The Acute Stage.—A tickling, teasing, itchy irritation is felt at the orifice of the urethra. The lips of the meatus are found adherent or a bluish sticky discharge is seen between them. A slight stinging is felt on urination. The lips of the meatus now swell slightly and redden. The quantity of discharge increases and it becomes opaline, then purulent. The meatus feels hot and sore. The pain on urination increases.

After the fifth day from its first appearance the discharge has become very much more copious (if unrestrained). It gets thick and purulent and soon acquires a greenish colour from slight admixture with blood, which latter may appear in little streaks.

Under the microscope the discharge is seen to contain at first pavement epithelium, mucous filaments, a few pus cells containing gonococci, and many gonococci outside of the cells. As the pus increases the epithelium diminishes and red blood cells appear, while the gonococci constantly increase in number within and without the cells. Finally, as the discharge thins down, epithelial cells reappear, while the pus cells and gonococci steadily diminish and finally disappear altogether. In the chronic gleety discharge gonococci may still sometimes be found and sometimes not. When the discharge recurs in relapse the pus cells again appear, but contain very few gonococci, these being for the most part free in the fluid and attached to the outside of the epithelial cells (Legrain [1]).

During erection the mucous membrane may be cracked, perhaps occasioning considerable hemorrhage. Pain is now felt all along the pendulous urethra, and the canal is sensitive to pressure. Irradiating pains may be complained of in the groins, testicles, perineum, cord, and back. Involuntary seminal discharges at night are sometimes brought on by the local irritation, and these ejaculations may be exceedingly painful. The urethral mucous membrane becomes thickened by the inflammation, and the stream of urine is consequently small, forked, or dribbling. Retention may come on, possibly from spasmodic muscular contraction or by extension of the inflammation backward, causing sudden congestion of the prostate (Thompson)—a condition recognised by rectal examination. But retention with gonorrhea is the rarest of complications, unless the patient continues to drink hard or has a rather tight stricture before he acquires the disease.

As the inflammation increases the prepuce may become edematous, occasioning phimosis or paraphimosis; or, if the prepuce be

[1] Archiv. de physiologie, 15 août, 1887.

naturally tight, the inflammation may extend into the balano-preputial cavity and light up balanitis.

Chordee.—Erections at this time become painful, threatening chordee. This indicates that the inflammation has extended beyond the free surface of the mucous membrane, and has included the delicate meshes of the erectile tissue of the corpus spongiosum. As a rule, the acuter the urethral inflammation the greater the liability to chordee. In actual chordee more or less of the areolar structure of the corpus spongiosum is obliterated by the effusion of plastic lymph, while other portions lose their distensibility. This condition may implicate a longer or a shorter distance of the urethra, sometimes almost all the pendulous portion. Consequently complete distention of the areolæ of the corpus spongiosum does not occur, and the urethra is too short for the erect corpora cavernosa, and bends the penis downward like a bow during erection, the urethra being the cord to the bow. If the corpora cavernosa become inflamed and the corpus spongiosum escapes, the arching is in the opposite direction. This takes place sometimes, but very rarely. A sort of spurious chordee, upward or lateral, may be caused by inflammation of the lymphatics along the dorsum or the side of the penis. In chordee great pain is felt from the stretching of the inflamed erectile tissue. This is measurably relieved by bending the penis so as to increase the bow, thus slackening the string; and it passes off entirely as erection disappears. Chordee is most frequent during the night and towards morning. It may render sleep impossible. The point of greatest curvature is situated anywhere along the pendulous urethra, most frequently near the glans penis. The pernicious practice of breaking the chordee—viz., roughly straightening the penis when erect—gives rise to a hemorrhage which may become excessive and be the starting-point of organic stricture.

The Decline.—After the disease has continued at its height for several weeks, the pain on urination ceases, the discharge becomes more watery, chordee infrequent. The discharge finally diminishes to a drop in the morning, the meatus again sticks together, and the patient is presently well, unless the inflammation is perpetuated behind a stricture or in the prostatic urethra.

During all the local, surface, inflammatory disturbance there is no constitutional sympathy. Feverishness means complication, although nervous individuals commonly complain of a real or fancied sense of prostration during the continuance of the discharge.

The Cure of Gonorrhea

"May I get married?" The frequency with which the sufferer from gonorrhea presents himself with this question on his lips is a sad commentary upon the levity of youth. Yet it is a question which the practitioner is frequently—nay, commonly—called upon to answer. And upon the correctness of that answer the happiness of a household often depends. An error on the side of overcaution —forbidding a man to marry when he has a perfect right to do so —is only less heinous from the patient's point of view than the permission to marry before the danger of infection has passed. On the one hand there is the prospect of moral despair for both parties, on the other the certainty of infection of the innocent with all its train of physical woes and the possible discovery of the guilty partner, with results that need not be dwelt upon.

And unhappily the question is not an easy one to answer. So difficult is it indeed that scarcely any two authorities agree as to the criteria upon which the answer shall be based. Against the genial vagueness of the light-hearted practitioner, himself a rounder and a *roué*, who proclaims that one is free from danger as soon as he is down to his customary morning drop, we may oppose the Spartan severity of those few authorities who assert that once a gonorrheic always a gonorrheic, once infected always infectious.

The broad-minded adviser will avoid either extreme. He will seek a middle course. Knowing full well that the majority of men who have had gonorrhea become and remain absolutely sound and clean, and recognising also that while most of those who exhibit the traditional morning drop are undoubtedly infectious, there remains an important minority that cannot impart its disease, under whatever stress of sexual excitement. These are practical facts commonly encountered. We need not concern ourselves with those rare cases of alleged marital infection ten or twenty years after a cured gonorrhea. By their very nature such cases are open to a suspicion of that symptom common to all venereal disease, viz., lying; and against them I can advance the experience of thirty-five years, during which I have advised countless patients to marry, with no disastrous consequences so far as I know, and all will recognise the probability that such an error would rebound forcibly enough upon its perpetrator. Such being the case, I am willing to assert the possibility of determining in any given instance that infection may or may not occur.[1]

[1] While the *diagnosis* may thus always be definite, the *prognosis* must remain indefinite. I can tell a man that he is or is not now infectious, but if he is now infectious I cannot tell, with any certainty, when he will become clean. That is a matter of relative immunity, severity of lesion, faithfulness to treatment, and a thousand other details, differing for every case.

When does the gonorrheic patient cease to be in danger of infecting the woman with whom he cohabits? Not until the gonococci have been entirely eliminated from him. The gonococcus is the sole infectious agent. If it is present there is danger; if not there is none. But to find the gonococcus is no easy matter. Its presence may be *suspected* on account of the symptoms the patient presents—and this clinical evidence was all we had to go by until within a few years—or it may be *proved* by the evidence which bacteriology has at last evoked.

Clinical Evidence.—The clinical evidence of the presence or the absence of gonococci, which has been for so many centuries the surgeon's only criterion, is overshadowed nowadays by recent advances in bacteriology; to such an extent, indeed, that the signs and symptoms of the disease scarcely figure in the surgeon's estimation. Yet the bacteriologist is by no means infallible, and it is absolutely essential that the clinical evidence should accord before science is allowed to conclude that a patient is clean.

The notable clinical evidence of the presence of gonococci is pus, and in view of the prevalence of gonorrhea it is a general rule that *whenever there is pus anywhere in the genital or the urinary tract the presence of gonococci may be suspected, and conversely when the whole tract is proved free from pus the presence of gonococci may be denied.*[1]

Clinically speaking, a great many classes of cases may be ruled out at once. Thus, gonorrhea of the kidney is very rare and never occurs except in conjunction with gonorrhea of the lower urinary passages. Similarly the history of suppuration due to hypertrophied prostate, stone, tubercle, or tumour is usually such as to rule out gonorrhea. But the cases which come for a diagnosis on this point may be divided into three classes:

First, those who having had gonorrhea continue to have pus in the urine or are subject to relapses at every indiscretion, be it sexual or alcoholic.

Secondly, those who, having had gonorrhea, whether they allege a continuance of the discharge or not, are not subject to relapses, no matter how much sexual and alcoholic dissipation they indulge in.

Thirdly, those who, after a gonorrhea, have no longer a discharge or any other symptom, and show perfectly sparkling urine.

[1] With the single exception that the patient may have just been infected and may still be in the incubation period.

Of the first class the majority are still infectious; of the second class the majority are no longer infectious; while all who continue in the third class for a month are certainly free from gonococci and from all danger. For these last, then, the clinical diagnosis suffices; for the others there is only a probability from which the experienced surgeon may often reach an assured conclusion one way or another, but a probability which always deserves to be confirmed by scientific tests.

Bacteriological Evidence.—Here there is such a disparity of opinion as almost to shake one's faith. It is customary to excite a urethral discharge by an orgy of drink, of copulation, or of both, or by irritating the urethra by the passage of a full-sized sound or by the instillation of a strong solution (1% to 10%) of silver nitrate. The discharge is then examined for gonococci by cover-glass or by culture. Of these various methods none impresses me favourably. Such of them as are not of unsavoury morality have the distinct disadvantage of making a well man—a man supposedly well, at least—ill, and are, I believe, quite unnecessary.

I have obtained entire satisfaction by an opposite method. Instead of stirring up the gonococci, and the patient as well, I have submitted all the discharges to a practised bacteriologist. I employ three sterilized centrifuge tubes. One is filled with the first drops of urine passed by the patient, another with some of the "second flow" of urine, and a third with the secretion expressed from the prostate and vesicles. These three tubes are centrifuged and the sediments submitted to cover-glass and culture examinations. In every case the result has been accurate. The only precautions required to insure success are:

1. Sterilized tubes into which the urine is passed directly.
2. Immediate examination.
3. The application of the culture as well as of the staining tests (p. 59).
4. A bacteriologist thoroughly conversant with the delicate technic of cultivating the gonococcus.

With these precautions accuracy is assured, as fully, at least, as by any other method, and with the concurrence of the clinical evidence it is absolute—given an expert clinician and an expert scientist.

Diagnosis of Gonorrheal Urethritis

In the acute stage it is necessary to distinguish urethral gonorrhea from simple urethritis, while in the chronic stage the distinction between true relapsing gonorrhea and simple recurring urethritis is, if anything, more important still. In either case, the ultimate conclusion must rest with the discovery of the gonococcus; but there are many signs to guide the experienced practitioner, straws that show which way the wind blows, and a knowledge of these will, in many cases, suggest a brilliant diagnosis and cure, even without the aid of bacteriology.

Acute Simple Urethritis and Gonorrhea.—When a patient presents himself complaining of having contracted a gonorrhea, an inspection of his penis will often confirm or refute this opinion. If the lips of the meatus are red and swollen, exuding a creamy discharge, there can scarcely be a doubt of the specific nature of the infection. But *unless the urethral orifice is greatly swollen—unless there is ardor and chordee—an examination of the discharge is necessary to differentiate true gonorrhea from simple urethritis.* It may be that the gonorrheal inflammation is not yet well under way, or that there is chronic gonorrhea, of which this is an exacerbation, or, on the other hand, the whole matter may be a mere sexual strain. In either case the discharge may be slight or profuse, watery or creamy. The microscope and "the Gram" are required for an immediate decision, to save the surgeon from the possibility of an erroneous diagnosis and to afford the patient the advantages of immediate local treatment.

I fear not every one will accept the statement that non-gonorrheal urethritis can simulate the true specific inflammation; but I have seen cases that went through a very fierce attack and proved exceptionally unmanageable by permanganate irrigations, although the patients denied any sexual act for many weeks before the beginning of their attacks, while repeated microscopical examinations revealed no gonococcus in the discharge. In many other cases the acuteness of the onset gave every promise of a true gonorrhea, but the negative microscopic evidence was confirmed by the rapid subsidence of the inflammation under a course of treatment that never could have conquered the gonococcus. It is the relative frequency of such inflammations of the urethra that supports the quack and deludes the unwary. In view of the Protean nature of acute pseudo-gonorrheal urethritis, a few paragraphs may be profitably devoted to it here.

Acute Pseudo-gonorrheal Urethritis (bastard gonorrhea) may occur without any sexual contact whatever. I have known a sharp case to occur after a very severe sunburn, and I recall another, only a trifle less severe, in which the discharge came upon a robust and healthy man while camping in the woods, and was attributable to no cause. Such cases are, however, rare; as a rule, there has been sex-

ual intercourse a-plenty. Indeed, excess, whether sexual or alcoholic, is so commonly an exciting cause that the patient himself readily recognises the milder form of the disease as a strain. The immunity to simple urethritis of married men who remain true to their vows shows how necessary some illicit excitement is. Although the patient is always ready to attribute his troubles to some leukorrheal or menstrual discharge of his partner, I confess that I doubt very much whether these have anything to do with the matter. Certainly newly married men do not often acquire simple urethritis, though they are not famed for their respect for the menstrual epoch nor for their sexual moderation.

But there is another and more important side to the picture. The predisposing cause of simple urethritis usually exists in the patient himself. It may be local or general—i. e., urethral or constitutional. A sharp attack of simple urethritis has been known to occur in a virgin urethra; but I believe, nevertheless, that a urethral past—a history of previous gonorrhea—is an important etiological factor. Of no less importance is the patient's diathesis. Severe simple urethritis is most commonly seen in patients of the soft, flabby, lymphatic type. Such men are liable to catarrh of any of their mucous membranes, and the urethra forms no exception. In brief, the exciting cause of simple urethritis is some external influence, almost always sexual excess; the scars of previous inflammations prepare the urethral soil, and a lymphatic, catarrhal habit makes the patient an easy victim to such an inflammation. Thus, if the excess is sufficient, there may be simple urethritis without any predisposing cause; but the attack will be light and transitory, while a slighter strain in a fit subject may well light up a sharp inflammation.

The course of non-specific urethritis depends upon the state of the urethra, the patient's general health, and the treatment. Its natural tendency is to get well promptly, and failure to do this is due either to continued excess (alcoholic or sexual), or to the damaged condition of the urethra, or to some personal idiosyncrasy, or to the local treatment. Wine and women must, therefore, be absolutely and immediately forbidden—though later mild alcoholic or sexual stimulation may prove beneficial—and the surgeon must decide, according to the evidence at hand, whether the discharge is being kept up by the state of the urethra or by the treatment. When a patient comes with a gonorrhea which he controls by a protargol injection thrice a day and a dash of permanganate after each urination, stopping his treatment will usually cure his disease; on the other hand, a history of repeated protracted attacks will suggest recurrent urethritis and demand appropriate treatment (p. 92). Any individual catarrhal predisposition that may exist will militate against a cure by any treatment, and may sometimes require a change of climate (p. 137) to overcome it.

Relapsing Gonorrhea and Recurring Urethritis.—The predisposing cause of these two conditions is the same, viz., a damaged urethra. If the case is a true gonorrhea, gonococci still exist in the discharge; if a recurring urethritis they do not; but beyond this the clinical symptoms are much the same. There is a long history of repeated attacks of urethral discharge; often enough the patient will confess that for many years he has never been well for six months at a time; there has been some stickiness of the meatus, or a morning drop. The occasional exacerbations to which such a patient is subject do not much concern him. If gonococci still inhabit his canal he has become relatively immune to them. The worst of his attacks is but a week or two of purulent discharge without any notable swelling of the meatus or chordee, and unless he is neurotic, or subject to relapsing swelled testicle, he takes a very light-hearted view of the situation. Forgetful of the sorrows of his initial attack, he proclaims that a "dose" is no worse than a cold in the head, and, acting accordingly, he spreads infection broadcast throughout the community, all the while enticing his young friends to a fate that has lost its terrors for him.

To decide whether such a man harbours gonococci or not requires the microscope and "the Gram"; or, if his troubles are quiescent, prostatic massage, the centrifuge, and cultivation of the gonococci. And definite knowledge on this point is essential both for a decision as regards matrimony and for the direction of treatment—if, perchance, he really wishes to get well. Gonococci being absent, the case may be attacked boldly. There is little danger of lighting up an acute prostatitis or epididymitis, and gentleness is practised only out of respect for the tenderness of the urethra—a respect to be observed always. The sound is introduced in search of a possible stricture; the discharge is treated by astringent instillations of nitrate of silver, thallin sulphate, or protargol, unless its profuseness calls for irrigations of permanganate of potash, or nitrate, or protargol. But if gonococci are present, the mildest measures are more likely to succeed. The sound will irritate; the epididymis must be watched; perhaps rectal irrigations or a vacation from all treatment will be required before the disease can be finally conquered. In short, this is the most tenacious type of chronic urethritis, and must be treated as such.

Course of the Disease and Complications

For purposes of clinical description and methodical treatment urethral inflammation (whether gonorrheal or other) must be distinguished as anterior and posterior and as acute and chronic in the anterior and posterior localities, since the treatment, notably the mechanical topical treatment, varies greatly with the locality. The general internal treatment, on the other hand, is not so essentially modified either by the intensity of the inflammation or the region upon which it manifests itself, being for all areas a proper balance between balsamics, alkalies, diluents, rest, and anodynes as required. Therefore the malady may be rationally presented here, as in a clinical study, all surface inflammations being considered together.

Acute Anterior Urethritis

Morbid Anatomy.—Gonorrhea, the type of this inflammation, commences at the meatus and travels slowly backward. By the eighth day all the anterior urethra has become invaded. Its surface is congested, without polish, and covered with little bare spots like those seen in balanitis where the epithelium has exfoliated. There is no ulceration. These lesions tend to become localized at the bulb, in the fossa navicularis, or at some intermediary point where there may have been much chordee.

The gonococcus first gains lodgment upon the soft epithelium just within the meatus, rapidly multiplies and penetrates between the cells into the deeper epithelial layers, into the foramina and the ducts of the mucous glands, and into the subepithelial tissues. The minute foreign bodies act like the stings of so many countless nettles, and Nature enters at once into a fierce contest to get rid of the enemy.

Hence the inflammation and the running together of myriads of leukocytes which, possessing themselves of the microbic enemy, float them out to the surface of the mucous membrane and thence to the meatus, where they appear in a stream of creamy pus.

The pus is really Nature's method of cure—a method unfortunately slow, and when left to itself painful and not without its complications.

This bird's-eye view of the situation makes it at once clear why local treatment by injection and irrigation is so tardily effective, even when the agent employed is deadly to the gonococcus, unless it be set to work while all the gonococci are upon the surface and within easy reach of the destructive agent. When the microbes have worked their way beneath the surface, which they seem to

accomplish in a few hours to a greater or less extent, and each hour to penetrate more deeply, they become shut in and protected from the action of any germicide locally employed against them, and it is only by repeated and prolonged irrigation that they can be finally mastered. To expect to destroy them by one or two injections, however powerful in a germicidal way, is as sensible as to expect to drain a swamp with a broom.

A moment's contemplation of this idea intensifies one's appreciation of the truth of the fact that in an acute gonorrheal case local treatment to be promptly effective must be commenced very early—certainly within twenty-four hours of the appearance of the discharge. Every hour later makes the prompt efficiency of local germicidal treatment less brilliantly effective.

A thorough conviction about this rapidity of penetration of the bacteria is most valuable to the surgeon.

In three autopsies of cases of acute gonorrhea produced by inoculation,[1] it is shown that the pavement epithelium of the anterior urethra somewhat opposes the penetration of the gonococci, which, thirty-eight hours after inoculation, are found in groups upon the cells and commencing to penetrate between them.

It is through the foramina and foraminulæ of Morgagni and the ducts of the urethral follicles and of the glands of Littré that the germs find readiest entrance to the subepithelial tissues, and even as early as the thirty-eighth hour a certain number of leukocytes, having devoured some of the advance guard of the enemy, reach the surface and are found in the discharge, notably in the mouths of the foramina of Morgagni.

However, the germs soon get beneath the surface, and are there protected from the action of parasiticides even better than they are in laboratorial cultures.

And it has been found that antiseptics applied even for two minutes are not able to sterilize cultures. Finger made such experiments with permanganate of potash 1 : 10,000 to 1 : 1,000, carbolic acid 1 : 10,000 to 1 : 1,000, corrosive sublimate with salt 1 : 100,000 to 1 : 5,000, nitrate of silver 1 : 2,000 to 1 : 1,000, and all failed; a failure ascribed to the fact that the cultures cover themselves with an albuminous coagulation when in contact with these antiseptics, and in this way the central portions of the culture remain protected.

Symptoms.—The symptoms of anterior urethritis are the same as those of gonorrhea. Repetition is unnecessary. When the inflammation is traumatic, chemical, or of any non-virulent variety,

[1] Cited by Sée, p. 117, from Finger, Gohn, Schlagenhaufer.