I.

PUS ARISING FROM THE URETHRA IN THE PART CONTAINED BETWEEN THE MEATUS AND THE COMPRESSOR URETHRÆ.—URETHRITIS.

This form of suppuration comprises the varieties of urethritis *per se*. The characteristic of this suppuration consists in the fact that the purulent catarrhal secretion is passed out with the urine and also spontaneously escapes from the meatus in the intervals of urination, discoloring the linen more or less, according to the intensity of the secretion. Suppuration in the urethra in this region alone, as far as the compressor, is never accompanied by tenesmus, or an almost uncontrollable desire to urinate. The patients urinate about as often as normally, and only perceive (especially in acute cases) a severe smarting sensation while the urine is passing along the urethra. Moreover, in acute cases of urethritis the mouth of the urethra is usually swollen and reddened, while in chronic cases, on the contrary, such an alteration is seldom seen at the meatus. As long as the purulent secretion of the urethra is more profuse, we invariably find the pus escaping as a drop from the meatus. If, on the contrary, the secretion is scanty, as in chronic urethritis, we usually see no secretion at all by external inspection. In order to see the secretion in such cases, we press the urethra from behind forward. In many cases we obtain a drop in this way. If, on the contrary, the secretion is

thicker, more tenacious, and clings to the affected parts of the urethra more firmly, it may not be possible to detect the presence of secretion in this way. In such cases nothing remains but to have the patient urinate. The stream of urine, if much of any be in the bladder at the time, issues with considerable force, and, by reason of its friction with the urethral walls, washes off the purulent secretion, the coating of the diseased portion, and thus carries it out of the penis. At the same time, this membranous coating will be rolled up into a little thread, the so-called gonorrhœal threads or fibres, and thus eliminated. That this secretion of the urethra, called the "gonorrhœa thread," or pus-fibre, does not exist as such ready formed in the urethra, is shown by endoscopic examination of the latter, by which we find the coating simply clinging to the affected part, never free in the form of a thread. Gonorrhœal or pus fibres are of constant occurrence in a urine. These are to be distinguished from small portions of semen or mucus, which are likewise not infrequently found in urine, by the fact that they appear much more compact, and, by reason of their greater specific gravity, sink quickly to the bottom of the glass when urine is passed, while constituents like mucus or semen float about in the urine for some time as a light transparent cloud, at first incline more toward the surface, and later sink to the bottom. If we take up one of these things with a pair of fine forceps and place it under the microscope, then we can always tell whether the same consists of mucus, semen, or of purulent secretion. There is no other way to determine the quality of these small floating clouds or threads than by the microscope. We can only say that the secretion floating about in the urine as compact threads probably represents a purulent secretion. It

was formerly generally believed that the pus or gonorrhœal threads occurred *as such* in the urethra, and conclusions were drawn (which were thought correct) as to the part of the urethra in which they originated, from their form, length, and thickness. If the fibres were short and equally thread-like throughout, they were supposed to represent a cast of a gland-duct; if they were long, thick, and cylindrical, they were supposed to arise from the lumen of the urethra itself; and if the threads were short, lumpy, or ragged, or had fringe-like appendages, they were thought to come from the pars prostatica. Since we know to-day that these fibres are a product of the stream of urine, this reasoning, of course, falls to the ground. We can only say that larger and thicker threads come from a greater, smaller and thinner threads from a less affected portion of the urethral mucous membrane. Further, we can say that the thread-like gonorrhœal fibres for the most part come from the anterior urethra as far as the compressor urethræ muscle, and the broad, lumpy, and ragged affairs more often from the posterior part of the urethra, from the prostatic portion. This way of reasoning is not always free from error. It is only when, by microscopical examination, in addition to the pus-corpuscles, we also find spermatozoa imbedded in the gonorrhœal fibres, that we can say, with the greatest probability, these originate from the most posterior portion of the urethra.

Seen through the microscope, the pus or gonorrhœal fibre consists of a transparent cylindrical mass in which are imbedded numerous pus-corpuscles and a few urethral epithelial cells. The more compact such a fibre seems, the more pus-cells it contains. If, on the contrary, the thread-fibre is delicate and transparent, it consists mostly of urethral epithelium and the pus-cells are

in the minority. The more the epithelium predominates in such a thread, the nearer the process is to a cure. Thus, the microscopic examination of these fibres has a certain significance in this respect. The suppuration of the urethra, as far as the compressor urethræ, is also dis-

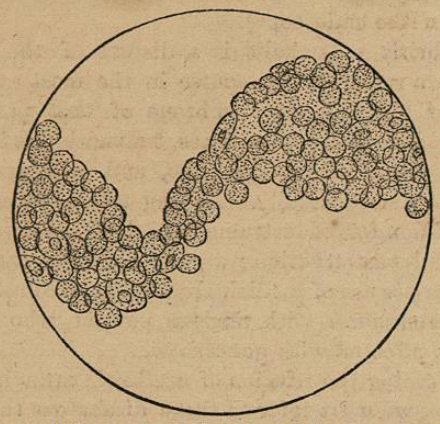

Fig. 2.—A so-called gonorrhœal thread, consisting of pus-corpuscles and urethral epithelium.

tinguished by the fact that when the patient urinates half his urine in one glass, the remainder in a second glass, only the first half will appear dim, while the second half of the urine will be found clear and transparent. That is to say, the urethra is freed from its secretion at the beginning of the urination, the urethra is completely washed out by the forcible stream, and consequently the secretion of the urethra is found in the first half of the urine, while, if no more secretion be present in the urethra, the urine passed later must appear always clear and transparent.

As already noted, this form of pyuria is found with

the various forms of urethritis. The milder kind of urethritis has its type in urethritis catarrhalis, the severer kind in urethritis gonorrhœica. It is not the aim of this sketch of pyuria to discuss gonorrhœa in detail. We will here give only so much as appears absolutely necessary to understand and treat chronic gonorrhœa (without the aid of the endoscope).

Urethritis catarrhalis is a disease of the urethra, which as a rule runs its course in the most superficial layers of the mucous membrane of that part. The exciting causes are sometimes traumatic and chemical influences, often dyscrasiæ, and diseases affecting the system generally. Among traumatic causes we may mention forced instrumental interference (catheterizing) and masturbation; among chemical causes, the inappropriate use of medicinal agents in the urethra, and sexual intercourse with unclean persons, who are not, however, affected with gonorrhœa.

Concerning the relation of urethritis catarrhalis to a dyscrasia, we must refer to those discharges that sometimes accompany tuberculosis and syphilis, and which resist all our efforts to cure, until we take the general systemic disease sufficiently into consideration. Often enough, gonorrhœal infection is combined with such a condition, and then the course of this form of urethritis is a very chronic and therapeutically, a most obstinate one, which only improves by simultaneously treating the general disease, and thus it sometimes finally gets well. The urethritis after trauma in catheterizing, after inappropriate intra-urethral local treatment, and after impure non-gonorrhœal sexual intercourse, is usually but of short duration; it often disappears after a few days if the hurtful influences be removed. The course of urethritis is not so rapid if it has arisen after masturbation has

been practiced continuously for years. In this case the urethritis yields only to an energetic local and instrumental procedure, both being carried on at the same time. The secretion of catarrhal urethritis is, as a rule, not purely purulent. It is, on the contrary, whitish or gray, and stains the linen with white spots which have rather a dark border and a central yellow point. Microscopically we find, it is true, many pus-cells, but at the same time the epithelium from the urethra is always found in large amounts. We not infrequently find such a urethritis in boys of ten or twelve years, if these are addicted to the vice of masturbation. It is very different with gonorrhœal urethritis. *Gonorrhœal urethritis* always constitutes, as compared with catarrhal urethritis, a more intense disease. In the first place, its normal course is a much longer one, and in acute cases seldom ceases before the fourth to the sixth week. Gonorrhœal inflammation of the urethra only occasionally attacks the most superficial layers of the urethral mucous membrane alone. The inflammatory irritation is more apt to extend deeper in certain places, and excites the submucous layers of the urethra to further inflammatory hyperplasia with a chronic course.

Thus, we not infrequently find, here and there, portions of the urethra affected with gonorrhœa infiltrated in its entire thickness, so that such an infiltration can be even felt by the finger. Not only the walls of the urethra are attacked by this inflammatory process, but in certain cases we find much peri-urethral infiltration, not only perceptible to the touch, but even visible as a swelling to the eye, and which often ends (if it becomes an abscess) by perforating the skin of the penis and evacuating its purulent contents. From this description it is clear that the gonorrhœal disease of the urethra is capa-

ble of getting into the deeper layers of the urethral walls, and that, in a chronic case, it may cause the most diverse alterations of the urethra itself. The superficial changes caused by the gonorrhœal process have been made accessible to the eye through the endoscope ; the deeper alterations, on the contrary, express themselves by metamorphoses of the urethral walls, sometimes taking up their entire thickness. The coats of the urethra become rigid, and since their elasticity is lost, they are together changed into a stiffer-walled, more rigid urethra, which has a slightly lessened calibre.

Otis first called our attention to these alterations in the urethra after gonorrhœa, and named them "strictures of wide calibre." A microscopic examination of urethras from individuals who have got well after a chronic gonorrhœa, generally shows two important and striking alterations. One concerns the epithelium, the other the submucous and urethral connective tissue. In isolated places the epithelium may often be seen in massive layers one over another, and show us what is called a heaping-up of the epithelium of the urethral mucous membrane; the submucous connective tissue appears also much thicker, there is more of it, and in some places it forms layers which occupy the entire thickness of the urethra.

This revelation of the microscope shows clearly enough, that as compared with the catarrhal urethritis, the gonorrhœal process is very apt to attack the deeper layers of the urethra, and there cause those alterations—the well-known consequences of gonorrhœa—strictures. Acute gonorrhœa begins at the extremity of the urethra, where the infection always takes place, and gradually extends backward from this place. In its usual course it stops at the compressor urethræ in the fourth or

sixth week, and in proportion as the disease concentrates itself in the back of the urethra, the anterior, first inflamed part gradually loses its very red look. If the gonorrhœa passes the boundary of the compressor urethræ, an abnormal course of the disease sets in, not unfrequently accompanied by prostatitis, cystitis, epididymitis, etc., and thus prolongs the duration of the gonorrhœa very considerably. Now, although the gonorrhœa gradually attacks the entire urethral mucous membrane, still there are particular favorite places where it is apt to linger in the chronic disease. These places are the physiological dilatations of the urethra, the fossa navicularis and the bulbar portion. Thus in both these places we find the consequences of chronic gonorrhœa (that is to say, strictures) most often and most strongly pronounced.

To sum up, purulent discharges from the anterior urethra (as far as the compressor urethræ) are characterized by the fact that, if the urine is passed into two glasses, only the first half will always be dimmed by flakes, fibres, or otherwise, while the second part of the urine remains clear and transparent ; and further by the fact that, in the intervals between acts of urination, the secretion escapes spontaneously from the meatus, or at least appears at this place, spotting the linen to a greater or less degree, since there is no muscle in the urethra between the compressor urethræ and the meatus to cut off the free exit of pus.