salpinx, arthritis, tenosynovitis, endocarditis, and in peritonitis requires more than the simple cover-glass examination and the application of Gram's method of staining. In these conditions the pathologist demands that the suspected organism be isolated in pure culture and its peculiarities in cultures shown to agree with the well-known peculiarities of the gonococcus. If cultures are not applied, the results of cover-glass examinations, although agreeing with the idea that the gonococcus is present, amounts from a scientific standpoint to little more than a probability. In other words, it does not suffice to prove that a given case of arthritis is due to infection with the gonococcus by showing that Gram decolorizing cocci inside of pus cells are present in the exudate, but it must be shown in addition to this that these cocci will grow only on special culture media and it must be rigidly determined that they will not grow on ordinary culture media.

Furthermore, it must be shown that these colonies on special culture media have certain appearances, and that the micrococci composing such colonies are decolorized by Gram's method and have a decided tendency to group in fours. The test of the behavior of the cocci, so isolated, towards the Gram staining reaction is of great importance, and is to be applied with certain precautions.

The first of these precautions to be observed is that the culture must not be more than forty-eight hours old, because some Gram staining cocci in older cultures will be observed to be decolorized when treated by Gram's method. The second is that the cover-glass preparation should not be made too thick, and the judgment, as to whether the coccus decolorizes or not after treatment with Gram's method, should be made only from portions of the field where the cocci are well separated from one another and not from portions where the cocci are aggregated in masses. This precaution is necessary because, where the cocci are aggregated in masses, those in the interior of the mass escape the action of the reagents. These criteria for the identification of the gonococcus in cultures must be rigidly carried out in order to avoid a very easy mistake in bacteriological diagnosis. In brief, no culture of a micrococcus is to be regarded as a culture of the gonococcus unless the organism grows only on special media in colonies of a certain appearance, decolorizes by Gram's method and shows a decided tendency to grouping in tetrads.

The necessity of rigidly subjecting the suspected gonococci, obtained in cultures, to these criteria has been emphasized by a recent observation of a case of acute arthritis of the knee clinically of gonorrheal origin. Cover-glass examination of the exudate showed Gram decolorizing cocci inside of the pus cells which were regarded at the time as gonococci. The cover-glass examination of the vaginal discharges also showed micrococci inside pus cells decolorizing by Gram. At the time the pathologist had no doubt but that the case was one of gonorrheal arthritis. The cultures, however, from the exudate in the knee showed an organism which had a considerable resemblance to the gonococcus, so much so, indeed, that it was only after it had been cultivated through a number of generations and had been carefully subjected to the foregoing criteria that the pathologist was compelled, against his will, to decide that the coccus was not the gonococcus. It was found to grow on ordi-

nary culture media. Its colonies were not identical with those of the gonococcus, but sufficiently so to come within bacterial variations. It decolorized by Gram like the gonococcus, but it did not show the decided tendency, possessed by the gonococcus, to group itself in fours.

Concerning the relationship of this organism to the gonococcus, the pathologist has nothing to offer, except to say that he does not think that this organism should be regarded as a variety of the gonococcus.

In conclusion, a word might be said concerning the frequent negative results of the bacteriological examination of inflammatory conditions supposed to be due to the gonococcus. The common experience in cultures from pyosalpinx, arthritis and similar conditions is that no bacteria grow on cultures on special media, nor are any bacteria found by cover-glass examination. We are inclined to explain these results as being due to the destruction of the gonococci after their arrival in the tissues, rather than as being due to the results of a toxin transported there from a distance. It seems reasonable to suppose that the gonococcus might set up a very active inflammation and an accumulation of inflammatory products and then die out, leaving, however, these products as an irritating body to continue the inflammatory process.

Moreover, we know that the bodies of dead gonococci have irritating and pyogenic properties. Certain it is that in many instances of arthritis and of pyosalpinx the most painstaking examination may fail to show any sign of the gonococcus or other bacteria.

TREATMENT OF ACUTE GONORRHEA.¹

BY FRANKLIN G. BALCH, M.D., BOSTON.

THIS is not to be an elaborate article on acute gonorrhea, but rather a short paper telling of some of the methods from which I have seen results.

As to prevention.—Some people have told me that after a doubtful connection they always take an injection of a weak solution of permanganate of potash, and that they never become infected when they have done so. For a person who understands how to take an injection, and who can be relied upon not to try it when under the influence of liquor, this may be a safe procedure, but for the ordinary run of such people it is unwise and liable to be productive of more damage than good. I have had patients come to me the day after and have irrigated the urethra myself with permanganate, 1 to 4,000, or a 4% solution of boracic acid. In none of these cases has a gonorrhea followed, but I am very doubtful whether it would have anyhow. Theoretically it should be an extra safeguard, for the gonococci would not then have penetrated the cells and could easily be reached by an antiseptic.

If, however, a person has been infected and comes for treatment with the very first appearance of any moisture at the meatus, or perhaps only a slight tickling sensation, what advice should he receive? There are so many sides to the question that I generally talk to him somewhat as follows after getting, if possible, a positive slide. Gonorrhea is a disease which it may take anywhere from three weeks to three years or more to recover from. Sometimes it can be aborted.

¹ Read before the Boston Society for Medical Improvement, December 31, 1900.

If successful, that means that a patient is under treatment for from two to six weeks. It is best to treat the case twice a day during the first week or ten days, and the patient uses an injection himself two or three times a day for two or three weeks more. By this method the patient will probably be more comfortable, have less discharge, and get well somewhat more quickly and with less danger of complications. It is not certain that the disease will stop short. It probably will not. If a patient thinks that he cannot give up so much time at first, I tell him that I can give him some medicine and see him perhaps twice or three times in the first week, and then once a week for as long as it takes to effect a cure.

There are many advocates of very many injections in abortive treatment. Personally I have come to believe in only three, nitrate of silver, permanganate of potash and protargol. In the very early stages the disease is confined to the anterior urethra and an injection that will reach that part of the canal is all that is required. I have been more successful with nitrate of silver than with anything else, used as follows: First, have the patient empty his bladder. This washes out the urethra as far as any discharge goes, but leaves some urine in it. As urine combines with nitrate of silver and precipitates some of the silver, I next irrigate with plain boiled water. An ordinary McElroy glass syringe with a blunt end serves very well for this purpose. Strip the penis gently to get out all the water possible. Next inject a syringe of the silver solution. If the lips of the meatus are puffy, I use a solution of a strength of 1 grain to the ounce. If there is no evidence of very active inflammation I use 2 grains to the ounce. This should be held in for about a minute, when it should be allowed to escape and the urethra should again be washed out with water. Do this twice the first day. Increase the strength of the solution to 2 grains to the ounce the second day, and the next day increase to 3 grains to the ounce. Higher than this it is unwise to go. A few years ago I used to increase the strength of the solution until I was using from 6 to 8 grains to the ounce, but I had 2 cases which had acute exacerbations follow the higher strength. This has never happened where I did not go above 3 grains. The weaker solutions are just as efficient. In the cases I speak of there was scanty urine, backache, headache and a temperature of 103° to 104°. They had to go to bed for several days. There is usually some scalding with the first one or two injections, but nothing unbearable, and after two days patients usually do not complain. Scalding on micturition often ceases after the first injection. The discharge becomes thin and watery after a few days, and often ceases after five or six days. It returns if the treatment is then discontinued, so that it is best to continue the injections for several days more, gradually decreasing the amount of nitrate of silver. If at the end of ten days there is no discharge, let the patient use an injection of permanganate of potash, 2 grains to 16 ounces of water. He should begin by using it twice a day and continue to use it for two weeks or so. When permanganate of potash is used from the beginning instead of nitrate of silver it is best to irrigate with a large amount of a weak solution rather than with a little of a stronger one. One to 4,000 is strong enough. In my hands a Kiefer nozzle has not been satisfactory, and I use a No. 6 English soft-rubber catheter attached to the

nozzle of a douche bottle. With the bottle at an elevation of not more than 3 feet the solution has not force enough to get back into the bladder, but flows forward very readily around the small catheter. A soluble lubricant should be used for the catheter. A quart of this solution as hot as can be borne comfortably should be allowed to flow in and out, and where possible it should be done twice a day. This should be kept up for ten days, and then the patient should take injections himself for ten days longer.

Where it is impossible to see a patient as often as these two methods require protargol is a safe injection to let him use himself. A $\frac{1}{2}\%$ solution is as strong as it is best to begin with, and if there is any great amount of scalding this should be diluted. An ordinary 2-drachm syringe should be used and the injection retained for at least three minutes. Ten minutes is better, but few patients will do it. This should be repeated three times a day for the first ten days, and then at longer intervals until a cure is effected.

With all three of these methods it is often necessary to give a mild astringent injection at the end to get rid of the final glueing together of the lips of the meatus in the morning. For this purpose the following prescription is useful: Sulphate of zinc from 4 to 8 grains, fluid extract of hydrastis $\frac{1}{2}$ ounce, and rose water up to 4 ounces. Strong solutions of silver nitrate applied through an endoscope, or strong solutions of permanganate or corrosive sublimate by injection will rarely cut a gonorrhea short. They are very painful, are apt to lead to serious complications, and are so seldom of any benefit that they are justifiable only under extraordinary circumstances.

If the patient presents himself only after the disease has been fully developed for several days, and there is a thick yellow discharge with scalding, painful erection, etc., there is no use in trying to abort the trouble. If an injection is used at all it should be very mild. It is usually safest to give no local treatment for a time, but rely on medicine. The remedies which are useful, or are said to be useful, in gonorrhea are reckoned by hundreds. As the gonococcus grows in an alkaline medium, drugs to render the urine alkaline would seem to be theoretically contraindicated. The citrate and acetate of potash are useful, mainly, in that they make a patient thirsty. The same result can be accomplished by making him drink water as a medicine. If it does not upset his digestion at least 2 quarts a day should be drunk. Compound salol capsules are good and should be taken after meals and before going to bed. They give about the same results as sandal oil, but without the backache which that so often causes, and they do not as often disagree with the stomach. Methylene blue is also of some use. It is necessary to see that you get methylene and not methyl blue, as the latter has no effect. It is best given in capsules containing 1 grain of methylene blue, 1 drop of oil of cassia, and 1 drop of oil of sandal wood. Three capsules a day is usually as much as a patient can take, and at times the dose has to be reduced to 2 after forty-eight hours. More causes very frequent micturition and tenesmus. The urine is green, and stains the clothing if allowed to come in contact with it. Urotropin has not done as well as it was at first hoped it would. Given in large doses it causes great scalding. Where the bladder has become infected and there is a dirty alkaline urine

it is extremely useful and often accomplishes very prompt results. Salol is indicated in the same class of cases as urotropin, but is not quite as efficient as urotropin as a urinary antiseptic, while it has the same disadvantage of causing scalding when given in considerable amount.

As to diet, if we except peppery and spiced foods there are few things which do harm. A simple diet is best, especially when taking medicine which is liable to upset the stomach. Nothing with any alcohol in it should be allowed, and ginger ale is just as bad on account of the pepper in it. I have seen a case which was doing well lighted up as badly by a bottle of ginger ale as by a bottle of beer.

Other things being equal, the quieter a person keeps the better he will do. Bicycle and horseback riding should especially be avoided. Keeping the bowels open and a hot bath before going to bed lessens the tendency to chordee. It should be impressed upon patients that all sexual excitement is bad for them. They should be told to handle the penis as little as possible, and not keep stripping it to see how much of a drop they can find. A suspensory bandage lessens the liability to epididymitis, and should be worn from the beginning of the trouble. If inflammation should occur, rest in bed and an ice bag give the greatest relief. In patients with a narrow meatus it is often advisable to cut it at the beginning, as it is not possible to give injections satisfactorily unless there is a fairly good opening.

It must always be borne in mind that while an injection can cure a discharge it can also keep one up. In obstinate cases it is occasionally surprising to see how quickly they will clear up when all treatment is stopped. An astringent injection in the early stages of a gonorrhea is unjustifiable. It cannot kill the gonococci nor materially retard their growth. It does often give a false sense of security which later events prove was wholly unwarranted.

The idea that it is not well to do anything for a gonorrhea except give citrate of potash in large doses is fortunately passing away, though in a certain class of dispensary practice I often come to the conclusion that there is a great deal of truth in what one of my instructors once said to me when I asked him why he did not give injections. His reply was, "What is the use? Most of them drink it and the rest squirt it into their bladder."

GONORRHEA IN WOMEN.¹

BY W. L. BURRAGE, MD., BOSTON.

At the outset it is well to bear in mind some of the characteristics of the gonococcus. It has been shown that the gonococcus is somewhat dainty in his diet and habitat. He requires air and he thrives best in an alkaline medium. He lives in columnar and not in pavement epithelium, and, needing oxygen, he does not as a rule go far from the surface. The phagocyte is not the special enemy of the gonococcus, and when the latter ceases to exist it is because he cannot find food and surroundings to his liking rather than because he has been eaten by the phagocyte.

In the course of the inflammatory process set up by the gonococcus the cylindrical epithelium, in which the

germ has its home, is cast off and thus the process tends to cease. As shown by Bumm, gonorrhea is essentially a disease of the epithelial layers.

In considering the different portions of the genital tract of the female that are most frequently affected by gonorrhea, we naturally look for those where there is cylindrical epithelium. At the mouth of the urethra are the racemose glands of Skene. These are lined with cylindrical epithelium. In the urethra, which, to be sure, is lined with pavement epithelium, there are mucous crypts which correspond to Littre's glands in the male, and the mucous membrane of the urethra is in folds except during urination, and thus furnishes lurking places for the cocci. The canal of the cervix has many Nabothian glands with walls of cylindrical epithelium, and the glands of Bartholini are also lined in the same way. The vulva, vagina and intravaginal cervix are covered by pavement epithelium, and the vaginal secretion, made acid by the lactic-acid bacteria of Döderlein, is inimical to the life of the gonococcus and other pathogenic bacteria. The uterine canal from the external os to the openings of the tubes is lined with a simple layer of ciliated cylindrical epithelium. In the cervix there is a submucous layer, but in the body of the uterus the utricular glands rest directly on the muscle. These uterine glands are all on the surface, and are shed to a greater or less degree at the catamenia. There are no glands in the tubes, but the walls of the tubes are in folds and are pouch like, thus affording tarrying places for the cocci. The external os, the internal os, and the isthmus of the tube are narrow paths which may serve as barriers to the progress of the gonococcus, so also the neck of the bladder and the sphincter ani assist in shutting out disease from the bladder and rectum.

A majority of authors give the following as the most frequent seats of chronic gonorrhea in the order of frequency: Urethra, cervical canal, Bartholini's glands, uterus, tubes, vulva, vagina, and bladder and rectum. Vulvitis and vaginitis are rare except in certain acute cases and in children. In very young women, in those with delicate mucous membranes and light hair, and where the mucous membrane is succulent, as in pregnancy, gonorrheal vaginitis is more common than it is in women who have intact and firm epithelium in the vagina.

Experimentally, Bumm found that the period of incubation of acute gonorrhea was twelve hours; in twenty-four hours the attack was well established. Clinically acute gonorrhea in the female is much less frequent than in the male. The disease is not, as in the male, always preceded by a period of acute invasion, the symptoms of which necessarily attract the attention of the patient and the physician, and for this reason gonorrhea in woman is often overlooked. The symptoms and signs are for the most part those of subacute or chronic gonorrhea from the start.

The frequency of chronic gonorrhea in women has excited a great deal of discussion ever since Noeggerath published his first paper on the subject in 1872. He stated that 80% of all gynecological cases have latent gonorrhea. Sängner, from an examination of 1,930 cases, both in hospital and in private practice, diagnosed gonorrhea in 12%, and this was in the eighties, after the discovery of the gonococcus by Neisser (1879). Sängner's percentage seems to be a fair one for all cases, and is pretty generally adopted

¹ Read before the Boston Society for Medical Improvement, December 31, 1900.