

noxious properties; but boiling is the surest way to render it innocuous. In addition to giving attention to the water supply, amelioration of the general social conditions of the afflicted community must be sought, by preventing intermarriage, diversifying the industries, shortening the hours of work, improving the food supply, widening the streets, and modernizing the sewage system.

In sporadic cretinism remarkable results have been achieved by the so-called substitution treatment, *i. e.*, the substitution for the deficiency in the activity of the thyroid gland of either the gland itself, obtained from animals, or preparations made from it. It is unnecessary to dwell upon the development of this treatment, although it forms an interesting chapter in the history of medicine. The father of it, as at present practised, is G. R. Murray, of Newcastle-on-Tyne; although the value of the gland in the treatment of conditions dependent upon absence or disease of the thyroid body had previously been recognized both by Bircher and by Horsley. They, however, had recommended the implantation of the gland—a method not devoid of danger. At the present day numerous preparations of the thyroid are on the market. Some represent the gland in a dried state—the so-called desiccated thyroid; others are glycerin or ethereal extracts in liquid or solid form. As a rule, the gland from the sheep or the calf is employed, but that of the hog also seems to be efficacious. Attempts have been made to isolate the active principle and to use it instead of the extract or the gland itself. Different investigators, however, have isolated different substances, each claiming that his is the active principle; thus, there are Baumann's thyrotodin, Notkin's thyreoprotein, Fränkel's thyroantitoxin, and Hutchinson's colloid. The active principle seems to contain iodine.

The dose of thyroid is more or less arbitrary and varies with the preparation. It is well to begin with small doses (for example, a minim of the liquid or a grain (0.06 gram) of the solid extract nightly), increasing the dose with care. The younger the cretin, the more brilliant are the results; but there is no period, except, perhaps, extreme old age, at which it is not wise and proper to make a trial of the remedy.

Under the treatment a wonderful change comes over the entire system of the individual. There is a growth in height and a diminution in the general bulk of the body; a disappearance of the oedema of the skin, of the swelling of the tongue, and of the fatty tumors; a rise in body temperature; an improvement in the condition of the bowels; and a very striking increase in the intelligence. There is in the beginning, as pointed out by Thomson (*British Medical Journal*, 1893, vol. ii., p. 677), a slight tendency to muscular debility, connected with the tremendous change in bodily metabolism; but this soon disappears.

If the thyroid medication is too active, symptoms of intoxication—so-called hyperthyroidism—may develop. These are tachycardia, pains in the limbs and elsewhere, slight fever, and diarrhoea.

Under thyroid treatment the diet should receive some attention. The use of meat should be restricted, and the food should be largely vegetarian in character.

A number of cretins that were under thyroid treatment have succumbed with astonishing rapidity to infectious diseases, such as diphtheria, typhoid fever, etc. Whether the thyroid medication had in any way lessened the patients' resistance to these is a fair question, but one which cannot as yet be definitely answered. The benefits obtained from the treatment so far outweigh any possible disadvantages that the latter need scarcely be given a thought.

In order that the beneficial effects of the thyroid treatment may not be lost, it is necessary to continue the administration of the drug throughout the patient's life. The lowest efficient dose should be determined, and then kept up uninterruptedly.

Specific medication with thyroid gland, which has been of such signal benefit in sporadic cretinism, has, so far, not met with striking success in the endemic form. The reasons for this are manifold. In the first place, the

method has not been tried upon any large scale; secondly, the causes underlying the endemic cretinism continue; and thirdly, the majority of cretins were at a comparatively advanced age when the treatment was begun. It would seem advisable to administer the substance in a more or less routine way, as is done with quinine, for instance, in malarious districts, and thereby to aid the hygienic factors which have been mentioned. In any case the earliest manifestations of the cretinoid condition should be a spur to the use of thyroid preparations. Unfortunately, the state of civilization in cretin and goitre communities is, as a rule, so low that the people are slow to accept benefits, even if they do not actively resist them. To them applies the saying of Goethe: "Die Menschen wollen zu ihrem Glücke gezwungen sein."

I have referred to border-line cases that seem to bridge the chasm between idiocy and cretinism, and between dwarfism and cretinism. In them, as well as in infantilism, it is proper to make a test of thyroid treatment. A beneficial effect is proof that in the given case some of the elements of cretinism were present.

David Riesman.

#### GOITRE, EXOPHTHALMIC. See the APPENDIX.

**GOITRE. (SURGICAL.)**—In the treatment of goitre, surgical measures may become necessary, because internal medication has failed to stop the growth of the tumor or to relieve dyspnoea or other severe symptoms; or an operation may be resorted to, merely to free the patient from a disfiguring tumor.

External applications have little effect upon a goitre. The reports of success from the application of iodine in some form or other, or from the use of electricity, have been too few and too scattered to count for much.

**Injection.**—Many surgeons have reported excellent results from the treatment of goitre by injection, but on the other hand not a few deaths have been reported, so that one should be careful in advocating the use of injections. Since the perfection of the operative treatment, and the greatly diminished mortality of the operations performed for goitre in the last few years, the field for injection has been much limited. There will still be instances, no doubt, in which patients will absolutely refuse an operation, or in which on some other account a surgeon will be justified in injecting a goitre with iodine or iodoform; but such injection should be made with a clear understanding of its danger, and, it is hardly necessary to add, under strict aseptic precautions. Even then there is danger from hemorrhage and embolism.

Besides the tincture of iodine which has been most generally employed for injection, carbolic acid, alcohol, arsenic, and ergotin have been tried, but they are less effective than iodine, and do not decrease the danger of this method of treatment. Iodoform is the only substitute which has found many friends. It should be mixed with ether and olive oil in the proportions of 1 part of iodoform to 7 parts each of ether and oil. When the mixture turns brown it contains free iodine, and should be discarded.

To lessen the risk of hemorrhage, the hollow needle should be separately introduced. When it is seen that no blood escapes from it, the syringe should be attached, and ten or fifteen drops of the chosen mixture slowly injected. The resulting pain is sometimes very great, but lasts only for a few moments. The effect upon the gland is more or less marked according to circumstances. There may be an initial swelling, followed in a few days by more or less shrinking. Usually ten or twenty treatments will be required. These may occur at intervals of three days or more according to the amount of reaction. Parenchymatous goitre is best suited to treatment by injection, and this is the type of the disease which is most benefited by internal remedies. If the treatment is successful, there will in a few days be a distinct shrinking of the gland apparent to the eye and finger, and also capable of demonstration by measurements of the neck.

**Operation.**—Many operations have been advocated for the relief of goitre. Three of them have proved their worth and may be spoken of as classical. They are partial resection, enucleation, and ligation of the thyroid arteries.

Removal of the whole gland was formerly practised, but has been pretty nearly given up on account of the fact that acute or chronic "cachexia thyreopriva" follows in twenty-five per cent. of the cases. The acute form of this trouble is marked by tetanic symptoms which may terminate in speedy death. In the more chronic form surgical myxoedema develops, and this too may increase in severity till the patient succumbs. Hence total thyroidectomy, except for malignant disease, may be considered an unjustifiable operation. Partial resection is rarely followed by symptoms of tetanus, and when they do occur they are light and usually transitory.

Before any operation is performed upon a goitre, the patient should be prepared with all possible care. The difficulty of carrying out perfect asepsis so near to the mouth, the proximity of the tumor to important vessels and nerves, and above all the risk of sudden and severe hemorrhage, make the operations upon the gland much more serious than they appear at first sight to be. True, the mortality is small when a single surgeon operates upon a long series of patients, Kocher, for example, having reported a mortality of much less than one per cent.; but under ordinary circumstances a mortality of five per cent. may be expected.

**Choice of an Anæsthetic.**—Some surgeons advocate the use of ether, some of chloroform, and some prefer to use cocaine or some other local anæsthetic. The last plan possesses one advantage, namely, that the patient by speaking can demonstrate that the recurrent laryngeal nerve is not injured. A local anæsthetic should be chosen in cases of goitre accompanied by severe dyspnoea.

**Incision.**—A transverse incision is now generally preferred, as it well exposes the tumor, and leaves a scar in the direction of the wrinkles of the neck, and therefore not a conspicuous one. In case of a very large or deep-seated swelling, Kocher employs an angular incision, extending transversely on the level of the thyroid cartilage, from the sterno-mastoid muscle to the median line, and then bending downward to the sternum if necessary. This incision avoids the complete division of the sterno-laryngeal muscles.

**Partial Resection.**—When the skin incision has been made, and all superficial veins have been divided between ligatures, the muscles which lie in the way must be divided or drawn to one side, and the superficial fascia which overlies the true capsule of the gland must be divided and retracted. Beginning then with the upper and lower poles of the gland the surgeon carefully separates it from the surrounding tissues, placing ligatures around arteries and veins, and gradually dislocating the gland—as fast as it is freed—toward the median line. It is very important that every vessel should be clearly seen before it is clamped or ligated. If this rule is followed, the recurrent laryngeal nerve, which is closely associated with the inferior thyroid artery, will not be injured. Sudden hemorrhage should be controlled by compression, not by hasty clamping. The gland is often intimately attached to the trachea, and it is therefore better to leave a small portion of it behind, rather than to risk injury to the nerve by too violent attempts at removal. Hemorrhage from the substance of the gland, either where the isthmus is divided or elsewhere, may be controlled by cauterization or by ligation. The divided muscles are to be sutured. If the wound is deep, it should be drained for a couple of days.

The amount of gland tissue to be left depends a good deal on the shape of the goitre. If only one side of the gland is affected, the other is naturally left. If both sides require removal, enough gland tissue should be left to equal in bulk at least one-fifth of a normal gland. This tissue should be left at the poles of the gland, preferably about the inferior thyroid arteries, so as to reduce the risk of injuring the recurrent laryngeals.

**Enucleation.**—If a goitre is due to the development of distinct nodules within the thyroid gland, these may be enucleated. The ease with which this procedure may be carried out depends largely on how free these nodules are. Sometimes they may be shelled out from the surrounding gland tissue, almost as readily as non-inflamed tuberculous glands from their fibrous coverings. At other times the enucleation, on account of close attachment of the nodules, becomes virtually a partial resection. In such cases bleeding may be very troublesome, while on account of the depth of the holes which remain infection is more likely to follow in any case of enucleation than in a partial resection. Moreover, recurrence of the goitre is said to be more frequent after enucleation than after partial resection. Previous treatment by injection makes enucleation very difficult. There is little danger of injury to the nerves or jugular veins during enucleation. The skin incision is the same as that for partial resection.

**Ligation of the Thyroid Arteries.**—By the ligation of the thyroid arteries a certain amount of atrophy of a goitre may be accomplished. The superior artery is easily found through an incision along the median border of the sterno-mastoid muscle. The inferior may also be reached through this incision; but an easier method is to make a transverse incision situated far enough backward to allow the sterno-mastoid muscle to be drawn forward out of the way. The thyroid axis can be reached in this manner, and the inferior thyroid separated and tied near its origin.

**Exothyropepy.**—Jaboulay and a few other surgeons have succeeded in bringing about atrophy of a goitre by dissecting the enlarged gland sufficiently free to allow it to be brought into the wound, there to remain until healing by granulation shall have taken place—*i. e.*, for from three to eight weeks. Of the first sixty-five patients so operated upon four died, so that the operation is not without danger, and on account of its other obvious disadvantages it has not been generally taken up.

The two operations, therefore, which are most valuable are enucleation and partial resection; the former for isolated cysts and solid tumors, and the latter for diffuse and adherent goitres and all rapidly growing ones, since it best provides against recurrence.

Edvard Milton Foote.

**GOLD.**—So far as determined, the action of gold upon the animal system resembles that of mercury more nearly than that of any other of the well-known heavy metals. Locally, soluble gold salts are powerfully irritant, and, constitutionally, gold compounds affect nutrition. In therapeutic doses they tend, like mercurials, to improve nutritive tone, but in poisonous quantities to derange it, with the development of stomatitis and gastro-enteritis, and, in continued dosage, of emaciation and progressive general enfeeblement. Gold has the common reputation of being a nerve tonic, especially in cases of nervous derangement in the genital apparatus, particularly the ovaries. Therapeutically, it has been used in ovarian inflammation and irritation, in amenorrhœa, in loss of virility, and in various conditions of impaired nerve power, and also as a substitute for, or adjuvant of, mercury in the treatment of constitutional syphilis.

In none of these applications can gold be considered a medicine of first-rate, nor possibly even of second-rate power. The sole compound of gold official in the United States Pharmacopœia is that entitled *Auri et Sodii Chloridum*, Gold and Sodium Chloride. This is "a mixture of equal parts, by weight, of dry gold chloride and sodium chloride" (U. S. P.). The compound is easily obtained by mixing in proper proportion solutions of the two salts and evaporating to dryness. It crystallizes in elongated prisms, but is commonly found as "an orange-yellow powder, odorless, having a saline and metallic taste, and slightly deliquescent in damp air" (U. S. P.). The compound is freely soluble in water, and the solution has a slightly acid reaction. This preparation is locally irritant even to causticity, and constitutionally exerts the virtues

of gold as already set forth. The dose is about 0.005 gm. (about gr.  $\frac{1}{2}$ ) three times a day, in lozenge or pill.

Edward Curtis.

**GOLDTHREAD.**—**COPTIS.** The rhizome of *Coptis trifolia* (L.) Salisb. (fam. *Ranunculaceæ*). This plant is a pretty little evergreen bog-plant, with long, bright-yellow, thread-like rhizomes: bright-green and shining ternate leaves, and white, solitary, star-shaped flowers. It grows rather abundantly in the cold bogs of America, Europe, and Asia. The whole plant is generally collected, although the rhizome is undoubtedly the most efficient part. The description of the plant given above is sufficient for the drug, which has an intensely bitter taste, but no odor. The color, taste, and medicinal value of goldthread are due to a salt of the alkaloid *berberine*, which it contains in considerable quantity. A second alkaloid, *coptine*, is described by Gross as also present, but does not affect the medicinal properties of the former.

Goldthread is a simple bitter. It is frequently used in the country as a mouth wash for aphthous and herpetic ulcerations, etc. The ordinary dose is 1 to 4 gm. (gr. xv.-lx.).

The root of *Coptis Teeta* Wallich, of Asia, is a classic remedy for sore eyes, and still used in the Orient. Its properties are similar to those of goldthread.

W. P. Bolles.

**GONORRHŒA.**—Gonorrhœa, blennorrhœa, or clap is a contagious, inflammatory disease of the urethral mucous membrane, of venereal origin, and having as its cause a well-identified micro-organism, the gonococcus of Neisser.

This micro-organism was first isolated by Albert Neisser, in 1879, and has since been indubitably demonstrated to be the pathological principle of gonorrhœa.

It is a somewhat oval micrococcus, usually taking the diplococcal form, the individual coccus not being spherical but flattened on the side toward its neighbor, appearing more like a discoid formation than a true sphere; the individual cocci having, according to Haab, a diameter of 0.4 to 0.6  $\mu$ . They form in clusters, never in chains, this being due to the method of division; as a separation in one diameter is followed by the next in a direction perpendicular to the first. In this manner are formed groups or clusters of four, eight, sixteen, etc., and not long chains increasing in length by fission in the same direction. They are usually attached to epithelial cells and pus corpuscles, and are found free in the fluid only when present in great numbers. The gonococcus may be cultivated, probably the best medium for this purpose being hydrocele or chest serum in neutral agar in the proportion of one to three. The medium should always be alkaline in reaction, and kept at a temperature of about 36° C.

The period of incubation of a gonorrhœa, *i.e.*, from the time of inoculation to the appearance of the first symptoms, varies from three to seven days; and though occasionally a somewhat longer period elapses, an incubation extending over more than fourteen days is extremely rare, if it ever occurs.

The attention of the patient is usually first attracted by a slight pricking or itching of the meatus, and on examination he finds the orifice somewhat reddened, the lips may be stuck together, and a drop of viscid or semipurulent fluid squeezed out. The discharge rapidly increases and becomes purulent, and the act of urination gives rise to a certain amount of smarting. At the end of the first or beginning of the second week this discharge appears as a thick, green pus, which flows copiously from the meatus night and day, and so freely as to soil the clothing and genitals of the patient, the color of the discharge changing to a bright yellow on drying. Other symptoms of the inflammatory condition also appear. The meatus and surrounding parts are swollen, and the entire urethra in the pendulous portion is tender on pressure, and may be felt from the outside to be thickened and indurated. Sharp pains occur spontaneously, and

are especially severe during erections. These latter are more frequent during the early morning hours in bed, and are extremely distressing to the patient, the penis being curved downward, owing to the diminished elasticity of the urethra (chordee). The urethral mucous membrane is swollen and the stream of urine small and split up. The passage of urine is extremely painful, causing an intense burning along the urethra.

This aggravation of the symptoms usually continues into the third week, the inflammatory process having by this time extended to the bulb of the urethra. In addition to the other symptoms a feeling of weight, heat, and fulness is felt in the perineum. During this inflammatory period the patient also experiences a feeling of general malaise with slight feverishness, which, together with the mental distress, causes him to be greatly depressed.

About the end of the third week, in typical cases of acute anterior gonorrhœa, a rapid improvement occurs. The inflammatory and subjective symptoms diminish; the secretion, though still profuse, becomes thinner, later diminishes in amount, and finally is present only as a small drop in the morning on rising, disappearing entirely about the sixth or seventh week after infection.

While this description may be considered fairly typical, by far the greater number of cases do not end so happily. The inflammatory process overcoming the resistance of the compressor urethræ muscle invades the deeper urethra, and a new set of symptoms develop, while the difficulty of effecting a cure is increased. Owing to the close anatomical relation with the prostate, seminal vesicles, and epididymides, the disease is apt to involve any of these organs and disagreeable complications ensue. At times the invasion of the posterior urethra is acute, and is announced by the desire to urinate frequently and with extreme urgency, which may become exceedingly distressing to the patient. The tenesmus may be almost constant and is not relieved by urination; while a few drops of blood may appear at the end of urination, which always alarms the patient but is of no serious importance. In subacute cases this tenesmus is less constant, being present only when there is a certain amount of urine in the bladder; the patient will experience a sudden desire to urinate and is often unable to avoid wetting his clothing. At this time smarting or burning sensations, or lancinating pains, are experienced in the deep urethra, and they are increased by the acts of defecation and micturition. Nocturnal emissions are apt to be frequent, and are accompanied by pain in the deep urethra. These are due to the inflammatory condition of the caput gallinaginis, and are almost positive evidence that the deep urethra has become involved.

The secretion is similar to that of anterior urethritis (muco-purulent). The patient is usually much depressed, complexion sallow, a slight amount of fever is present, and there is loss of appetite with obstinate constipation. In some cases, however, all these symptoms may be greatly intensified. Not only may the prepuce become edematous but also the entire body of the penis may undergo enlargement through lymphangitis. At the same time there is likely to be an extremely abundant secretion, sometimes mixed with blood and containing large numbers of gonococci, which are also found in the free fluid. Extreme sexual irritation and chordee are present, and there is fever due to implication of the general system.

On the other hand, the infection may be subacute from the start. The period of incubation and the stage of prodromes last longer, the inflammation is less intense, and general symptoms may be entirely absent. While the secretion always contains pus, it is more gelatinous and does not become more than muco-purulent in these cases. Gonococci are present usually in the flat epithelial cells. This condition is extremely insidious and is almost certain to involve the posterior urethra, causing chronic posterior urethritis and prostatitis.

**DIAGNOSIS.**—The history of a definite exposure, a period of incubation, together with the subjective symptoms, render the diagnosis of a gonorrhœal urethritis

comparatively easy. At the same time there exist several forms of urethral inflammation which closely resemble it, particularly at the outset; so that it becomes exceedingly important, as regards both the prognosis and the treatment, to determine definitely the true character of the disease as early as possible. The true nature of the disease can be determined by the presence or absence of the gonococcus in the secretions, by means of the microscope.

An examination of a fresh specimen of gonorrhœal pus, under a high-power oil-immersion lens, will demonstrate the presence of gonococci in some of the pus and epithelial cells in the form of small clusters of minute refractive bodies having movements of oscillation and rotation; but in order to examine these satisfactorily the use of some staining agent becomes necessary. Fortunately, the gonococcus has a well-marked affinity for all of the basic aniline dyes, and is very easily stained with simple solutions of fuchsin, methyl violet, gentian violet, or methyl blue.

A good working method is to place a small drop of the suspected pus on a clean microscopic slide, and with another slide spread this out into a thin film as evenly as possible. This is allowed to dry thoroughly, and is then covered with a strong solution of any basic aniline color which is allowed to remain for about one minute, when it is washed off with cold water and a thin cover-glass placed over the stained specimen, which can be immediately examined under the microscope, or may be mounted in Canada balsam as a permanent specimen.

The microscope should be provided with a high-power lens (one-twelfth oil immersion) and the Abbe condenser.

A method of double staining is recommended by Weiss; this is sometimes useful, as it colors the microbes in a different manner from the neighboring tissues. A saturated solution of fuchsin and thionin and a two-percent. solution of carbolic acid in water are mixed in the proportion of one to four. The specimen is stained with this for half a minute and then rinsed with water. The gonococci appear blue, the protoplasm of the pus cells red, the nuclei bluish-red, the epithelia deep red, and their nuclei reddish-blue.

As the gonococcus is closely simulated by several other micro-organisms, it is sometimes necessary to differentiate it from these. Perhaps the easiest way of accomplishing this is by means of the staining method of Gram, which depends on the fact that gonococci do not stain with iodine. Heiman gives the following method of making the Gram test: "To 10 c.c. of water add 2 c.c. of aniline oil, shake well, and filter through moist filter paper. To the clear aniline water obtained add 1 c.c. of ninety-seven-percent. alcohol and 1 c.c. of a concentrated alcoholic gentian-violet solution. This is about the quantity required for ordinary staining. After passing the cover-glass quickly through the flame, it is then placed in this solution for from two to three minutes. Gram next states that the cover-glass may be washed in alcohol or not, as preferred. I prefer to drain off the excess on filter paper without washing in alcohol. The cover-glass is then placed for five minutes in Gram's solution of iodine, which consists of iodine, 1 part; iodide of potassium, 2 parts; water, 300 parts; immediately afterward it is to be placed in alcohol (97 per cent.) in order to wash out all the coloring matter. It is sometimes advisable to renew the alcohol.

"Now wash the cover-glass well with water and place it in a Bismarck brown solution 1 part, water 5 parts, for one or two minutes, then wash in water and mount in balsam."

The difficulty in regard to this method of differentiation is that it furnishes only proof of a negative character; as by its use the gonococci disappear from the field, while other forms of bacteria resembling them are stained by the iodine and remain.

**PROGNOSIS.**—The idea so prevalent among the laity, and also unfortunately among a large number of the medical profession, that gonorrhœa is a comparatively unimportant disease and unworthy of very serious con-

sideration, is erroneous in the extreme and cannot be too vigorously combated. For although it rarely results fatally in itself, its complications not infrequently end in sterility, the loss of an important joint, permanent damage to the kidney, or even death itself.

The fact also that the germ may linger for years in the urethra of the unsuspecting victim, eventually to contaminate an innocent wife, bringing in its train those terrible ovarian difficulties which it is so capable of producing, is alone sufficient to class it among the most serious maladies of the human race.

In regard to the duration of the discharge, it is impossible to give a definite prognosis; though it may be said that an individual who recovers in from four to six weeks may be considered exceedingly fortunate.

**TREATMENT.**—The discovery of the gonococcus as the etiological factor in gonorrhœa has naturally revolutionized the treatment of the disease, although many of the old remedies which had formerly been used purely empirically possess a bactericidal action and are useful in the modern methods of treatment.

To begin with, the diagnosis of a true gonorrhœa having been made, the patient should be instructed to avoid all factors which affect the disease unfavorably; and he should also be advised in regard to his manner of living during the attack. Most important is it that he should be informed of the contagious properties of the discharge, and of the danger of infecting either his own eyes or the eyes of those with whom he may be brought into familiar contact. This is a very real danger, particularly as patients are apt to grow careless as the disease progresses; indeed, not infrequently both eyes become involved, and sometimes the final result is a total loss of sight. The discharge, usually profuse, should be received on a pledget of absorbent cotton, which may be tucked into the prepuce, or placed in a small bag, which is tied over the penis behind the corona glandis. Many drug stores sell a contrivance known as the gonorrhœal apron, which consists of a small bag about six inches long by four wide, which is fastened about the waist by tapes, and the penis is introduced into it through a hole on the side next to the body. This is filled with absorbent cotton, which is removed and destroyed from time to time as it becomes soiled. A buttoned flap on the front side of the bag allows the penis to be freed for purposes of urination. The soiled cotton should be burned and the hands thoroughly washed with soap and water after touching the penis or soiled cotton.

The most favorable condition for a patient during the acute period is that afforded by rest in bed; but unfortunately this will rarely be submitted to. A patient who could readily be induced to remain in bed with a simple sore throat will stubbornly resist such a course in case of a gonorrhœa which causes him far more inconvenience; he feels that by remaining about he avoids the suspicion of his friends. At all events, all forms of violent exercise should be avoided, as also should sexual excitement, which exerts a most pernicious effect. The swelling and inflammatory condition of the penis may be somewhat obviated by soaking the penis in water as hot as the patient can bear, a procedure which will also relieve the dysuria, the urine being passed while the penis is still immersed. This dysuria, which at times is very distressing, is caused by the dilatation of the inflamed urethra by the stream of urine, and also by the acid character of the urine itself, which acidity should be overcome by drinking copiously of water, or still lithia waters, or of strong lemonade. The addition of citrate of potassium to the water is also beneficial.  $\mathcal{R}$  Potassii citratis,  $\mathfrak{z}$  i.; aquæ destill.,  $\mathfrak{z}$  iv.  $\mathcal{M}$ . et  $\mathcal{S}$ ig.: A teaspoonful in a full glass of water four times a day.

If the dysuria be very severe, a drachm of a two-percent. solution of cocaine may be injected into the urethra, rubbing it backward to the deeper urethra with the finger underneath the penis, a few minutes before urinating.

In regard to the diet of the patient, it should be simple and easily digested; he should avoid hearty and rich foods,

and especially asparagus, tomatoes, and rhubarb. Alcohol should be entirely interdicted in any form, and this prohibition should likewise extend to carbonated waters, ginger ale, and the like.

Smoking in moderation is not injurious. It is especially important that the bowels should be kept open, and a laxative dose of some of the saline aperients every morning before breakfast is usually beneficial.

In weak and run-down individuals a tonic may be of service; and in such cases the diet should not be reduced.

**Internal Remedies.**—The employment of internal remedies in the treatment of gonorrhœal urethritis with any idea of affecting the course of the disease is worse than useless; they are frequently productive of digestive disorders which are as serious as is the disease for which they are administered. Among such remedies may be mentioned cubebs, copaiba, sandal-wood oil, oil of turpentine, etc., drugs which have been handed down by an effete empiricism, and the administration of which may be followed by a complete anorexia, vomiting, diarrhœa, cutaneous erythematæ, and chronic gastritis. As gonorrhœa is a local process we cannot expect, except in a very round-about way, to influence its cure by the use of internal remedies. At the same time, certain urinary antiseptics are beneficial in preventing the decomposition of the urine, and also, by rendering the urine antiseptic, they may prevent the extension of the disease backward into the posterior urethra, and they certainly tend to prevent the occurrence of an ascending pyelo-nephritis. Among these drugs may be classed the salicylates, salol, salicylate of soda, etc., likewise methyl blue; and, above all, urotropin, by far the most valuable urinary antiseptic which we at present possess. The dose of this latter drug is from five to ten grains four times a day. This acts by liberating formaldehyde in the urine, and is of great value in all suppurative diseases of the genito-urinary tract.

**Local Treatment.**—As gonorrhœa is caused by a micro-organism which exerts its influence upon a localized portion of the body and cannot in any sense be considered a general disease, local treatment would appear to be the most rational method of dealing with it, and as a matter of fact it has given by far the best clinical results.

One of the oldest and best-known forms of applying this local treatment is by means of urethral injections, and it is the plan which is most frequently chosen, being especially advantageous, as it can be used by the patient himself. The method of using injections is by means of a piston urethral syringe, which should be made of either hard rubber or glass, with a well-fitting piston, a conical point, and a capacity of from two to three drachms.

In administering these injections upon his own person the patient should first fill the syringe by immersing the point in the fluid and drawing up the piston, all the air being excluded by holding the syringe with the point upward and gently pressing upon the piston until the fluid oozes out. The penis should be held in the left hand with the glans between the forefinger and the thumb, which support it from beneath so that when they are brought together the meatus is compressed and the injected fluid is held in the urethra as long as is desired, after the removal of the syringe. The syringe should be held between the thumb and middle finger of the right hand,



FIG. 2342.—Piston Urethral Syringe.

while the forefinger manipulates the piston. The conical point is inserted into the meatus and wedged sufficiently firmly to prevent the escape of fluid alongside the syringe, the piston being pressed steadily home until the urethra is fully distended. The thumb and finger of the left

hand then compress the meatus, retaining the fluid in the urethra.

The patient should always urinate just before injecting, to prevent the discharge being washed backward by the injection as well as to present a clean surface for the medicated fluid to act upon.

The necessary essentials of a remedial solution suitable for use in such injections are that it should contain some antiseptic capable of destroying the gonococcus, but not of sufficient strength to injure the mucous membrane. It should be composed of ingredients which are completely soluble and should not be a mixture containing powders which may clog up the ducts of the urethral glands and so cause the formation of small follicular abscesses. It is desirable that the fluid injected should also have an astringent action and should not be of sufficient strength to cause the patient undue suffering.

In acute inflammations only very mild antiseptic injections should be used, but they should be administered more frequently than is necessary after the discharge has become chronic.

As every known substance has been used at one time or another as the basis of an infallible urethral injection, it is possible here to indicate only a few of the medicaments which have proved serviceable in my hands:

Potassium permanganate in aqueous solution varying in strength from 1 to 4,000 to 1 to 1,000; nitrate of silver of the same strength; the bichloride of mercury, 1 to 30,000, and, finally, the dioxide of hydrogen, 1 to 4.

Comparatively recently a new set of silver salts have been produced which have proved exceedingly valuable, possessing a marked bactericidal action and good penetrating power, and at the same time causing less pain than the silver nitrate. These are: protargol in watery solution of 0.5 to 2 per cent.; albargin, .05 to 0.2 per cent.; argentamin, argonin, ichtargol, and others which have given exceedingly good results.

In the latter stages of the disease when the discharge has become watery and the gonococci have disappeared, injections of a purely astringent character may prove of service. The sulphates or acetates of lead, zinc, or aluminum, or the vegetable astringents, hydrastis, krameria, rose-water, etc., may be used alone or in combination. The injection Brou, which has acquired a wide reputation among the laity, will serve as a type of this class of injection; it has the following composition:

R̄ Zinci sulphat. . . . . gr. xv.  
Plumbi acetat. . . . . gr. xxx.  
Ext. krameriæ fluidæ,  
Tinct. opii . . . . . ʒiij.  
Aquæ . . . . . q.s. ad ʒvi.

M.

**Abortive Injections.** In attempts to abort a gonorrhœa at the very outset of the disease, exceedingly strong injections are sometimes used, as silver nitrate gr. xx.-xl. to the ounce. As a rule, if not always, these prove inefficacious; they are exceedingly painful, and are not to be recommended.

When the patient can come to the surgeon at least once a day, the continuous irrigation of the urethra with large quantities of fluid has proved a very successful method of treatment. An irrigator containing from two to four quarts of medicated solution is hung at an elevation; from this leads a rubber tubing, at the end of which is a glass or hard-rubber urethral nozzle. The patient stands up close to the edge of a sink or sits on the edge of a chair with a basin in front of him. The nozzle is pressed into the meatus, and the fluid turned on gradually until the urethra is filled, when a portion of the fluid is allowed to escape by the side of the nozzle, and circulation through the urethra is kept up in this way until the irrigator is emptied. A good form of nozzle for this purpose is known as Kiefer's, and consists of two hard-rubber tubes which come together in a conical point so that when the nozzle is held firmly in the meatus and the urethra is filled, fluid running through one of the tubes will flow out of the other. It must be remembered that

the fluid will take the shortest way out, so that after the urethra has been distended with fluid, although the fluid continues to run from the outlet tube, the instrument fails to wash out the urethra unless it is so manipulated that the outlet is occasionally stopped with the finger which allows the urethra to balloon up; then the finger is removed and the fluid again permitted to run from the outlet tube.



FIG. 2343.—The Kiefer Nozzle.

This tube can also be used to advantage in irrigations in which the bladder is filled without the use of the catheter. The finger being held steadily on the outlet tube, and the patient being requested to relax the sphincter muscles, the fluid will in most instances readily flow back into the bladder. This procedure should not be insisted upon too strongly. If the sphincter resists very forcibly, too much pressure should not be used, but frequently after one or two trials the surgeon will experience no difficulty in filling the bladder with ease in this manner in patients in whom at first it was found impossible to wash out the bladder in this way. The solutions used in this procedure are similar to those used in urethral injections, viz., the permanganate of potassium (from 1 to 6,000 to 1 to 1,000), nitrate of silver, bichloride of mercury, protargol, etc.

**POSTERIOR URETHRITIS.**—While this has been considered one of the complications of gonorrhœa, it occurs so frequently that it may be said practically to constitute a constant symptom of the disease. At about the end of the third week the patient experiences a sense of heat and heaviness in the perineal region with an increase in the frequency of urination; it may be necessary to urinate every few minutes, and the act is often associated with considerable pain and occasionally with the passage of a few drops of blood. There is usually considerable urgency, the patient having to urinate instantly when the desire seizes him, without previous warning. Erections and painful nocturnal emissions are apt to occur; they are caused by the irritation of the inflammatory process.

On the other hand, the invasion of the posterior urethra may be exceedingly insidious and give almost no symptoms of its occurrence. In some cases a rectal examination will show a tenderness over the posterior urethra without prostatic enlargement.

To ascertain definitely whether the posterior urethra has become involved, perhaps the best method is one devised by Sir Henry Thompson, and known as the "two-glass test." In this test the first portion of the urine is passed into a clean glass, and the second into another. The compressor urethræ muscle being stronger than the internal sphincter of the bladder, the pus resulting from a suppurative inflammation in the posterior urethra, which lies between the two, is unable to overcome the firm resistance of the compressor, and therefore flows backward into the bladder and contaminates the urine within it, so that if anterior urethritis alone exists, the first portion of the urine will be cloudy, owing to the fact that it contains the washings of the anterior urethra, whereas the second portion will be clear, the first portion having washed the urethra clean. In posterior urethritis, however, both portions of the urine will be cloudy, because the pus formed in the posterior urethra has flowed back into the bladder and clouded the urine contained in it. Unless suppuration of the bladder or kidneys exists, this test is entirely satisfactory.

When posterior urethritis develops the irrigations should be allowed to go back into the bladder. The intense pain and frequency of urination may be controlled by suppositories of opium, and by an occasional local application of the nitrate of silver. A few drops of a solution of from five to ten grains to the ounce being introduced by means of Uitzmann's syringe, will be found exceedingly useful in stopping the tenesmus, or a two-per-cent. solution of protargol may be introduced in the same

manner. To control the temporary increase in the tenesmus an injection of ten minims of a four-per cent. cocaine solution will often be found very effective.

**COMPLICATIONS.**—As the urethra is in close proximity to various organs, complications occur with a greater or less degree of frequency, and are often much more important and serious in their results than the original inflammation. Lack of space, however, prevents more than a casual mention of these.

**Balanitis** is an inflammatory condition of the mucous membrane of the glans penis which is apt to occur when the discharge is profuse. The patient should wash the penis three or four times daily with warm water and castile soap, drawing back the prepuce, and he should also allow the organ to soak for some time in an antiseptic solution.

**Phimosis**, a condition in which the preputial orifice is too small to allow the retraction of the foreskin over the glans, also sometimes occurs, promoting balanitis, which should be treated as before, a syringe with a long point being used to introduce the washes under the prepuce.

**Epididymitis.**—About fifteen per cent. of all cases of gonorrhœa are complicated by the extension of the inflammatory process to the epididymis; it occurs only after the gonorrhœal process has attacked the posterior urethra. The extension of the disease may be marked by a chill and rise of temperature followed by pain in the testicle and cord, often very severe, and a rapid swelling of the epididymis. This usually remains stationary for several days, and then finally subsides, often leaving, in the head of the epididymis, a nodule which remains permanently. This condition is serious, inasmuch as it frequently blocks the vas deferens, and when it occurs on both sides it may render the victim sterile. During the acute attack the patient should rest in bed, and to this he readily assents. The application of poultices, painting the tumor with a ten-per-cent. solution of silver nitrate, or lightly brushing it with the white-hot cautery, care being taken not to burn the skin, are all useful in quieting the inflammation. The addition of a handful of fine-cut tobacco to the poultices is considered of value by many practitioners.

**Folliculitis.**—The minute glands of the urethra frequently become inflamed, forming small round tumors which open spontaneously through the skin or occasionally into the urethra. They should be treated by hot applications or by the inunction of mercurial ointment; or, if suppuration occurs, they should be opened and the cavity washed out with an antiseptic and packed with gauze.

**Cowperitis.**—The glands of Cowper may be infected in the same way, and the treatment is the same as for folliculitis.

**Prostatitis.**—The prostate gland may also become involved during the course of an acute posterior urethritis. The inflammatory process may be either follicular or diffuse. In follicular prostatitis the diagnosis is exceedingly difficult as the symptoms are identical with those of posterior urethritis. Examination by the rectum usually indicates small points of induration and tenderness on pressure. When the inflammation is diffuse, however, the symptoms are much more characteristic. In addition to the frequency of urination, perineal pain, and tenesmus, there is a feeling of fulness in the rectum, with pain on defecation, and occasionally ribbon-shaped feces are passed. The finger in the rectum detects a throbbing, hot, tender tumor, the prostate, which may attain the size of an orange. Fever is usually present.

As a rule, resolution takes place under treatment, but suppuration may occur. In the latter event the patient will have a chill and there will be a marked rise of temperature; occasionally, also fluctuation may be felt in the tumor through the rectum. If not treated surgically the abscess may burst into the urethra or the rectum, or through the perineum. At times it will open into both urethra and rectum, leaving the patient with the horrible condition of recto-vesical fistula; or the pus may burrow between the layers of the pelvic fascia, and so cause

septicæmia and death. The treatment of this condition is by hot rectal enemata, the application of leeches to the perineum, and hot sitz baths three or four times daily, the vesical tenesmus being relieved and controlled by the

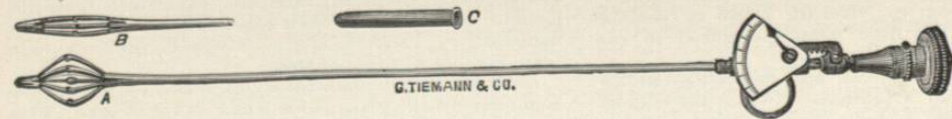


FIG. 2344.—Otis Urethrometer. A, Widely open; B, closed; C, protecting cap.

use of opium. When suppuration takes place the pus should be evacuated through a perineal incision and drainage established.

**Vesiculitis.**—Inflammation of the seminal vesicles occurs with greater frequency than has until recently been supposed. The symptoms are a feeling of weight and throbbing pain at the neck of the bladder, sexual hyperæsthesia, priapism, and seminal emissions. Exploration by way of the rectum reveals the fact that the vesicles are tender and swollen. Treatment is the same as for prostatitis.

**Cystitis.**—The gonorrhœal process rarely attacks the bladder proper, the inflammatory process being usually limited to the neck alone. When such an extension does take place, however, the results may be of a serious character. The cystitis, for example, may become chronic, or the inflammation may invade the connective tissue and muscular layers (parenchymatous cystitis), rendering the patient permanently disabled. After the acute symptoms have passed off, the bladder may be washed with only the mildest solutions, as boric acid in saturated solution, nitrate of silver, or potassium permanganate 1 to 6,000. At the same time urotropin should be administered internally.

**Pyelitis.**—This is a rare complication of gonorrhœa, but occasionally it does occur and may result in the loss of the kidney, though as a rule recovery finally takes place. The diagnosis can be made only with the microscope. Treatment: rest in bed, dry cups, hot fomentations and poultices over the region of the kidney, and the administration of diuretics and urinary antiseptics.

**Gonorrhœal Rheumatism.**—During the course of a gonorrhœa one or more joints may be affected and should be treated by the usual methods employed in synovitis. In rare instances the peritoneum, pericardium, or other distant organs may be invaded. For a detailed account of this complication consult the article on *Gonorrhœal Arthritis*.

**CHRONIC GONORRHŒA.**—When the discharge has lasted for a period longer than two months its continuance is due to the presence of some pathological condition in the urethra. As a rule, this will be found in the presence of stricture, a contraction of the meatus, or in localized infiltrated granular patches which fail to heal. The rôle which the gonococcus plays in the production of these infiltrations has been disputed, but in all probability it penetrates the deeper tissues and is the direct cause of the inflammatory deposit which subsequently becomes organized cicatricial tissue. Strictures which encroach so little upon the calibre of the canal as not to interfere in the slightest degree with its physiological functions are at the same time perfectly capable of indefinitely continuing a discharge once established, and are exceedingly apt to be overlooked by the surgeon. In a minority of cases of chronic gonorrhœa no stricture will be found to be present, the discharge being prolonged by the involvement of the sinuses and glands of the urethra, which are much more numerous and of greater depth than is generally recognized; by the presence of small neoplasms; by the involvement of the seminal vesicles; by the general condition of the patient; or, finally, even by a mixed infec-



FIG. 2345.—Ultzmann's Syringe.

tion of the tubercle bacillus. The discharge may be exceedingly profuse, or it may be so slight as to remain unnoticed by the patient, appearing only in the form of a single drop in the morning, or it may appear only in the form of threads and strings in the urine. These threads, the so-called "Tripper Faden" of the Germans, consist of separate masses of purulent secretion exuding from the granular patches. Upon being washed out by the stream of urine, these masses are rolled up in the form of threads and appear as such floating in the urine. They consist of transparent cylindrical masses in which corpuscles and a few epithelial cells are embedded. The more compact these fibres appear the more pus they contain, but if they are transparent they consist for the most part of urethral epithelium with but little pus. The more epithelium there is in these threads the nearer the process is to a cure. The threads, which are principally composed of mucus and epithelium, have a tendency to float, while those composed chiefly of pus sink rapidly to the bottom of the glass.

Some authors hold that the location of the lesion can be diagnosed by the form of the threads. If they are short and thread-like, they are supposed to be formed in a gland duct; if long and thick, to arise from the urethra itself; and if short and lumpy, to come from the prostatic urethra. As they are in reality formed by the stream of urine washing out and rolling up into threads the secretion which originally had a flat, plate-like form, it is evident that we can form no satisfactory opinion, simply from their external appearance, as to what portion of the urethra they come from. When the microscope shows the presence of spermatozoa embedded in the substance of the thread, the probability is that it originated in the posterior urethra.

It is very important to locate the position and determine the character of the lesion upon which the continuance of the discharge depends. As has been said before, the most frequent cause is a urethral stricture, the presence of which may be determined by the use of the urethrometer or by means of graduated bulbous bougies.

The presence of areas in which a granulating or ulcerative process is going on, or of a neoplasm, can be definitely determined only by the use of the urethroscope, so that this instrument is exceedingly valuable in the diagnosis as well as the treatment of chronic urethral discharges.

**Treatment.**—No matter in what portion of the canal the disease may be located, the first indication for successful treatment is to remove all mechanical obstacles which stand in the way of a cure. All pathological narrowings should be divided by means of dilatation and urethrotomy combined, although in recent cases dilatation alone will often prove sufficient.

In the subsequent treatment injections similar to those

employed in acute urethritis may be used, but they may be of greater strength and need not be used with so great frequency.

As in most cases of chronic gonorrhœa the posterior urethra is also involved, it will be found necessary to treat the entire urethra. This is best done by means of irrigations, in which the bladder is filled with fluid through a catheter, which is then removed and the pa-

tient allowed to eject the fluid in the same manner as if he were urinating; or the bladder may be filled without a catheter by the use of an irrigator and urethral nozzle as described in the treatment of acute posterior urethritis. The solutions best adapted are protargol, one per cent.; nitrate of silver or permanganate of potassium, 1 to 1,000.

When the posterior urethra is alone involved instillations of solutions of the nitrate of silver, of from five to ten per cent. strength, are very useful, from five to fifteen minims being introduced by means of the Ultzmann drop syringe.

A favorite method of treatment by Professor Ultzmann is the daily passage of a sound large enough to fill completely the urethra, the instrument being allowed to remain *in situ* for several minutes. These sounds should not be lubricated with vaseline or other oily substance, but with lubrichondrin, glycerin, or other substance which is soluble in water, as this mode of employing sounds is to be immediately followed by irrigation. In carrying out the latter procedure the patient should first be placed in the recumbent position, and then a short catheter—one that will reach only a short distance into the posterior urethra—should be introduced its full length. The syringe (capacity, 5 or 6 ounces) having previously been filled with the remedial solution, should next be connected with the catheter by means of a bit of soft india-rubber tubing. Then the fluid should be injected slowly into the urethra and on into the bladder.

If the latter easily contains a large amount of fluid the syringe may be filled a second and even a third time. It will be known that the catheter is in the correct position if the fluid flows easily into the bladder and does not run out of the catheter when the syringe is removed; for if the instrument extended no farther than to a point in front of the compressor the fluid would flow back along the sides of the catheter and come out at the meatus. When the method described above is carried out successfully, the posterior urethra receives a double washing: first, by the introduction of the fluid through the catheter, which is provided with several slit-like openings instead of a single eye; and secondly, when the patient expels the large amount of fluid which has been introduced into the bladder.

The solutions used by Ultzmann and which are very efficacious are based on an ascending scale. He employs them in the following manner:—

First day, a solution of zinc sulphate, alum, and carbolic acid, each one part, to one thousand parts of water; second day, the same, 1 to 500; third day, permanganate of potassium, 1 to 2,000; fourth day, permanganate of potassium, 1 to 1,500; fifth day, permanganate of potassium, 1 to 1,000; sixth day, nitrate of silver, 1 to 2,000. The silver is strengthened in the same ratio as the permanganate of potassium, not being used in greater strength than 1 to 1,000.

I give this graduated method of Professor Ultzmann which has been standardized by him, and which has proved most serviceable in my hands, although I am inclined at present to substitute some of the later silver preparations for some of the solutions used by him. One of the great advantages of this method is the definite rule of progression, which allows the patient to become used by degrees to the increasing strength of the remedies employed. This rule should not be too closely adhered to, however, and if the patient complains greatly at any time, the progression should be made more gradually.

After one has reached the higher solutions of the silver nitrate, in carrying out the plan just described, it is well to resort to the instillations into the deep urethra as before described. They may be repeated advantageously on every second or third day.

**The Urethroscope.**—One of the most satisfactory meth-

ods of treating the lesions of chronic urethritis is by making direct applications to the diseased urethral mucous membrane by means of the electro-urethroscope. Within the last few years this instrument has been so simplified and improved that it can no longer be regarded as being for the use of the specialist alone, but should form a part of the armamentarium of all those who undertake the treatment of diseases of the urethra.

At the same time a certain amount of practical experience is necessary in order to recognize the various pathological conditions encountered, and this can be acquired only by the actual use of the instrument, as no amount of description can more than indicate the exact appearances of the urethral field.

The tube used should be the largest which will pass the meatus, and occasionally it will be found necessary to divide the latter in order to pass an instrument which will give a satisfactory view. This should be done, if possible, a week or so before the urethroscope is used, so that time is allowed for healing to take place. When this cannot be done it is often feasible rapidly to dilate the meatus with solid sounds sufficiently to allow the passage of the urethroscopic tube without bleeding.

If the anterior urethra alone is to be examined, one of the shorter tubes should be chosen, lubricated for its entire length with lubrichondrin or glycerin, and gently passed on as far as to the bulbo-membranous junction. The tube should be held between the index and middle



FIG. 2346.—Otis Urethroscope.

finger of the right hand below the disc, the thumb pressing firmly on the handle of the obturator to prevent its being displaced. The left hand grasps the glans penis between the index finger and thumb.

The greatest possible gentleness is necessary in order to avoid bleeding which obscures the field and is most annoying. The end of the tube having reached the bulbo-membranous junction the obturator should be withdrawn, the illuminator fastened to the tube, the light turned on, and the instrument slowly withdrawn. In this way the entire anterior urethra may be carefully observed bit by bit.

Blood or discharge at any point should be removed with the swab, and applications can be made to any diseased areas which may appear in the field.

The examination of the deep urethra is an exactly similar procedure, except that it is necessary to pass the triangular ligament with a straight instrument, and therefore somewhat greater skill will be needed on the part of the operator.

In conclusion I may state that the urethral mucous membrane is exceedingly delicate and resents any but the most gentle advances, and that it is especially necessary to remember this when contemplating any instrumental procedure. For this reason, moreover, it is not infrequently the case that we see obstinate chronic discharges which owe their continuance to over-treatment, and which would get well if left entirely alone. It is also well to remember that the urethra may become tired of any one form of treatment if too long continued and that a change is frequently necessary if a cure is to be effected. *William K. Otis.*

**GONORRHŒAL ARTHRITIS.**—(Synonyms: Gonorrhœal Rheumatism; Gonorrhœal Synovitis; Blennorrhagic Rheumatism.) The term "rheumatism," as applied to this disease, is objectionable, implying a relation to ordinary rheumatism which does not exist.

**DEFINITION.**—Gonorrhœal arthritis is inflammation of a joint or of joints, due to the gonococcus of Neisser.

**PATHOLOGY.**—Gonorrhœal arthritis is to be regarded as

one of the commonest manifestations of a general infection of the circulating medium with the gonococcus or its toxins. Other manifestations are endocarditis, myositis, disease of the tendons and fasciæ, and of the eye. According to Taylor, it is probable that septic absorption in urethritis does not take place until the infection has reached the posterior urethra. The gonococcus has been cultivated from the blood, first, I think, by Hewes in 1894, and later by Welch. Gonorrhœal arthritis, then, always implies infection of the circulating medium.

The joints show varying degrees of inflammatory change. There is first a simple synovitis with more or less fluid—serous or sero-fibrinous. Later the fluid may become purulent. The process tends strongly to extend to the fibrous and ligamentous structures about the joint, resulting in a peri-arthritis. Adjacent bursæ and tendon sheaths are very commonly involved.

Bacteriological studies, by the microscope and by cultures, give varying results. The gonococcus may be found alone or pus organisms may be found alone—the latter in cases with purulent exudation. The fluid may contain both gonococci and pyogenic microbes, or it may be sterile. It is probable that the gonococcus is always present at first and that there may be a simultaneous or, more often, subsequent infection with pus organisms. In the cases in which no organisms are found, it is probable that the gonococci have early disappeared. In some such cases the arthritis may not be due to gonorrhœa at all. Some cases may be due to the toxins of the disease, without any bacteria, like the joint affection following the use of diphtheria antitoxin. But probably in most cases the gonococcus is at some time present in or about the joint.

As a result of severe and protracted cases fibrous adhesions are prone to result. There may be almost complete fibrous ankylosis. This is especially apt to occur as a result of repeated attacks of arthritis from repeated reinfections of the urethra, or when the joint has been long immobilized. Changes resembling those of chronic rheumatoid arthritis may result. Nearly every joint in the body may be permanently damaged.

ETIOLOGY.—Enough has already been said in speaking of pathology to indicate the etiological relationship of the disease to the gonococcus. It is always a sequel of local infection with this organism—usually urethritis. It has also resulted from vulvo-vaginitis in children and from gonorrhœal infection in which no urethritis existed, as in ophthalmia neonatorum.

No age or sex is exempt, but it occurs most commonly in adult males—in other words it is commonest where gonorrhœa is commonest. Exposure to cold and trauma act only, if at all, by increasing susceptibility. Individual susceptibility varies greatly. Some men have it with every new gonorrhœa. Others, the majority, never have it at all. Persons subject to ordinary rheumatism or having the rheumatic diathesis do not show any special susceptibility.

DISTRIBUTION.—Arthritis occurs in about ten per cent. of all cases of gonorrhœa (Taylor). The commonest site is the knee, and next the ankle, wrist, fingers and toes. While it is commonest in the larger joints any joint may be involved—even the jaw, chondrocostal, intervertebral, sacro-iliac, sterno-clavicular, and crico-arytenoid. In about forty per cent. of the cases but one joint is involved. But it may be polyarticular, and in fact a single attack may involve nearly every joint in the body.

SYMPTOMS.—The disease may begin in almost any stage of gonorrhœa, most commonly about the fourth week. According to Taylor it seldom begins in acute gonorrhœa earlier than the second or third week, when the posterior urethra is involved. It may be delayed for months, till the urethritis has run on into a chronic gleet.

The onset is rapid—beginning with slight pain and stiffness. Premonitory fever and malaise are rarely present. As a rule general symptoms are mild throughout. Fever is slight in most cases. Rarely there is delirium or profound sepsis. Sweating is not a prominent feature. As the case goes on anæmia and debility are marked, espe-

cially when there have been unusual pain and confinement.

When the inflammation is at its height the appearance of the joint is quite characteristic. There is much swelling, due to fluid in the joint cavity and to edema of the surrounding soft parts. Owing to the tendency of adjacent bursæ and tendon sheaths to share in the inflammation the swelling often extends up and down the limb for a considerable distance. There is not often great redness and the tenderness is usually less than in ordinary acute rheumatism. So, where the distribution is such that locomotion is not prevented, many cases are treated as hospital out-patients. Pain varies greatly: it may be almost lacking, so that the patient complains mainly of stiffness, or so severe as to prevent sleep and require morphine.

The course of the disease is slow and tedious. Once involved, the joint usually remains so till the case is over—there is no marked tendency to jump about from joint to joint. A large joint seldom recovers in less than from four to six weeks. The acute process may subside and leave a hydro-arthritis lasting for months in spite of all treatment. In some cases complete resolution may never occur, the joint remaining more or less ankylosed.

In the so-called arthralgic form of gonorrhœal arthritis there occur, in the course of a gonorrhœa, fugitive pains in the joints and muscles, without any active inflammatory process. The symptoms may be very persistent.

When the joint becomes infected with virulent pus bacteria the case becomes like any purulent arthritis. Fortunately this is not common. If prompt surgical relief is not afforded, and there is a general infection, such a case shows the symptoms of pyæmia—chills, irregular fever, progressive asthenia, and death.

Relapses do not occur unless there is a new urethral infection. One attack does not confer immunity. Indeed, some individuals seem to have it nearly every time they get the clap.

COMPLICATIONS.—Bursitis and teno-synovitis are not uncommon. Involvement of the muscles, and of the fasciæ, especially of the palm and sole, sometimes occurs. The eye may be involved by means of organisms or toxins brought by the blood, a condition to be distinguished from the gonorrhœal conjunctivitis due to infection from without. Endocarditis and general infection with the gonococcus or with pus organisms is a very serious complication.

DIAGNOSIS.—Gonorrhœa is common, and so are other forms of arthritis. Therefore even when joint inflammation occurs in the course of a urethritis it does not follow that the disease is gonorrhœal arthritis. The diagnosis can be made with absolute certainty only when the gonococcus is recognized in the fluid from the joint cavity. The distinguishing clinical features of the affection are the tendency to involve one or a small number of joints; its persistent character, long duration, and failure to jump from joint to joint; the usually slight general disturbance, the fusiform character of the swelling from the tendency to invasion of tendon sheaths, and the association with other manifestations of gonorrhœal infection.

Ordinary acute articular rheumatism usually involves many joints, shifting about from one to the other, the first ones recovering as others become involved. There are more elevation of temperature and greater redness, pain, and tenderness than in the gonorrhœal disease, and the bursæ and tendon sheaths are not apt to be invaded. These characters, together with the effects of treatment, explain why it is rarely mistaken long for gonorrhœal arthritis, even when coincident with gonorrhœa.

Long-continued cases may give rise to a suspicion of tuberculosis, especially when the joint in question is the hip. Gout and simple or traumatic synovitis should also be mentioned. In purulent cases it is of little moment whether the disease is the result of gonorrhœa or not, as the course and treatment are identical.

PROGNOSIS.—Complete recovery is the rule. But the disease is an obstinate one and the treatment is not satisfactory. There is often danger of ankylosis, especially

when the condition is recurrent. The patient should be warned that a new gonorrhœa is likely to mean a new arthritis, and that each new arthritis is likely to leave the joint in a less perfect condition than before. When the inflammation is purulent and associated with endocarditis from mixed infection with the streptococcus the prognosis is of course unfavorable.

TREATMENT.—It is of the first importance to remedy, by measures adapted to the individual case, the primary gonorrhœal focus. According to Taylor especial attention should be given to the posterior urethra.

Salicylates and alkalies are of no value in gonorrhœal arthritis. Yet on the chances of an error in diagnosis the writer is of the opinion that in many cases a vigorous trial should be given them—on the principles laid down for ordinary acute rheumatism. Potassium iodide has been much used, but is probably devoid of any specific action. The same may be said of quinine and methylene blue. Probably iron, arsenic and other tonics, together with fresh air and plenty of good food, are the best general measures.

During the acute stage the patient should be kept in bed and the part at rest. If pain is severe it may be relieved by an ice-bag. Immobilization by splints or plaster usually gives great relief. But immobilization should be as brief as possible, owing to the danger of ankylosis. Later on, "baking" the joint in hot, dry air or counter-irritation by means of tincture of iodine, vigorous blistering, or the cautery may hasten resolution. If ankylosis threatens massage and passive motion are indicated after the acute process has subsided.

If the effusion persists the joint may be aspirated with or without the subsequent injection of corrosive sublimate solution 1 to 2,500, carbolic acid 1 to 50, or iodoform emulsion. This should of course be done under the most rigid antiseptic precautions. It may be repeated if necessary. It has given excellent results in competent hands. For suppurative cases prompt and vigorous surgical measures are demanded. *Ralph C. Larrabee.*

GORDON SPRINGS.—Lake County, California. These springs lie in Cobb's valley, about half-way between Calistoga and Lakeport. They are romantically situated in the heart of a mountain and forest region. The climate is very fine. The location is about 3,000 feet above the sea-level. The principal spring flows about 300 gallons of water hourly, having a temperature of 100° F. The waters are sparkling, alkaline, and have antacid and aperient properties. Following is Winslow Anderson's analysis:

ONE UNITED STATES GALLON CONTAINS:	
Solids.	Grains.
Sodium chloride.....	20.75
Sodium carbonate.....	3.19
Sodium sulphate.....	8.62
Potassium carbonate.....	.73
Magnesium carbonate.....	6.14
Magnesium sulphate.....	10.93
Calcium carbonate.....	11.16
Calcium sulphate.....	23.46
Alumina.....	3.55
Silica.....	2.27
Organic matter.....	Trace.
Total solids.....	90.80
Carbonic acid gas, large excess.	

The waters have considerable reputation in chronic albuminuria and in cystitis; they are also valuable in acid dyspepsia. A pleasant resort has been established, and it is worthy of remark that persons suffering from chronic bronchitis, catarrh, asthma, and the early stages of consumption do well at this eyrie among the pines. *James K. Crook.*

GOSSYPIUM. See *Cotton*.

GOUDOU. See *Henpuye*.

GOUT.—The exact nature of gout is still unknown. One might with honesty begin a description of it as Sydenham did more than two hundred years ago: "Either

man will think that the nature of gout is wholly mysterious and incomprehensible or that a man like myself who has suffered from it thirty-four years must be of a slow and sluggish disposition not to have discovered something respecting the nature and treatment of a disease so peculiarly his own. Be this as it may, I will give a *bona fide* account of what I know. The difficulties and refinements relating to the disease itself and the methods of its cure, I will leave for time, the guide to truth, to clear up." Numerous hypotheses are described for the consideration of students of the subject, and our knowledge of the malady has greatly increased since Sydenham wrote, but its mystery has not yet been fathomed.

Gout has been recognized as a malady from the earliest times. It was well described by Hippocrates (350 B.C.). Five hundred years later Galen ascribed its origin to noxious substances as "black bile," "blood," or "phlegm" about the joints. He believed the tophi were produced by their consolidation.

In the middle ages, according to the prevailing theory, the disease was believed to originate from "tartar," which was supposed to come from wine that had been drunk and which formed incrustations about the joints, like those found in wine casks. This theory was disproved when Schule (1776) showed that tophi were composed of urates.

Gout has been thought contagious. This was the belief of Boerhaave. Cullen advocated a nervous origin for the malady. In 1848 Garrod's thesis on "The Blood and Urine in Gout, Rheumatism and Bright's Disease" established the existence of an excess of urate of sodium in the blood and ascribed to it a causative relationship to the malady. From that time to near the present a majority of pathologists and clinicians have regarded gout as due to an excess of uric acid in the blood, and they have described those prone to it in its typical or irregular forms as of the uric-acid diathesis.

As our clinical knowledge of gout is comparatively perfect, it seems best, therefore, to describe its symptoms first and to consider its nature, causation, prophylaxis, and treatment later. Cases of gout are clinically placed in three groups: (1) Acute gout; (2) chronic gout; (3) irregular gout.

ACUTE GOUT.—Premonitory symptoms are commonly observed. They are usually those of gastric indigestion, such as flatulence, sourness of the stomach, a feeling of fulness in the epigastrium and constipation, or irritability of temper, restlessness at night, dull headache, or melancholia. Twinges of pain in the small joints of the feet and toes are often felt for several days before the acute attack occurs.

Acute gout commonly makes its onset in the early morning hours, the patient awakening with intense pain in the metatarso-phalangeal joint of one big toe, oftenest the right. The pain is severe but becomes more intense during the next two or three nights. It is described as a sensation of squeezing. The feeling is as if the toe were in a vice. Throbbing, burning, and sometimes a lancinating pain, are also complained of. At first the veins about the affected part are unusually prominent. Soon, however, the joint swells uniformly and the skin becomes slightly red and glossy. It is exquisitely tender, so that even the weight of the bed-clothing is a source of increasing distress. The slightest motion of the joint also elicits a cry of anguish from the sufferer. Bodily temperature is increased, often only a little, sometimes to 102° or 103° F.

Often such attacks of podagra begin with a chill, or at least with chilly sensations and rise of temperature. After daybreak the pain subsides, fever lessens, and the patient may doze for a time. Although the intense pain is less, the swelling remains in the affected joint and it is kept immobile because of the pain which movements of it provoke. Toward night the symptoms again become more intense. So long as the attack lasts each night is made sleepless by an aggravation of the characteristic symptoms of the malady. Patients therefore become greatly wearied, even much debilitated by sleeplessness,