman who did not have the disease. At the present time no such belief can be maintained. It seems far more reasonable, in the light of our present knowledge, to believe that, in these obscure cases, the woman, although apparently free from the disease, is in reality afflicted with a latent gonorrhœa.

"True gonorrhœa requires no idiosyncrasy, no ale or champagne, no excess, no weakened condition of the urethra for its development, but simply intercourse with a female [or male] having a gonorrhœal discharge. No abrasion of the membrane is necessary. Simply contact of the virus with the membrane is sufficient to establish the disease" (Van Buren and Keyes).

Latent Gonorrhœa.—The serious nature of gonorrhœa in women and the importance of early recognizing its presence, except for the purpose of avoiding contagion, are matters which have been sadly neglected. The idea of gonorrhœa has been so intimately associated with urethral trouble that unless that particular part of the body was affected no anxiety was experienced. As the acute symptoms rarely continue longer than ten days or two weeks, and then subside without leaving a urethral stricture in their train, this affection in women has been thought a comparatively simple and harmless affair. But since Dr. Noeggerath, in his now classic paper, pointed out the latent propensities of this vicious disease, attention has been more carefully centred upon it, and it is now receiving some of the consideration which its importance demands. The fact is recognized that, after a partial advance toward recovery, the disease may linger for years, and, by gradually extending itself, be the cause of cervical catarrh, endometritis, salpingitis, ovaritis, sterility, and the oft-repeated attacks of peri-uterine inflammation with which its victims are afflicted. But these unfortunate sequelæ not only follow an acute attack in which due warning of their impending arrival has been given, but they may be the first indication of trouble, so insidious is the disease in its latent form.

Dr. Noeggerath's views regarding the frequency of gonorrhœa in women were so extreme, and he insisted so strenuously on sterility as its inevitable consequence, that his paper met with almost universal dissent. This was in 1872. But the pendulum has now recovered its equilibrium, and the careful observer is daily recognizing in his practice cases which illustrate the correctness of the picture which Noeggerath so faithfully drew.

The tenets of Noeggerath's creed are that gonorrhœa, though apparently cured, may exist, in a latent form, in both the male and the female, throughout an entire lifetime; 'that this latent form may be transmitted to the female, to continue there in a quiescent state for an indefinite period, or, travelling along throughout the mucous tract, excite serious uterine, peri-uterine, or peritoneal inflammation, or at any moment burst forth into acute gonorrhœa. He undertakes to show that the wife of every husband who at any time of his life before marriage has contracted a gonorrhœa is, with very few exceptions, afflicted with a latent gonorrhœa, which sooner or later brings its existence into view through some form of disease of the uterus or its appendages.

While we may not give assent to the universality which Dr. Noeggerath claimed for this form of the affection, it embraces such a large class of cases that it is most important to recognize it, and I cannot do better than place before the reader Dr. Noeggerath's graphic description of a typical case.

"Mr. M——, a merchant of New York, formerly a commecrial traveller, like almost every one of his tribe, acquires a gonorrhœa. The treatment recommended by a renowned specialist is carefully followed, and the affection cured in two months. Two years later this gentleman marries a healthy, robust young girl. Three months later the woman begins to complain of backache and general malaise; it becomes difficult for her to attend to the common household affairs; the usual promenade, instead of being a pleasure, becomes fatiguing. Menstruation, which appeared hitherto without any premonitory symptoms, is now connected with backache, more profuse than usual, and followed by a white discharge. By and by the desire to urinate becomes more frequent, and is occasionally accompanied by burning at the meatus. The white discharge gradually extends from one period to the next. About eight weeks later a pain is felt in the left side of the abdomen, which suddenly increases, upon an unusually severe exertion, to such an extent that the patient has to take to her bed. At the same time the dysuria is increased, the discharge becomes profuse and of a greenish-yellow color, like mat-

ter. The physician attending her recognizes an acute attack of perimetritis.

"A year after this she consults me for sterility. I find her suffering from general weakness, backache, pain in the left side, increased before the now scanty menstruation, and a muco-purulent discharge.

"On examination the uterus is found in right lateroversion and anteflected; the left vaginal roof, or parts above, hardened and contracted; the uterus, soft, succulent, very tender on being gently pushed into its normal position, great tenderness of posterior cul-de-sac, cervix of a high color, surrounded by a thin rim of eroded tissue, discharging a tenacious yellow mucus; both outlets of Cowper's gland eroded to some distance and painful to the touch.

"In the history of this patient we find no trace of the existence of acute gonorrhœa either before or after marriage but a condition very like it, if not truly gonorrhœa, is being developed during the acute attack of perimetritis. The patient has never been infected, in the accepted meaning of the word, but she gradually develops a condition which we usually observe as the result of an attack of acute gonorrhœa."

These cases of latent gonorrhœa are distinguished from simple leucorrhœa in the following manner: If the upper part of the vagina be filled with a copious, glairy, greenish-yellow glue which adheres to the cervix tenaciously when the attempt is made to remove it, gonorrhœa is present. And even when the discharge is scanty, pellucid, white, or of a pale-straw color, it is gonorrhœa, if the five following conditions also exist: (1) If there is also a red, eroded, narrow rim about the os; (2) if there are signs of present or past peri-uterine inflammation; (3) if there is catarrh of the vulvo-vaginal or peri-urethral glands attended with condylomata in the fourchette or around the urethral orifice; (4) if the discharge is very difficult to relieve; (5) if it has developed, soon after marriage, in an otherwise healthy woman, without other morbific cause.

These clinical features are quite sufficient for a diagnosis; but if, in addition to them, the gonococcus be present, the cause of the trouble is at once made clear.

Thus, latent gonorrhœa accounts not only for a large percentage of the manifold troubles embraced under the terms peri-uterine and pelvic inflammation, but there is no doubt that some of the cases of puerperal fever supposed to be due to septic poison are really caused by a latent gonorrhœa; especially those cases in which the inflammation is circumscribed and the general septic condition is absent.

Symptoms.—The patient's attention is early attracted, usually from three to five days after the impure intercourse, by a sense of heat and burning in the vagina. This is followed by aching and weight in the perineum, a throbbing pain through the pelvis, a profuse purulent and offensive discharge, frequent desire to micturate, and swelling of the labia. A severe attack will be ushered in by a chill and sharp rise of temperature—103° to 104° F.,—anorexia, nausea, and general nervous excitation. The mucous surfaces about the vulva become excoriated, and the inflamed parts so sensitive that motion is very painful. If the nymphæ are large they may swell to such an extent as to protrude beyond the labia and become constricted, a condition analogous to paraphimosis.

Accompanying the discharge an almost intolerable itching about the vulva sets in. This is usually worse just when the patient gets warm in bed and wishes to settle down for the night, and it leads her to scratch and tear her person for relief.

As a rule the poison finds its way into one or both of the ducts of the vulvo-vaginal glands, which open just in front of the lateral carunculæ myrtiformes. Thence it may invade the gland and set up an abscess. This is extremely painful when once the capsule is put upon the stretch, and continues so until relief is afforded by the bursting of the abscess or by artificial evacuation.

All cases are not so severe. Instances occur in which the redness, swelling, and sensibility are but slight, and the discharge is scant.

Physical Signs.—When the parts are exposed to view, the labia are seen to be swollen and tense, the mucous surfaces smooth and red, or abraded and livid in color; at the same time they are sore and sensitive to the touch. As the labia are separated purulent matter of a creamy or greenish color, sometimes streaked with blood, is seen exuding from the vagina. In the cases which come under observation at the public clinic this discharge may bathe all the external parts, excoriate the perineum back to and around the anus, irritate the integument on the interior aspect of the thighs, and become mingled with the hair of the mons veneris, where it dries in yellowish crusts. The clothes are also soiled and stained with this yellowish discharge. To the touch, when digital examination is possible, the vaginal canal is found to be hot, the papillæ and rugæ rough and prominent. The introduction of the speculum is always painful, sometimes intolerable, and should be managed with great care. When exposed to view through a speculum (and Sims' speculum should always be used in these cases) the vaginal membrane presents a swollen, roughened appearance, the color varying in different cases, and in successive stages of the disease, from a bright red to a deep livid or leathery color, with patches here and there in which the mucous membrane is denuded of its epithelium. These superficial abrasions are found throughout the entire canal, including the vaginal surface of the cervix. About the external os is a ring of inflamed and granulating tissue, and hanging in the os is a mass of muco-pus. If a pessary has been worn, the imprint of it, when removed, still remains in the mucous membrane, and may be marked by abrasion.

The urethra may or may not be involved, the scalding which attends micturition being frequently due to contact of the urine with the excoriated vulva. When, however, the lips of the meatus are swollen and irritated, and pressure by the finger along the canal of the urethra from behind forward causes pus to appear in the meatus after the parts have been carefully cleansed, there can no longer be any doubt about the disease having involved the urethra. Formerly the involvement of the urethra was regarded as a diagnostic sign, but this is not now considered reliable.

Diagnosis.—The differentiation of the gonorrhœal form of inflammation from simple acute vaginitis is extremely difficult, and in some cases impossible, at least by a study of its clinical features alone. If a history of recent suspicious sexual contact or intercourse can be obtained, in conjunction with the well-known clinical manifestations, the question, for all immediate practical purposes, is settled. But final judgment rests absolutely upon the discovery of the gonococcus in the discharges. Microscopic examination must, therefore, never be omitted. In making a diagnosis, and to the same degree in applying treatment, the fact must not be lost sight of that gonorrhœa in woman does not always mean a vaginitis. The two sites of infection that are far more frequent than the vagina are the urethra and the cervix uteri. It is in the secretions from these two sources that the gonococcus must be sought. The secretions of the urethra may be milked out by drawing the finger, with graduated pressure, along the urethra from the neck of the bladder to the meatus. Discharges from the cervix may be obtained by a pipette or on a cotton swab rotated within the cervical canal.

Prognosis.—Can an acute case of gonorrhœa be absolutely cured? There is abundant evidence to prove that cases are so cured, and the physician is justified in assuring a patient that, with proper treatment, the probabilities are that such will be the result in her individual case. But the virus has the property of penetrating so deeply into tissues, and the abundant crypts and follicles and ducts and glands afford so secure a lodging-place for the infectious organism that the question of its total eradication is beyond all ken. The more recent the at-

tack and the more limited the area of infection the more favorable the prognosis.

Treatment.—The importance of stamping out the disease promptly cannot be over-estimated. Whatever line of treatment is pursued must be followed up with the greatest thoroughness, persistence, and attention to detail. If it be granted that the gonococcus is the causative agent, the use of the most efficient germicide is the indication *par excellence*.

Oppenheimer has made successive experiments to determine which parasiticide is most efficient against the gonococcus. His method of experimentation was to cultivate the gonococcus in sterilized blood serum, the micrococci developing on bits of thread suspended or laid in it. Different substances were then applied to the solution and their effects noted. Alum, bismuth, and acetate of lead were absolutely inert, as were also balsam of copaiba and extract of cubebs. Solutions of bichloride of mercury, 1 in 20,000; carbolic acid, 1 in 20; permanganate of potassium, 1 in 25; weak solutions of nitrate of silver, and a strong solution of either iodine, bromine, or chlorine destroyed the gonococci promptly. Regarding copaiba and cubebs, it is important to state that, by an ingenious experiment, he seems to prove that these substances undergo a chemical change in the system, the products of which change are destructive to the gonococcus. This accounts for the efficiency of these drugs in internal medication.

Conclusions reached by such purely experimental methods must be tested by clinical experience. Nitrate of silver not only acts efficiently in destroying the gonococcus in culture fluids, but is found most satisfactory also in stopping the discharge, relieving the congestion, and restoring a healthy tone to the tissues. Efficient as nitrate of silver has proved as a germicide, it has, when applied to living tissues, the unfortunate property of coagulating the albumin and forming a coating over the epithelial cells. This retards its penetration into the deeper structures and confines its influence to the superficial tissues. Quite recently the pharmacologists have evolved various proteid silver salts. These salts, which contain varying amounts of silver, are known under the following names: argonin, protargol (8 per cent.); albargin (15 per cent.); nargol, argentamin, argyrol (30 per cent.), and many others. Of these, argyrol contains the greatest proportion of silver and is coming into general use. It is highly soluble in cold or warm water and, when applied to inflamed tissues, either in weak or in strong solution, causes no pain or irritation. It does not coagulate albumin or precipitate the chlorides, and therefore is free from any caustic action. Its innocuousness is certified to by ophthalmologists, who assert that it can be dropped with impunity into the eye in strengths of from five to twenty per cent., and that it produces most beneficial results. Moreover, these proteid salts have great penetrating action on vital tissues. A strand of catgut immersed over night in a one-per-cent. solution of argyrol was found to be impregnated through and through with the silver. Fresh stains on linen may be readily removed by hot water, and dry stains may be eradicated by a saturated solution of potassium iodide, followed by hot water.

In all acute cases of gonorrhœal vaginitis it is advisable, if there be no decided contraindications (such as weakness), to administer a purgative dose of calomel, gr. viij.-x., with an equal quantity of bicarbonate of soda, to be followed from time to time by saline cathartics. If the external parts are much inflamed a hot sitz-bath will afford great relief and will produce a tranquillizing effect upon the system.

If the case is seen within forty-eight hours after an exposure, effort should be made to abort the disease. Whenever possible, the patient should be confined to her bed and one of the silver salts—argyrol, for example—should be used freely and persistently. As soon as the parts will tolerate a speculum (and in mild cases this can be done immediately), the vagina should be thoroughly exposed by means of Sims' speculum, all discharge carefully wiped away, and the mucous membrane dried with absorbent cotton. Any excoriated points are to be touched with the stick of nitrate of silver and the entire membrane thoroughly swabbed with a twenty-per-cent. solution of argyrol. It is also well to swab the cervical canal with the same solution. Should the urethra be involved, an applicator moistened with the same solution should be passed into it, or half a drachm of the solution, of the same strength, may be slowly injected into the urethra and held there for from five to ten minutes. These applications may be repeated every second day by the physician, the patient on alternate days taking vaginal douches of argyrol, 1 in 200. At the expiration of from five to seven days the argyrol may be discontinued, and vaginal douches of sulphate of zinc, four to six grains to the ounce, three times a day, may be substituted. At the same time capsules of santal oil and balsam of copaiba, āā. gr. v., should be administered by mouth. At the end of ten days the secretions should be carefully examined. If no diplococci are present, the patient may discontinue treatment and be pronounced cured.

If leucorrhœa occurs later, or if bladder symptoms arise and gonococci appear, the disease must be considered chronic and a regular siege begun. If the cervical glands are involved, the entire cervix may be reamed out or amputation performed. Before resorting to so radical a measure, it may be wise thoroughly to dilate the cervix with the steel dilator from time to time, and then to apply argyrol. The dilatation expresses the secretions from the ducts, crypts, and glands, and permits of a more efficient diffusion and penetration of the medicament. If the infection travels into the body of the uterus it must be followed by thorough swabbing of the endometrium with argyrol. The wisdom of employing curettage under these circumstances is questionable. The ducts and glands of the endometrium are more shallow and simple than those of the cervix and hence more amenable to the effect of the application, while curettage may open lymph spaces to the infection and thus permit it to advance beyond the reach of the germicide. If the infection reaches the uterine appendages, it may be limited in its extension and severity by making an opening at once into the cul-de-sac of Douglas and inserting an iodoform drain. Unless general peritonitis threaten, no radical operation should be instituted till the pus has become circumscribed and the acute symptoms have subsided. The pus becomes sterile in the course of a few months, and then ablation can be performed with comparative immunity; or, in the course of a few years, conservative work may be done successfully upon the appendages.

Argyrol is also the best remedy to apply to the bladder when a cystitis develops as a complication. It may be used daily in the strength of from five to twenty per cent. The urine should first be drawn and then the bladder slowly distended with the injection, to the fullest degree of toleration (fifteen to twenty ounces). A long-standing urethritis may result in a urethro-vesical fissure, causing frequent and painful micturition and tenesmus. Dilate the sphincter vesicæ with the steel dilator, apply argyrol, and afterward administer urotropin, gr. x., night and morning. In persistent cases it may be necessary to resort to an artificial vesico-vaginal fistula, for the purpose of affording rest to the parts and thus permitting them to heal.

The patient and attendants must be cautioned about the contagious nature of the discharge, especially the danger to the eyes. All cloths and napkins used about the patient should be burned or at once soaked in strong bichloride solution. In the mean time the patient must be kept in bed, if possible; the diet should be light, simple, and nourishing; she should drink plenty of milk and avoid all spirituous or malted liquors.

When an anodyne is necessary, chloral may be tried, or, better still, opium may be administered in the form of a Dover's powder or in that of a suppository containing either opium or morphine.

The pruritus is at times the most difficult symptom to

relieve. The most efficient application is carbolic acid, which can be used in the strength of a five-per-cent. solution, although it is well to commence with a weaker solution and increase the strength if necessary. The parts thus affected may be brushed with a solution of cocaine or of the nitrate of silver; both are efficient.

Should one of the vulvo-vaginal glands become involved it will be necessary to open it as far within the vaginal outlet as possible. This condition may be mistaken for a prolapsed ovary or an inguinal hernia. The former is excluded by the previous history and the latter by its percussion note and, possibly, by reduction. The opening of the abscess will afford temporary relief; but when once this gland has been invaded, it becomes a source of frequent annoyance, and a permanent relief is obtained only by its complete eradication.

Buboes are not apt to occur. When they are present, an effort should be made by purgatives and counter-irritants to dispel them. A grateful application consists of an ointment composed of equal parts of Ungt. hydrarg., Ungt. belladonnæ, ichthyol, and lanolin. Apply with pressure. If suppuration is inevitable dissection alone affords the desired relief.

Granular vaginitis and adhesive vaginitis are described by some authors as distinct forms of inflammation. They also occur as phases of simple or gonorrhœal vaginitis, and hardly demand special consideration. The former, however, sometimes declares itself as a distinct form of vaginitis in connection with pregnancy.

VI. Vesico-Vaginal Fistulæ.—A fistula is an abnormal communication through the tissues between two organs or passages, or between an organ or passage and the exterior of the body. The course of the communication may be either direct or tortuous. A vesico-vaginal fistula is such a communication between the bladder and vagina; by means of it the urine constantly or spasmodically makes its escape.

These urinary fistulæ are classified according to their location as follows: I. Vesico-vaginal fistula (proper). This is situated in the vesico-vaginal wall and involves only that tissue. II. Vesico-utero-vaginal fistula. This comprises cases in which the tear reaches up to, or dissects off the vesico-vaginal tissue from, the uterus, and necessitates, when an attempt is made by surgical means to repair the defect, the passage of the suture through uterine tissue. III. Vesico-uterine fistula. In these cases the vaginal wall is intact, the bladder communicating with the uterus and the urine thus finding its way through the os into the vagina. IV. Urethro-vaginal fistula. This term is applied to cases in which an opening exists in the base of the urethra, through which urine escapes into the vagina. But this can occur only during the act of micturition. V. Uretero-vaginal fistula. This is the rarest form of fistula. It is the result of an extensive tear or loss of tissue involving the ureter. Dr. Emmet claims that this lesion is more commonly the result of a pelvic abscess. During the inflammatory process the ureter becomes occluded by pressure, perforation ensues, and the urine finds its way into the vagina. A uretero-vaginal fistula may be congenital, and cases are on record in which one ureter opened into the vagina and the other took the normal course and discharged the urine from one kidney into the bladder. Under these circumstances a diagnosis becomes obscure and difficult. During infancy and childhood simple incontinence suggests itself as an efficient explanation of the apparent phenomena, and repeated physical castigation is apt to be the lot of the unfortunate sufferer. It is only when the child has come to mature years that a sufficiently thorough investigation is instituted and the exact condition discovered. Congenital ureteral fistulæ usually open at a point below the neck of the bladder. Uretero-vaginal fistulæ occur not uncommonly from accidental wounds of the ureter in hysterectomy for cancer or for fibroid tumor of the uterus.

The most common location of a vesico-vaginal fistula is in the median line and directly behind the symphysis pubis. The usual form of a section of the fistula is oval, linear, angular, or round. The most common is the oval, due, as Dr. Agnew explains, to the superior contractile power of the longitudinal over the circular muscular tissue of the vagina. These fistulæ vary in size from an opening so small that it is found with great difficulty and admits only the smallest probe, to those that involve the whole of the anterior vaginal wall, together with the entire base of the bladder and the urethra. One illustration of the latter has come under my own observation and care. In this case there was no trace of urethral tissue whatever. The entire base of the bladder was wanting, and, stretching across the common cavity, behind the symphysis, and springing from and continuous with the tissue of the recto-vaginal septum, was a strong cicatricial band which reached from side to side of the pelvis, leaving only sufficient room for two fingers to pass with difficulty between it and the symphysis. Through this small opening the inflamed and sensitive fundus of the bladder frequently prolapsed. Such cicatricial bands, of greater or less density and resistance, and reaching across the vagina in the most diversified directions, are a common complication in cases of fistula.

Etiology.—The most common cause of urinary fistula is injury due to parturition. If the delivery be premature and rapid, especially when attended with undue rigidity of the soft parts, laceration of the cervix uteri is apt to occur. Especially is this the case in primiparæ of advanced age, and in cases in which morbid changes have occurred in this tissue. When sufficiently extensive this laceration results in a permanent fistula. The vesico-utero-vaginal and the vesico-uterine are the varieties most often produced in this way. The tear, beginning in a rigid os, extends out upon the vagina or up the cervix to the vesico-cervical junction. In the process of repair this may all heal with the exception of an opening at the junction of the vagina with the cervix. Or all the tissues below may heal, leaving an opening at the upper angle of the tear—a vesico-uterine fistula.

It is universally accepted now, however, that the majority of fistulæ are caused by the sloughing away of tissue due to severe and prolonged pressure of the presenting part of the child during parturition. So long as the pressure is intermittent, and not too long sustained at any one time, no harm is done; but when impaction occurs and the pressure becomes continuous, circulation is obstructed and the vitality of the soft tissue thus compressed is destroyed. Necrosis occurs, the slough separates, and the urine makes its escape. According to Agnew, over ninety per cent. of vesico-vaginal fistulæ are thus produced, while in Emmet's experience ninety-five per cent. of his cases were the result of prolonged and difficult labor.

When the fistula is produced by laceration the urine makes its escape at once and the condition is immediately suspected. But in cases of protracted labor time is required for the slough to separate and the urine may not escape for several days. The average time is ten days, but it may occur in four or five, and again it may be delayed for a month. One case under my care gave a history of retention of urine, following confinement, that persisted up to the ninth day, when suddenly her bladder burst and a flood of urine was discharged through the vagina. It was evident in this case, however, from the presence of cicatricial bands, that there had been some sloughing as a result of the pressure, and that the separation of the necrotic tissue had led to what she described as the "bursting of her bladder."

Ill-adjusted, displaced, and neglected pessaries have been known to ulcerate through the vaginal wall and produce fistula; vesical calculi likewise may ulcerate through into the vagina, leaving a fistulous opening. Urinary fistulæ are sometimes produced by gunshot wounds, by rough manipulation of a sound or catheter in the bladder, by accidental puncture during operations on surrounding tissue, as in the operation for atresia vaginæ or in amputation of the cervix uteri in malignant disease, etc. Contrary to former teaching, malignant disease of the uterus in itself almost never produces a vesical fistula. The essential tissue of the bladder is so highly organized, so well nourished, that it is enabled to resist the encroachments of such morbid action. As has been said, however, fistulæ are not infrequently produced in the course of operations for the relief of such troubles.

Occasionally cases of congenital fistula present themselves, but they are rare. The same methods of relief apply to them as to other cases; but at an early age the parts are usually too small to permit of successful operation.

Frequency of Fistula.—No statistics can be given showing the frequency of this accident. I have no hesitancy, however, in saying that it is a rare condition, and, if the experience of New York gynæcologists is an index of the experience of practitioners throughout the country and the world, it is becoming more and more infrequent. The Woman's Hospital, in New York City, was established primarily for the express purpose of relieving fistulæ, and its early history bears record of few cases of a different nature. During the first five or six years of its existence it was customary to have two or three operations each week for the relief of fistulæ. At the present time scarcely that number can be seen there in a year.

This change is due to two causes: First, the operation has become so popularized that when such an accident does occur, the local physician repairs the injury; second, the prompt application of forceps in cases of difficult labor prevents the damage to the tissues which otherwise would be likely to occur. Whatever abuses and injuries may attend the too frequent and too early use of forceps in parturition, all authorities are now agreed that their timely use is most efficient in preventing fistulæ. "Authors are disposed to attribute the accident of vesico-vaginal fistula in many cases to the awkward use of obstetric forceps; but from a careful analysis of these cases, and my own experience, I am well satisfied that for one case thus produced their judicious application has prevented it fifty times" (Sims). "I do not hesitate to state that I have never met with a case of vesico-vaginal fistula which, without doubt, could be shown to have resulted from instrumental delivery" (Emmet).

Symptoms.—In cases in which the bladder is punctured by an incised wound, the fact is at once made known by an immediate and involuntary escape of urine through the puncture. The same phenomenon indicates the presence of a fistula caused by laceration, due to too rapid delivery, or by ulceration due to the pressure of a pessary, calculus, or any foreign body in the vagina. This escape of urine may be continuous from the date of its first appearance, or may be interrupted. But as the vast majority of fistulæ are due to prolonged and difficult labor, the usual symptoms are those that follow such an experience. The presence of bruised and sloughing tissues furnishes a warning of the more serious condition to follow. But the actual extent of the injury cannot be known until the slough separates and the urine escapes by the fistulous opening thus established. This may occur on the third day, and may be delayed until the third week. From this time on, the urine may flow constantly, or may be retained for several hours, according to the position of the patient and the nature and seat of the fistula. If the lesion is high up in the septum, the bladder will have retentive power until it becomes filled up to that point; and when the patient is in an erect posture there will be no involuntary escape of urine if the bladder is evacuated frequently enough to prevent the overflow. Sometimes a fold of the vagina, the pressure of the uterus, or the approximation of the edges of the fistula, especially in fissure-like openings, may afford retention for hours. In uretero-vaginal fistula, when only one ureter is involved, there may exist the unusual condition of an almost constant dribbling of urine from the vagina with occasional normal micturition. Unless the woman devotes almost her entire time and efforts to personal cleanliness, the mucous and cutaneous surfaces over which the urine flows soon become inflamed and excoriated. The vulva, the thighs, and the nates, being kept constantly wet with this irritating excretion, become red, swollen, and abraded. Frequently they are the seat of vesicles and pustules, and even occasionally of deep ulcerations and abscesses. Such abrasions within the vagina soon become coated with a calcareous or phosphatic deposit that causes the greatest suffering. When there has been an extensive loss of the tissue of the vaginal wall the base of the bladder may become inverted through the opening. Under these circumstances it is just as likely, as in the condition just described, to undergo abrasion, and to become coated with a deposit, both of which alterations render it exquisitely sensitive. Otherwise the size of the fistula makes little difference with the discomfort of the patient. A woman may be as constantly wet when the opening is not larger than a pin's head as when it is large enough to admit one or two fingers, the small opening, as Dr. Emmet explains, acting like the spigot in a barrel. A disagreeable urinous odor is constantly emitted from her person, a circumstance which excludes her from society and forbids her participation in the ordinary pleasures and duties of life. Dieffenbach gives a sad picture of many of these unfortunate women of his time, shunned by their friends, disgusted with themselves, and dragging out a most pitiable and miserable existence.

Diagnosis.—When the symptoms above described exist, the probabilities are that a urinary fistula will be discovered. Sometimes, however, a chronic cystitis will result in paralysis of the bladder and constant dribbling of urine from the urethra, producing all the disagreeable symptoms of a fistula. If the fistula is larger, a digital examination will readily detect the lesion without the use of speculum and probe, but pinhole openings are sometimes most difficult to discover. In long-standing cases of extensive lesions, with abrasions and cicatricial bands, the true relations of the parts are discovered only by careful and painstaking investigation. When the opening is very minute, the whole field of the vagina must be gone over carefully with tenaculum and probe. The folds of the vagina are smoothed out and the probe is gently insinuated into every suspicious lead or fissure. Should this fail to reveal the fistula, resort can be had to injecting milk, or water stained with indigo or cochineal, into the bladder. A simple method consists in administering by stomach methylene blue, gr. iss., night and morning. This will give the urine an indigo-blue color and will promptly reveal the point of escape through the vaginal wall. In carrying out this method it is necessary that the bladder be allowed to become slightly distended with the chosen fluid, while the septum is carefully watched for its appearance upon the vaginal wall. Bozeman has devised an ingenious test for cases in which the previous methods are contraindicated by reason of the irritability of the bladder. The test is based upon the fact that urine instantly passes through linen, while secretions of the vagina do not. The suspected location of the fistula is carefully dried with absorbent cotton, a piece of thin linen is spread smoothly upon it, and carefully watched for the point of moisture to appear.

Prognosis.—In artificial fistula, made for the relief of calculus, or an obstinate cystitis, it is a well-known fact that it is with difficulty that the fistula can be kept open long enough to effect a cure. Not until Dr. Emmet devised his method of "working the buttonhole," was this difficulty obviated. In these cases the fistula is a simple slit or fissure, the edges of which fall naturally together when the speculum is removed. We may, therefore, infer that where the lesion consists of a laceration in the vesico-vaginal septum, due to rapid labor or accidental puncture, unless it be so situated that the natural strain of the parts tends to keep the lips of the wound apart, under proper attention to cleanliness and frequent emptying of the bladder, spontaneous recovery may be hoped for. Even when a slough has occurred, spontaneous recovery has taken place in a limited number of cases. In the majority of instances, however, the lesion becomes permanent and requires surgical interference for its relief.

"Prior to the application of the metallic suture by J.