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The Male Urethra.

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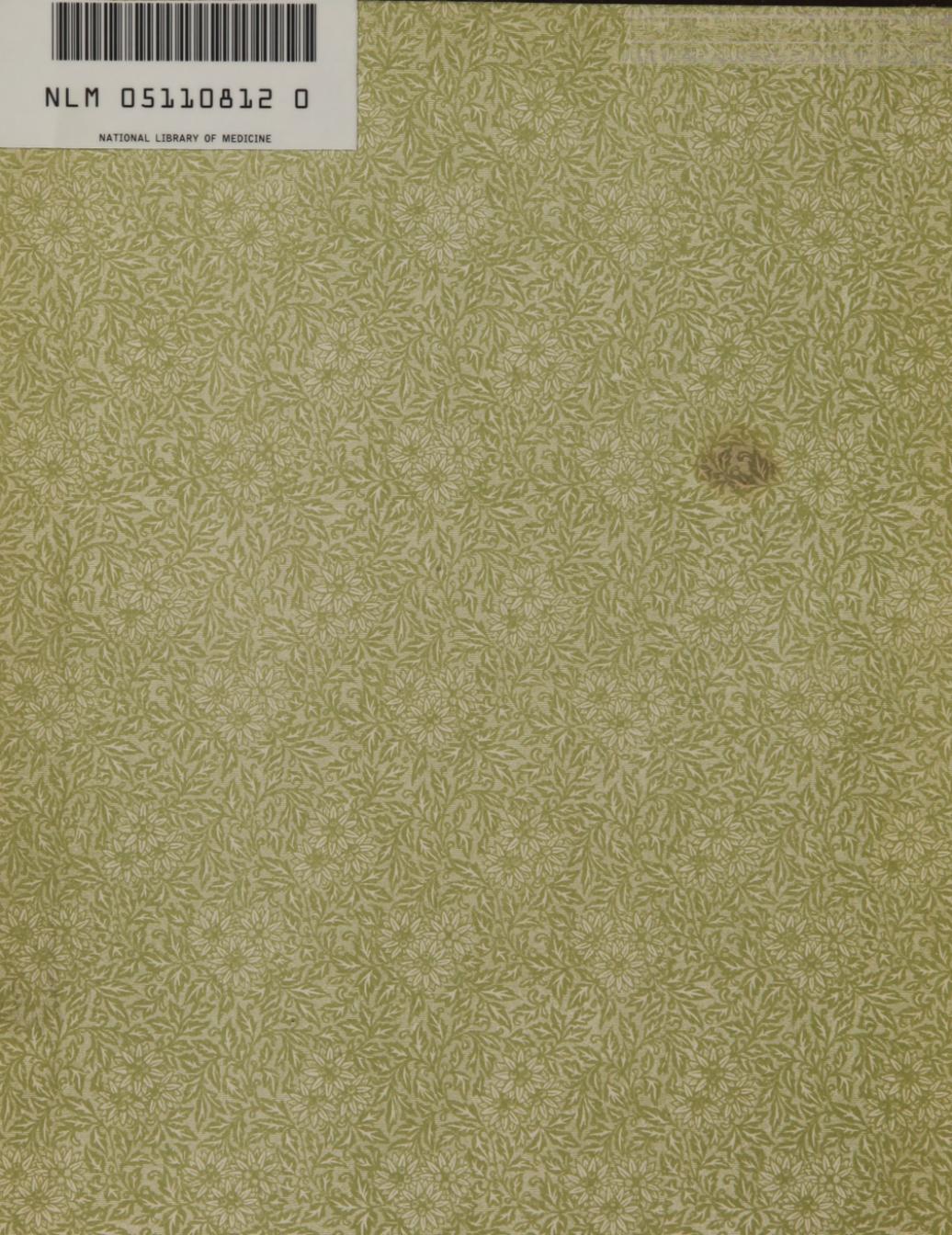
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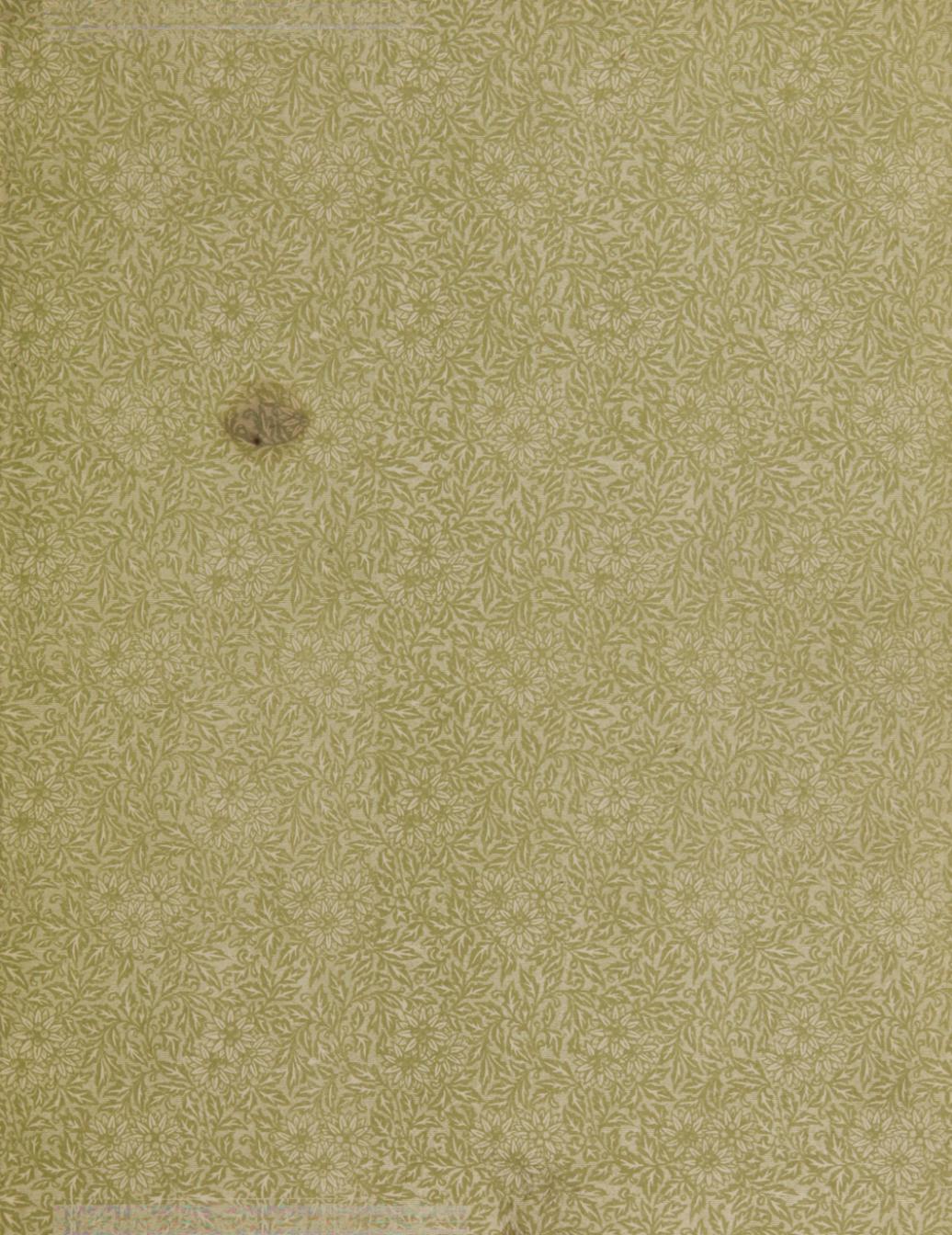
By Fessenden N. Otis, M.D.



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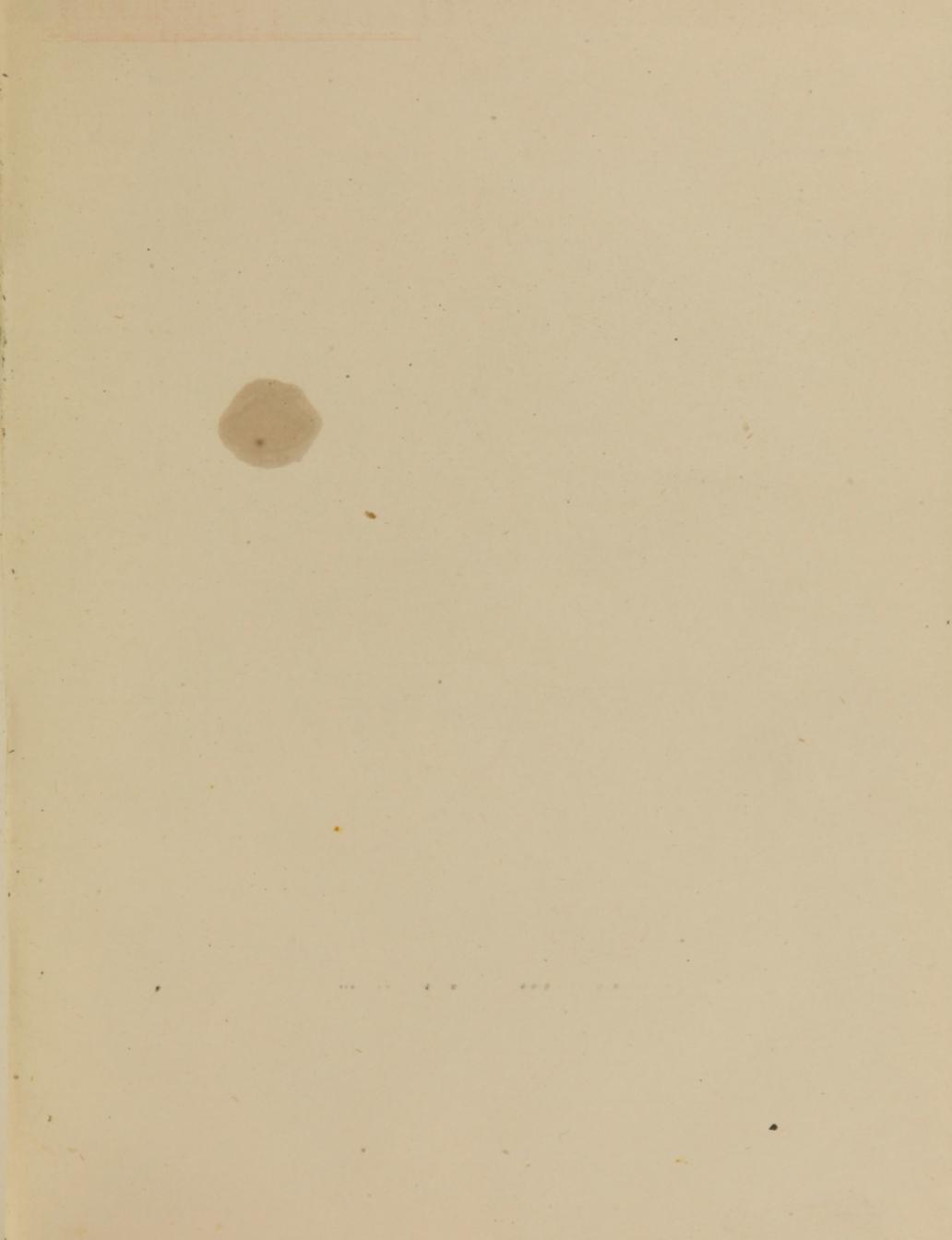
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*Dr. H. Baxter*  
*with regards of his friend*  
*the Author*

# THE MALE URETHRA,

ITS DISEASES AND REFLEXES.

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BY

**ANNEX**

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1888.

GEORGE S. DAVIS,  
DETROIT, MICH.

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## THE MALE URETHRA, ITS DISEASES AND REFLEXES.

### DESCRIPTION OF THE URETHRA.

The urethra is a tubular continuation of the bladder. Its functions are those of a common carrier for the urine and the seminal fluid, from their respective reservoirs (the bladder and the vesiculæ seminales), to their exit from the body. Its structure is similar to that of the bladder, being in point of fact an extension of its mucous coat and of its muscular layers, (the latter in somewhat varying degrees of density) composed of non-striated or involuntary and of striated or voluntary muscular fibres. The former are chiefly found surrounding the urethra at its commencement or junction with the bladder (the so-called vesical neck) and constitute the internal sphincter of the bladder. These fibres permeate and encircle the prostate, through which the urethra passes for the first inch and a quarter of its course. This, the prostatic portion of the urethra, is of especial interest as the locality of the seminal ducts and the muscular apparatus which is concerned in giving the proper direction and force to the seminal fluid. The floor of the canal is occupied by an elevation or ridge formed of fibrous and erectile tissue, in the centre of which, a depression occurs, and, at its margin on either side, are seen the slit-like openings of the ejaculatory or seminal ducts.

This depression, about a quarter of an inch in width, is continuous with a short canal or cul-de-sac, studded with racemose glands and lined with squamous epithelium, and is the alleged analogue of the uterus in the female. It is chiefly important in a practical point of view as capable of engaging the point of an instrument in its passage into the bladder, of furnishing a possible lodgment for small calculi, and as being the point of origin for fibrous growths which are claimed to result from its homology with the uterus. The complete investment this portion of the urethra, and permeation of the prostate with non-striated muscular tissue, plays an important part in the retention of the urine in the bladder, and in the forcible discharge of semen through the urethra. The urethra is strongly stayed in its position by the deep perineal fascia which is so arranged that the urethra passes through one layer, the posterior, at a point which coincides with the apex of the prostate, while the anterior layer, separated about three-fourths of an inch from it is also traversed by it in a similar manner. These two layers of the deep fascia, constituting the triangular ligament, thus enclose that important part of the urethra known as the membranous portion, the *pars muscularis*, so called from the strong muscular surroundings of the canal at this point. Chief among these are the compressores urethræ, two small striated muscles which are attached to the ischio-pubic bones, one above and one below, which on contraction com-

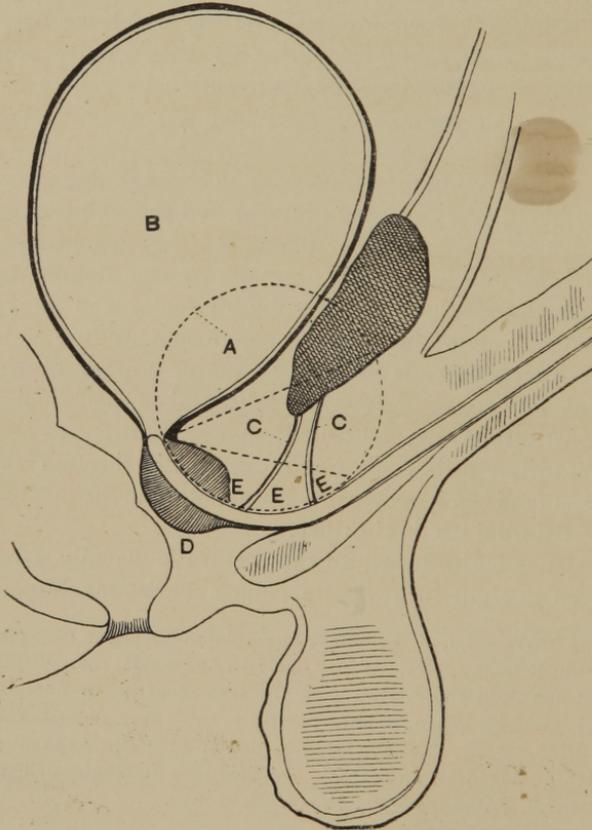
press the urethra between them so that the stream of urine is arrested at will. Besides these are numerous, circular, non-striated muscular fibres immediately surrounding the membranous urethra, which are also capable of arresting the urine by their contraction, and of producing involuntary retention as well as obstruction to passage of instruments, through reflex irritation.

The urethra after thus passing through the prostate gland (the prostatic urethra), and through the two layers of the triangular ligament (the membranous urethra), still invested to a greater or less degree by non-striated muscular fibres, both circular and longitudinal, enters the corpus spongiosum urethræ within which it extends along the inferior aspect of the penis a distance of four to four and a half inches (constituting the so-called spongy portion of the urethra), and thence for about an inch through the glans penis to its extremity, terminating in the meatus, the external urethral orifice.

The entire length of the urethra is usually from seven to eight inches. Its calibre varies much more

NOTE.—Dr. F. Esmarch, in an elaborate paper on Spasmodic Stricture, says: "My experience enables me to state that spasm of the urethra is an affection occurring frequently, and it is also often, if not principally, the cause of retention of urine. \* \* \* Even a minor degree of urethral spasm is often mistaken for stricture." See also Otis on Genito-urinary Diseases, Putnam's Sons, New York, p. 470.

DIAGRAM OF THE DEEP URETHRA—SHOWING THE  
" SUBPUBIC CURVE.



A. THE SUB-PUBIC CIRCLE. E. E. E. THE SUB-PUBIC CURVE.  
C. C. LAYERS OF THE TRIANGULAR LIGAMENT.

than its length in different individuals, bearing (as a rule to which there are few if any exceptions) a relative proportion to the circumference of the penis with which it is associated. Thus in the measurement of one hundred consecutive cases of supposed healthy urethra by the author (in 1874) the average calibre was found to be about 32 millimetres in circumference, and the average circumference of the penis was found to be  $8\frac{5}{10}$  centimetres or  $3\frac{1}{4}$  inches.

See Otis, on Stricture of the Male Urethra, its Radical Cure. Putnam's Sons. 1887.

#### COURSE OF THE URETHRA.

The course of the urethra in its fixed or sub-pubic portion is curved, and may for all practical purposes be considered as describing the arc of a circle three and a quarter inches in diameter (having its centre just below and behind the pubis), beginning an inch and a half anterior to the bulb and terminating at the vesical orifice. It is this so-called sub-pubic curve which is sought to be followed in adapting the form of all instruments intended for passage through the deeper or fixed portion of the urethra.\* The urethra anterior to this being pendulous may be made to assume any position best adapted to introduction of instruments. (See diagram, page 4.)

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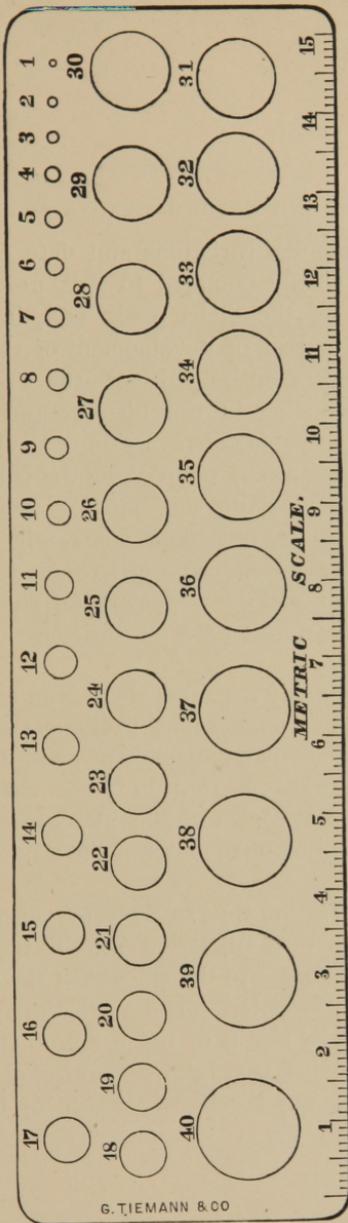
\* First suggested by Mr. Briggs, of London, and quoted with approval by Sir. Henry Thompson in 1st edition of his Stricture of the Urethra, London, 1853—page 42.

SIZE OF THE URETHRA.

The size of the urethra was found to increase or diminish by about two millimetres of circumference for every quarter inch added or subtracted from the average of 32 millimetres as before cited. The extremes being a urethra of a calibre of 28 millimetres circumference associated with a penis of  $2\frac{3}{4}$  inches circumference; and a urethra of 40 millimetres circumference associated with a penis of four inches circumference, measurements for the latter being made at about midway of the pendulous portion of the organ. In the normal urethra the calibre is found to be nearly uniform from the external orifice for about four inches, near which there is a gradual dilatation of from two to four millimetres circumference which continues and is usually greatest at about five to five and one half inches, *i. e.*, at the junction of the penile urethra with the membranous portion and corresponding with the anterior border of the triangular ligament, and known as the bulbous portion of the urethra.\* The urethral orifice is rarely normal, but is subject to great variations, ranging between 9 m. in circumference and about 40 m. The average being about 24 m. independently of the size of the penis.

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\* The approximate correctness of these measurements and proportionate relations have been since verified by many hundred carefully recorded observations (Otis on Strictures, page 242), and these are found to hold good equally in infancy, in childhood, and in old age.



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THE AUTHOR'S URETHRAL SCALE.

VARIATIONS AND DEFORMITIES OF THE URETHRA.

The congenital variations and deformities of the urethra are chiefly confined to that portion of this canal traversing the glans penis, and, in some rare cases through arrest of development of the parts, we have the urethra entirely absent, the urine passing through an opening in the bladder and abdominal walls above the pubis (extroversion of the bladder), or it may terminate at any point along the penis, very exceptionally opening on the superior aspect of that organ (epispadias), but more commonly on the inferior aspect (hypospadias), most frequently met with in the first inch, and due to congenital absence of the floor of the canal, or to the ulcerative action of chancre.

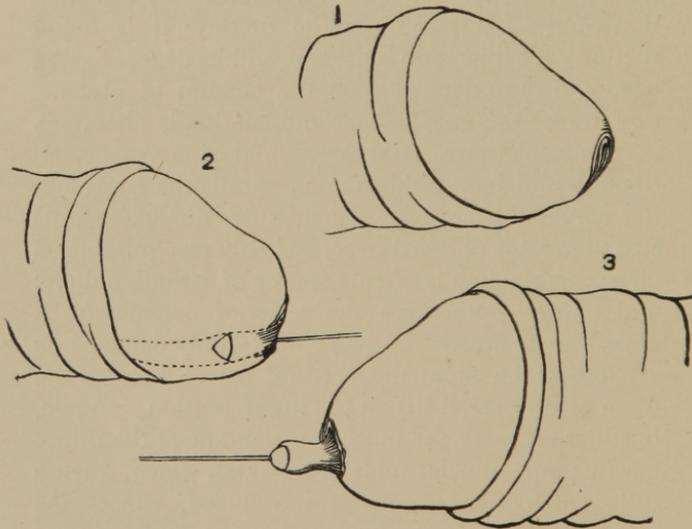
Again, in many instances there is an excessive development at this point which prolongs the floor, narrowing the orifice by encroachment upon it inferiorly, carrying it upward so that in some cases it opens upon the superior aspect of the glans, instead of anteriorly and in line of the floor of the adjacent portion of the canal.

The obstruction thus caused (by the contraction chiefly) results in a dilatation behind the orifice in degree proportionate to the amount of the obstruction (forming the so-called fossæ navicularis). Careful measurements by means of the urethrometer and the bulbous sound, in a very large number of cases claimed to be free from any results of disease or traumatism,

have proven that in a certain number of cases (say 2 or 3 to 100) the orifice corresponded completely with the calibre of the urethra behind it, while the remainder varied, so that while the average urethra in 100 cases was 32 m. in circumference, the average meatus was only 24 m., the extremes in this set of cases being 13 and 37 m. The conventional illustration and description of the urethra presented in the usual text books of anatomy show a marked dilatation behind the urethral orifice extending for about an inch and distinguish it as the *fossæ navicularis*. By examination of the foetal and infantile urethræ, it is found that no such dilatation is present, and its degree having been shown to depend upon the amount of obstruction, forces the conclusion the dilatation is abnormal.

In some cases, quite rare, a fold of mucous membrane found just within the urethral orifice, extending across the superior commissure, diminishing its size to greater or less degree, and only recognizable on close examination is often a source of irritation direct and reflex. Sometimes the superior commissure is closed to a greater or less extent—only detected on separating the labia: the urethral orifice being seen, often of very small size at the lower portion. Again, in still rarer cases, the mucous membrane at the orifice lies in perpendicular folds or wrinkles, which, when a full-sized bulbous sound is introduced, effaces the folds and is arrested by a narrowing at a depth of from four to six lines. A smaller bulb passing through this

narrowed portion, with a little resistance, on withdrawal, brings out a funnel-shaped structure some distance beyond the orifice. This congenital peculiarity, of which the author has met with several cases, he has ventured to designate as the 'fusiform meatus, and the form of stricture caused by it, the fusiform stricture. These deformities constitute strictures equally with contractions of inflammatory origin, and, in the author's experience, are especially apt to be associated with reflex difficulties.



FUSIFORM MEATUS AND STRICTURE.

THE MUCOUS MEMBRANE OF THE URETHRA.

This is continuous with that of the ureters and bladder, and in the prostatic portion presents the same variety of epithelium (stratified transitional of Beale). The superficial layer is composed of large flat cells or scales of polygonal form, while in the underlying layer the cells are smaller and club-shaped and underlying these cells are seen still smaller and spindle-shaped. In the membranous portion the epithelium is also of the stratified variety, while in the remaining portion of the canal it is of the cylindrical or columnar variety to within a short distance of the meatus urinarius, when again it is of the stratified kind. All these varieties differ widely in form influenced by the stage of their development and depth at which they are detached, rendering exact determination of the locality of their origin (through microscopic examinations of urinary and urethral secretions) often difficult and not infrequently impossible.

The secretion which lubricates the mucus membrane of the urethra is formed from fluid contents exuded from the epithelial cells in process of their development.

NOTE.—See examination of 100 cases of supposed normal urethræ, cited on page 210 et seq., also pages 228 and 229. Otis on Stricture, Putnam's Sons, New York.

FOLLICLES GLANDS AND FOLLICULAR SINUSES.

The epithelial surface is increased by follicles, crypts or sulci, and glands, which are simply the result of foldings and puckerings of the basement

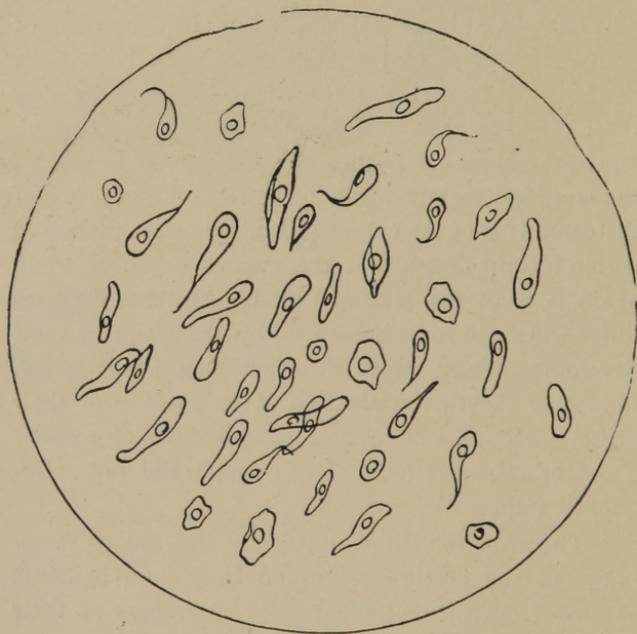


PLATE OF URETHRAL EPITHELIUM.

structures, which increase the epithelial area; the former producing little shallow sinuses lined with epithelium forming the simplest form of tubular gland,

while at the bottom of some, a puckering results in a reduplication of the mucous surface, constituting what is termed the racemose (or cluster-like) gland. Many of these tubular and racemose glands open by orifices more or less minute on the urethral mucus membrane, and of a size varying, from pin-points to that of an ordinary probe. These are found most frequently on the floor of the urethra and are especially numerous in the vicinity of the bulb. Their orifices point some backward and others forward. These canals and glands are all lined with the columnar form of epithelium. Two similar openings on the inferior surface of the urethra about an inch from the bulbo-membraneous junction, lead to two glands, each the size of a pea, situated outside of the urethra just beneath the anterior part of the membranous portion—the glands of Cowper. The lacunæ and orifices are not infrequently a source of embarrassment in the attempted passage of small instruments along the urethra, the largest, called the lacuna magna, situated on the roof of the urethra about an inch behind the meatus urinarius is most prominent, easily admitting the point of an ordinary filiform bougie.

*Follicular Abscesses.*—Of greatest importance in connection with the urethral follicles and glands is their liability to become involved in inflammatory action. The acute implication of such, is most likely during the occurrence of a gonorrhœa and may go on rapidly to the formation of peri-urethral phlegmon at any point along the urethra. Such an accident is

likely to be followed by an entrance of urine into the resulting abscess cavity, with the great danger of its escape from thence into the adjacent cellular tissue. If the abscess does not follow this course it may rupture externally and possibly heal without further damage, or, re-opening into the urethra it may result in a permanent fistula.

The accident of a phlegmon of apparently similar character may, however, occur in the perineal region and be due to inflammation of one of Cowper's glands. This may be distinguished, in its early stage, from a peri-urethral phlegmon by its situation either on one side or the other of the perineal raphe, as both glands are rarely involved at the same time.

In regard to this accident, however, an early incision is indicated if suppuration may reasonably be believed to have occurred.

*Urethral Fistulae.*—The more common occurrence in connection with the urethral follicles and sinuses however, is the sub-acute inflammation to which they are subject from long continued irritation, as behind a stricture or a contracted meatus urinarius, when, as a result of greater or less friction in the passage of urine (caused by the contraction) as well as the retention of urine more or less irritating, and the presence of crystalline deposits, the inflammation extends along the sinus and involves the gland. This gradually swelling goes on to suppuration, while the duct becomes obliterated, and the gland abscess is thus cut off from

communication with the urethra. The contained pus may become slowly absorbed, while the walls become thickened, and a small, hard, moveable tumor be left, which may at any time be safely enucleated. In still other and more frequent, as well as most important cases, the gland duct or follicular sinus, remains permeable, permitting the instillation of a minute quantity of urine. This, following down the canal to its termination keeps up a slow suppurative action which may cause perforation of the urethral tissues and, burrowing in the cellular tissue (with just enough irritation to cause the organization of a limiting wall in its progress), finally opens in the perineum. When the perforation is anterior to the triangular ligament (as in an instance of personal observation and record), it may even burrow to the bottom of the scrotum. In this case, for more than a year the patient, a physician, had been the subject of a painless enlargement of the scrotum, the cause of which was finally traced to follicular departure from the urethra, just behind a stricture at about three inches from the urethral orifice. (See Otis on Syphilis and the Genito-Urinary Diseases, page 381). A knowledge of the fact that a follicular departure from the urethra may occur at any point and result in urinary abscess, with possible general urinary extravasation (as a simple result of the presence of stricture only sufficient to establish a local irritation), will not unfrequently enable the surgeon to account satisfactorily for the occurrence

of apparently mysterious urinary fistulæ and abscess in this region.

Some two years since the author saw a gentleman in consultation on account of frequent attacks of hæmaturia. These had appeared shortly after the occurrence of an ischio-rectal abscess with extensive sloughing, which had finally healed, leaving a fistulous opening about two inches anterior and to the left of the anus. Into this a small flexible bougie could be passed about an inch and a half. A little pus only exuded.

Examination failed to detect any cause for the hæmaturia. There was a history of previous gonorrhœa and long-standing gleet. A stricture of large calibre was found in the urethra at three and one-half inches; no special contraction beyond that point was noted. The hemorrhage was suspected to be of urethral origin, and removal of the stricture advised in order to give the utmost freedom to passage of urine. It was subsequently learned that the hæmaturia gradually lessened and soon ceased entirely, although the stricture was not divided. The patient had no further trouble until a few days since (over two years from the date of first examination), when he reported that urine was passing from the fistulous opening. The explanation of the abscess and the subsequent hæmaturia was evidently in a follicular departure from the urethra behind the triangular ligament, finally causing the ischio-rectal abscess from in-

stillation of urine in the tissues of that region. The resulting sinus closed by inflammatory action associated with the abscess, but finally after the long period noted, again became pervious.

SUPERFICIAL AND DEEP PERINEAL FASCIAE IN RELATION TO THE URETHRA.

The arrangement of the superficial and deep perineal fasciæ is such as to separate completely from each other the parts anterior and posterior to the membranous urethra, or that portion of the canal included between the anterior and posterior layers of the triangular ligament. The anterior layer is continuous with the superficial fasciæ which, including the bulb of the urethra, extends forward on the penis, to its insertion in the glans, completely investing it in a membranous sheath, and separating the corpus spongiosum from the corpora cavernosa by a membranous septum, continuous with the superficial fascia, enveloping the body of the penis. Superiorly this fascia is attached to the symphysis pubis, and is lost in the aponeurosis of the suspensory ligament of the penis and in the surrounding cellular tissue. The posterior wall, or layer of the triangular ligament, is continuous with the prostatico-peritoneal aponeurosis, which, joining the pelvic fascia extending forward to its attachment on the inferior surface of the pubis, thus encloses the lower part of the bladder and prostate. This enclosure has received the title of the

superior or prostatic chamber. While those parts enclosed by the superficial fasciæ, extending forward from the anterior layer of the triangular ligament, and attached superiorly to the suspensory ligament and the tissues of the pubis, are known as the inferior penile chamber. It will thus be readily seen that extravasations of urine, occurring through rupture of the urethra anterior to the anterior wall of the triangular ligament, find easy access to the tissues of the penis, and may readily ascend through the interstices of the fascia at its pubic attachment to the groins and abdominal walls, and also by the same route gain access to the cellular tissue of the scrotum. Accidents to the urethral walls behind the triangular ligament are exceeding rare, and thus we seldom meet with urinary extravasation into the superior or prostatic chamber. When occurring, however, its localization will be understood by appreciating the fascial boundaries of this region; and the knowledge that through ulceration or rupture it may gain access to the cavity of the peritoneum will suggest early incision through the rectum.

The connection with the urethra in peri-urethral abscesses frequently cannot be demonstrated, as the urethral opening may and usually does close completely after the abscess is incised. In some cases where the opening refuses to close, the incision takes on an unhealthy condition and fails to heal until the urethra is freely incised, and all anterior strictures re-

moved. Case in point in "Otis on Stricture of the Urethra: Its Radical Cure," page 296. (For illustration of the effect of stricture of large calibre in preventing the healing of urethral fistulæ, and their disappearance on the removal of stricture, see *Ibid*, page 125).

Dittel, of Vienna, was the first to demonstrate, through *post-mortem* examination, that in certain cases, where death occurred from urinary extravasation, the opening in the urethra, by which the urine escaped, was *through a single small ulcerated follicle of the mucous membrane lining the urethra*. He showed that a simple folliculitis might result in perforation of the urethral walls, and that the follicular inflammation and ulceration, was an accident very likely to occur upon a previously diseased condition of the urethra, such as is manifested by the presence of mucoid rings and shreds in the urine. Dittel did not appreciate fully the significance of these shreds and rings, which in some cases are washed out of the urethra in urination. He recognized the fact that these mucoid shreds, which he describes as "inspissated mucus, sometimes single, sometimes ring-shaped," occur usually in persons previously the subject of gonorrhœa, and he claimed that they were evidences of *a diseased condition of the urethra, predisposing to follicular ulceration*. Since his observations, however, it has been demonstrated, by means of the urethrometer and the bulbous sound, that these shreds of mucus are the accumulations, behind a

*stricture*, which encroaches, often but slightly, upon the urethral calibre. It is readily seen, that such slight strictures as would permit the easy passage of a catheter might still be sufficient to catch the organic debris, in the urine of a patient suffering with lithiasis, and thus form a point of local irritation, finally involving one or more follicles in suppurative inflammation. Even from the increased urinary friction, at a point made salient by slight stricture, a similar folliculitis may ensue, which, once initiated, finally results in a perforation of the urethral walls. Such conditions as the foregoing may be claimed as the true cause of perineal abscess and fistulæ not otherwise accounted for.

A recent case seen in consultation with Dr. P., of this city, will serve to illustrate the importance of early recognition of the implication of the urethral follicular sinuses in the inflammatory process, and some of the symptoms which may be associated with the trouble in its inception. Mr. W., age 40, had an attack of urethritis in early life, not especially severe. Was treated almost wholly by rest and internal remedies from the beginning. Within a short time, however, a pain in the perineum occurred which became persistent, and acute prostatitis succeeded. The prostatic trouble soon yielded to appropriate treatment, but the perineal pain continued and kept the patient confined to his couch for many weeks; finally the discharge ceased, and the pain (which was only felt when in the

upright position) gradually disappeared. He remained free from all trouble for 13 years, when (about two months since) he had a recurrence of urethral discharge, following connections not considered suspicious.

The medical attendant was the same who treated the case during previous trouble. The patient was put to bed at once, and treated simply by diluents and hot water applications externally. The case promised to be a mild one up to the beginning of the second week, when the pain in the perineum, (the source of so much annoyance during the previous attack), reappeared. The author then saw the case in consultation. Examination of the discharge, which was profuse, failed to show any gonococci present. There was great unwillingness on the part of the patient to have any exploration of the urethra, but the presence of stricture had been suspected as a cause of the discharge. There was no enlargement or tenderness of the prostate, nor any marked tenderness of the perineum on pressure, but pain was felt on any attempt at standing or sitting. No swelling of the perineal tissues. No rise of temperature or any other signs of constitutional disturbance. The urethra was then irrigated with a solution of the bi-chloride of mercury 1 to 40-000, temp. 115° Fahrenheit, stopping the fluid at the bulbo-membranous junction. From the pain caused by this procedure, it was soon discontinued. Examination of the urethra under cocaine showed two

strictures at two and one-half to three inches of 20 f., and three bands of 18 f. at four to four and one-half inches from the external urethral orifice. Slight irritation at vesical neck. Examination of first portion of urine showed marked purulence, while in the second, it was very slight. On one occasion, within a day or two, during the first of the flow, the urine contained nearly a drachm of pus, while the second was comparatively free. There was marked diminution in the perineal discomfort. Rupture of a small abscess into the deeper portion of the urethra was suspected, although repeated examinations along the perineum and deeper by rectal touch had failed to locate any trouble, and there had been no rise in temperature. The following night a complete retention of urine took place, which, after a few hours, was readily relieved by catheter; and still no swelling could be detected in the deep urethra. For several days the catheter was used habitually, until on one occasion, being seized with an urgent desire to urinate, and not able to await the introduction of the catheter, the patient urinated voluntarily with much satisfaction. (Subsequent introduction of catheter, however, relieved him of several ounces of residual urine, indicating that some degree of atony had resulted from the attack of retention.) *On the following day, a distinct swelling was discovered in the perineum* This was neither very tender nor very dense, nor could anything like fluctuation be detected. It was, however, very

clear that the previous suspicions of abscess opening into the deeper portion of the urethra were correct, and that the retention resulted from first contact of urine with its cavity, further trouble from this cause having been prevented by the use of the catheter. On the first urination without it, however, the abscess cavity filled up with urine, evidently thus causing the sudden swelling in the perineum. The indications here, as in all such cases, were unquestionably for prompt incision into the tumor and through into the urethra—this made as in the ordinary method of external perineal urethrotomy for division of stricture.

This operation was immediately proceeded with. On reaching the membranous urethra, it was found strictured to 18 f., on the free division of which some two or three drachms of pus exuded from the wound. Passing the finger through the membranous and prostatic urethra, counter pressure by means of a finger in the rectum caused further slight exudation of pus, evidently from the tissue about the membranous portion. The anterior strictures before mentioned, were then divided by means of the dilating urethrotome and a 32 solid sound passed easily through all into the bladder. The patient since that time has had none of the pain formerly complained of, and at the present writing, 10 days from date of operation, is sitting up and passing all his urine voluntarily. The external wound is almost completely healed. This case appears to me an especially instructive one,

as showing the possible presence of sinuses of sufficient depth to cause marked symptoms when accidentally involved in catarrhal inflammation (as occurred during the urethritis thirteen years before); as showing also that such cases are especially liable to similar attacks, which unless promptly appreciated might go on to a general and fatal urinary extravasation before the true nature of the case was fully realized.

#### THE BLOOD-VESSELS OF THE URETHRA.

These are small and unimportant in a surgical point of view, so that as a rule internal incisions may be made through its walls without apprehension of severe hæmorrhage, unless the incision extend into the reticulated structure of the corpus spongiosum. In approaching the urethra by external incision, with the exception of the bulbous portion, the hæmorrhage is not likely to be noteworthy, but surrounding the bulbous portion is a rich vascular network, which when divided, as in the operation of external perineal urethrotomy is often exceedingly troublesome. The only single vessel of any size, however, in the line of the urethra, is the artery of the bulb, which if divided is likely to require ligature. External division should always be made strictly in the median line. Internal incisions should also be in the median line and in the roof or superior aspect of the canal, except in the an-

terior inch or that corresponding to the glans, which should always be divided on the inferior surface.

#### THE NERVES OF THE URETHRA.

These, while not large, are numerous and important.

The structure of the urethra made up of striated or voluntary and non-striated, or involuntary muscular fibres, has an abundant supply of nerves derived from the hypogastric plexus (the sympathetic) and the sacral (cerebro-spinal), and these connections are such as to warrant the expectation of extensive and varied reflex disturbances from comparatively slight causes.\* Intimately associated as the urethra is with surrounding structures of highest sensibility, it is not extraordinary that irregularities and irritations of this canal should be found affecting to greater or less degree the associated organs, and that these again reacting upon more distant structures and organs, should extend the possible influence of urethral difficulties to most distant parts of the economy. This is really the fact, first ascertained, however, not by scientific research into the laws that govern the modes of action of the various systems of nerves of this important region, but from accidental discovery through surgical interfer-

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\* See Black on the Functional Diseases of the Urinary Organs. London, 1875, page 4, *et seq.*

ence. M. Civiale, of Paris, was apparently the first to discover and formulate the fact that the urethra was capable of causing trouble in adjacent parts. In his large experience with the operation of lithotripsy, it often became necessary for him to divide the meatus urinarius, and also to remove strictures at deeper points in the urethra, in order to secure room for the passage of his lithotrites into the bladder. He found, in many such cases, that various troubles associated with them, and attributed to the presence of stone in the bladder, disappeared promptly on removal of the contractions, while the stone still remained, and that in others, where previously symptoms of stone were present, the division of such contractions caused all symptoms of stone to disappear—subsequent examination proving that no stone had been present.

Civiale, in 1850, wrote thus:

“Independent of its local sensitiveness, the urethra possesses another kind, which may be termed sympathetic. . . . . When this sensitiveness is aggravated, it may awaken sympathetic response in every organ and function of the body. . . . . It is not rare to observe that slight encroachments upon the urethral calibre induce marked difficulty in micturition: Those at the meatus having this effect not less than those located farther in.” (*Traite Pratique des Maladies Genito-urinaires*, Paris, 1850, pp. 45 and 354.)

In regard to treatment by division of the contractions, he says:

“An effect so prompt, through means, the significance of which is plain, shows that the slightest obstruction in the urethra is able to produce the gravest symptoms, local and general.”

SPASMODIC URETHRAL STRICTURE DUE TO REFLEX  
IRRITATION.

M. Verneuil, of Paris, in 1866, in a paper read before the Anatomical Society of Paris, supported Civiale's views by the claim “that a large proportion of what are commonly regarded as deep-seated organic strictures were simply spasmodic contractions of the compressor urethræ muscles, due to reflex irritation, transmitted from organic contractions of the anterior portion of the canal. These false strictures were always located in the membranous urethra. M. Verneuil's views were corroborated by citation of cases which had occurred in his experience. A year subsequently, M. Folet made the views of M. Verneuil the subject of an elaborate paper, published in *Archiv. Generales* in 1867, in which he recorded ten cases treated in M. Verneuil's service in the Lariboisiere hospital during seven months, only one of which was thought to have been organic stricture, while in nine the apparent deep stricture was shown to be due to the influence of the stricture in the spongy portion of the urethra.”

VARIOUS REFLEX TROUBLES DUE TO URETHRAL  
STRICTURE.

At about this time, unaware of the experience and views of Civiale in this matter, as well as those of Verneuil and Folet, the author's attention was directed to the influence of urethral irregularities as a source of various reflex irritations, and a paper entitled "Reflex Irritations Throughout the Genito-urinary Tract, Resulting from Contractions of the Urethra, Congenital or Acquired," was read before the New York Academy of Medicine, Feb. 19, 1874 (a resumé of which was published in the author's Vol. of Syphilis and the Genito-urinary Diseases (Birmingham, 1883, Putnam's Sons, 1886), page 487 *et seq.*, together with subsequent cases of similar significance at p. 470 *et seq.*

These observations on reflex troubles of the urethra were claimed as original by the author until 1877, when he accidentally met with those of Civiale, Verneuil and Folet previously cited, and the credit of priority was frankly conceded to Civiale in a discussion with Dr. Henry B. Sands on the subject of Spasmodic Stricture of the Urethra in the columns of the New York Medical Gazette (2nd paper entitled Chronic Spasmodic Stricture or Urethriasmus.) In addition to the list of cases presented by the author at the Academy, thirty additional cases were incidentally included in a tabulated report of one hundred cases, operations on urethral stricture by dilating urethro-

tomy (Otis on the Radical Cure of Urethral Stricture, Putnam's Sons, 1878.) These cases illustrating still farther the range of urethral reflex troubles, as well as their frequency, are thought worthy of citation here. Out of the 100 cases so operated on, no less than thirty were subjects of various painful or troublesome reflex irritations.

Thus No. 1. Case 1. Pain in the penis, scrotum, perineum and abdomen. Relief through complete division of urethral strictures.

No. 2. Case 2. Pain in urethra, scrotum, thighs, groins, knees, legs and feet. Treatment same. Cure.

No. 3. Case 4. Pain in urethra, perineum and thighs. Treatment same. Cure.

No. 4. Case 5. Lumbar and perineal pain. Frequent micturition. Treatment same. Cure.

No. 5. Case 12. Pain in perineum, left hip, and over region of left kidney. Treatment same. Cure.

No. 6. Case 13. Frequent micturition, imperfect erections. Division of strictures. Cure.

No. 7. Case 15. Irritability of vesical neck; imperfect erections. Division of strictures. Cure.

No. 8. Case 19. Frequent seminal emissions; incomplete erections. Division of strictures. Cure.

No. 9. Case 29. Frequent micturition; sense of foreign body just behind meatus causing great nervousness. Cure. Case 31. Frequent and painful micturition; pain in perineum, glans penis, thighs,

testicles; nervousness. Relief for 3 months; recontraction. Division of strictures, incomplete. Partial relief from 2nd operation.

No. 10. Case 34. Vesical tenesmus. Division of strictures. Cure.

No. 11. Case 35. Frequent and painful micturition. Pain in shoulders, knees and legs. Painful erections. Relief after operation; several recontractions. Stricture operations followed by relief each time.

No. 12. Case 37. Unpleasant sensation in testicles. Division. Cure.

No. 13. Case 42. Frequent painful micturition; pain in thighs, knees and legs. Division. Immediate relief after operation.

No. 14. Case 43. Frequent and painful erections; severe pains in thighs and feet. Extreme sensitiveness of glans penis. Division. Cure.

No. 15. Case 44. Extreme sensitiveness of glans. Frequent seminal emissions. Premature ejaculation. Division of stricture. Cure.

No. 16. Case 45. Frequent micturition. Spasmodic stricture. Repeated retention of urine. Division. Cure.

No. 17. Case 51. Frequent micturition. Spasmodic stricture in membranous uretha. Division. Cure.

No. 18. Case 52. Frequent seminal emissions. Division. Priapism. Temporary relief.

No. 19. Case 59. Spasmodic stricture in membranous portion. Division. Cure.

No. 20. Case 61. Intense pain following seminal emissions. Division. Cure.

No. 21. Case 62. Irritable bladder. Pain after ejaculation. Spasmodic stricture in membranous urethra. Division. Cure.

No. 22. Case 63. Pain in back, hypogastrium, groins, testicles and inner aspect of thighs and knees. Division. Immediate relief. Cure after third operation.

No. 23. Case 65. Constant desire to urinate. Pain in back, hypogastrium, right testicle and legs. Division. Immediate relief.

No. 24. Case 66. Frequent and painful micturition. Pain in perineum, above pubes and in groins. Division. Relief of pain.

No. 25. Case 77. Frequent micturition. Pain in deep urethra. Nervous feelings in thighs and legs; burning sensation in hands and feet. Division. Cure.

No. 26. Case 82. Pains in groins extending to feet. Spasmodic movements of the testicles, causing great suffering. Immediate relief after operation.

No. 27. Case 84. Frequent and painful micturition. Pain in penis and testicles, also in thighs and perineum. Division. Cure.

No. 28. Case 90. Spasmodic stricture of deep urethra, retention of urine. Division. Prompt relief.

No. 29. Case 96. Frequent micturition; sense of wetness about glans. Division. Cure.

No. 30. Case 97. Frequent and painful micturition. Pain in penis, perineum and rectum. Constant desire to defecate. Division. Cure.

It will thus be seen that in the majority of these (30) cases, 16 suffered with pains in lower extremities, especially on the inner aspect of the thighs, in the knees and feet and over the pubis. Spasmodic stricture was present in five cases; frequent micturition in seven; pain in the testicles in five; frequent seminal emissions in three; imperfect erections in three; painful erections in two; premature ejaculation in one; pain on ejaculation in one; priapism in one; constant desire to defecate in one.

In fourteen, viz. cases 1, 13, 15, 19, 35, 42, 44, 45, 59, 61, 62, 63, 77, 96, the stricture was at or near the meatus urinarius; the remainder had more or less contraction at or near the meatus, and from one to five strictures of large calibre in the penile portion of the urethra. In twenty-one of these cases, a permanent cure was made, and in the remaining seven, prompt relief followed the operations and continued until re-contraction of the stricture occurred. The conclusion that the irritation caused by the presence of the strictures produced the varied troubles from which these cases suffered seems to be thus proven. It suggests the immediate examination for strictures both at the urethral orifice and throughout the urethra, in all cases where symptoms similar to those occurring in the foregoing cases, are complained of, many of which

suffered for a very long period under much treatment without suspicion of the existence of stricture as a cause of their troubles.\*

The secret of the success in the treatment of these cases, as in those previously reported, consisted in the complete division of the contraction, always on the floor and in the median line up to the full normal calibre of the urethra. In always dividing the meatus, if necessary for relief, even to the extent of completely obliterating the so-called fossæ navicularis (see page

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\*Influence of Contracted Meatus upon Vesical Catarrh: Civiale, vol. iii, page 508.

“That which is especially striking is the rôle which is played in vesical catarrh by small strictures which are frequently found at the external orifice of the urethra.” \* \* \* “I have found,” writes Civiale, “many men suffering with vesical catarrh, in whom there existed a great sensitiveness of the urethra. On applying the ordinary treatment for neuralgias, I obtained an immediate relief, which, however, is of short duration. \* \* \* I remark that larger bougies are held by the meatus and that their passage causes pain. Then I decide to divide the band, by the proceeding which I have previously described, and I am always surprised to find the catarrh cease after so small an operation. I have, however, had occasions to verify this fact in sufficient numbers, that there now no longer remains any doubt in that regard. Other practitioners have also had similar experiments. M. Payan, of Aix, cites a case in which a vesical catarrh preceded by great disorder in the function of the bladder, and accompanied by frequent attacks of fever, was cured by the simple division of the meatus urinarius, after the most obstinate resistance to numerous treatments.”

459\*) and for the deeper strictures, using the dilating urethrotome as described on page 471, *ibid et seq.* As to the location of strictures in regard to their influence in producing reflex irritation of any especial character, it has not yet appeared that this was of much significance beyond the fact that contractions at the orifice (of by far the most frequent occurrence) were capable of producing every variety of reflex irritation, equally with those in the penile urethra. In quite a number of cases the contractions at and near the meatus were first divided and allowed to heal, while deeper strictures were present, but while generally causing great amelioration of symptoms, complete relief was rarely had until the deeper contractions had been entirely removed.

CEREBRO-SPINAL IRRITATION CAUSED BY URETHRAL  
STRICTURE.

Subsequent to the publication of the foregoing cases and statistics, and since the publication of the author's work on stricture, his experience has demonstrated a more extended and even more important range in the possible influence of urethral contractions, especially in their capacity to produce well-marked cerebro-spinal irritation, resulting in paresis of the lower extremities, hypochondriasis, melancholia, epileptiform troubles, etc. It has also confirmed his

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\*Otis on Syphilis and the Genito-urinary Diseases.

previous position that they cause spasmodic stricture both temporary and persistent, the latter resembling organic stricture, simulating prostatic hypertrophy and aggravating its troubles when present, and often causing retention of urine and recurring spasm of the bladder, etc. The following cases are presented in illustration:

CASE I.—A physician, aged 45, complained of irritation at the end of the penis which came on whenever he was debilitated from over-work, either mental or physical, the former apparently the more frequent and immediate cause of the irritation. Whenever the irritation was present, he became very despondent without any sufficient reason. He did not associate, in his mind, the irritation with the despondency, but attributed the latter to his general debility. The despondency was so great as to render all his mental processes unreliable, and to make him feel as if he did not care to live. He never had any venereal disease. There was some dribbling in urination. Upon examining the penis, which was  $3\frac{1}{4}$  inches in circumference, the meatus was found about the average size, No. 24 of the metric scale. There was no stricture of the urethra, as ascertained by the urethrometer, and no contraction except at the meatus which was then dilated to the extent of three or four millimetres. Division of the meatus was advised, but not accepted. After several weeks, the patient again called and stated that as soon as the smarting from the pas-

sage of the instrument, on his previous visit, was over, his mental atmosphere cleared up, and there was no irritation at the meatus till now, when he applied for another dilatation. This was done, and with the same result, the relief of symptoms, so that there was no doubt as to cause and effect. The dilatation was repeated at periods of from one to four months for a year or more, when the patient began dilating his own urethra. He would, however, never permit himself to be cut, and now for five years he has occasionally dilated the urethral orifice, and always with the same prompt relief.

CASE 2.—Another physician, the subject of attacks of profound mental depression, coming on without apparent cause. He stated that he was always a thin-skinned, nervous individual, and that he could not endure any great strain either nervous or physical. He had a long prepuce, and a troublesome fossa navicularis from which he had to shake out the last drops of urine. There was no smarting or scalding of the urine, but only the feeling of an unemptied urethra after urination until the last drops were exuded by pressure. The *coup de piston* was good. He bore these annoyances until he was past forty years of age, when to them were added various reflex nervous difficulties, among these a feeling of wetness in the urethra and a bearing-down in the perineum, great discomfort, and hyperæsthesia during urination. The meatus only admitted a No. 12 F. sound, which was

passed, with immediate relief to all his symptoms and when his troubles returned the sound was again passed with similar result. This was repeated under similar circumstance several times, during the next few weeks. After about one year the meatus was divided with the effect of permanently removing his mental depression, as well as the local troubles previously cited.

EPILEPTOID ATTACKS PRODUCED BY URETHRAL  
STRICTURE.

There are many cases in which a contracted meatus seems to be the determining cause of epileptic attacks, in illustration of which the following case:

CASE 3. A. B., æt. 18. In only fair health, and of nervous disposition. When about eleven years old, he began to masturbate on account of a sense of irritation at end of penis, and for several years he did so almost daily. At sixteen years he had his first epileptic attack without recognized cause. In the next few months he had two similar attacks, both during mental worry. No digestive trouble present. Each attack was preceded by distinct aura, and was of the character of the "petit mal," always producing temporary unconsciousness, but without well-marked convulsive trouble. About three weeks before coming under the author's observation, the attacks became more frequent, occurring almost daily. The usual remedies having no effect upon the epilepsy, the

genito-urinary condition was inquired into. It was ascertained that the patient had no functional difficulty, but prolonged waiting before urination, and dribbling after it. The meatus measured No. 26 F., the estimated normal urethral calibre being 34 m. There was great sensitiveness at the contracted portion. Upon the emergence of the urethrometer there was an attack of *petit mal* lasting for three minutes; and during the rest of that day there were three more slight seizures. There was no further trouble for five days, when there was another attack.

On the 15th October, 1877, the meatus was cut up to 34, the size of the urethra behind the contraction. No attack until the 31st October; hesitation in urination completely removed. From then to 7th December he was free from attacks and mental fatigue and worry, when he had a slight faint. On December 10th a slight recontraction was found, and divided up to No. 35 F. During the next three months he improved in every way, and only had two slight attacks under great fatigue. A slight recontraction at one-half inch was found, which was divided to No. 36 F., the size of urethra before and behind the contraction. No further trouble for five years, during which he was a hard-working student of medicine. In 1882 he contracted a gonorrhœa, and within a few days he had a single attack of *petit mal*; was in excellent health during the entire time from October, 1882, up to January, 1888, when he began to have threatenings of his

old epileptic difficulty, and also some urethral hyperæsthesia. These increasing, slight tendency to faint at times, he again consulted the author, coming a long distance from where he was in the laborious practice of his profession. Examination disclosed several strictures of 20 to 22, from  $2\frac{1}{2}$  to  $3\frac{1}{2}$  inches. These were divided on February, 1888, with immediate sense of relief, since when he has been free from any feeling or apprehension of his former difficulty.

CASE 4.—Referred to me by Dr. J. R. Leaming. Mr. K., with history of frequent attacks of petit mal coming on only at night, and always preceded by irritation in the fossa navicularis, this followed by a desire to urinate, which grows more and more frequent for fifteen minutes to one hour, when he gets a thrill over the region of the liver, sometimes accompanied by eructation of gas from stomach, then soon lapses into a state of insensibility, continuing for ten or fifteen minutes. These attacks occurred sometimes as often as twice a week, and the violence of the precursors were increased by errors in diet. There was no evidence of organic disease in the man. Examination showed circumference of penis  $3\frac{1}{4}$  inches. The normal calibre was estimated at 32 mm. and contraction of the orifice to No. 25 F.; the meatus was stretched 5 mm. with the urethrometer. The patient was not again seen for four weeks, when he reported great relief from low spirits and irritation of the penis, which continued over three weeks. The attacks of

epilepsy were two weeks apart instead of semi-weekly, as before. The operation for dividing the meatus was decided upon from time to time, but postponed for the reason that up to the present, nearly two years, there has been no return of this trouble.

There is yet another class of cases in which the reflex irritation falls more particularly upon the spinal cord.

SPINAL IRRITATION AND PARESIS OF LOWER EXTREMITIES PRODUCED BY CONTRACTION OF THE MEATUS URINARIUS.

CASE 5.—Child, æt. three years. First seen by Dr. Lewis Fisher, of this city, in October, 1881. The child when an infant did not improve satisfactorily; and a wet-nurse was obtained for it when six months old. He was weaned at eleven months. The child was then restless and fretful, had frequent erections and troublesome enuresis. The physician then in attendance examined the child's penis, and pronounced it free from any trouble. When the child was two and a half years old, it was still in the same general bad condition, and suffered from frequent attacks of indigestion. The parents then took the boy to Europe, and he was shown to several leading physicians there. No marked relief was afforded. In London, circumcision was advised, an account of enuresis and erections. This was done on child's return home, with relief to the enuresis, and almost entire stoppage of

erections during the day, though still troublesome at night. He often waked from sleep screaming, and was very hard to quiet. When first seen by Dr. Fisher, October 15, 1881, the child was found to be badly nourished, suffering much from indigestion, with great general irritability, and subject to frequent and violent outbursts of temper, stumbling in his walk with his right foot turned in. The child constantly fumbled with his penis while in bed or sitting on the floor so that his hands had to be tied—especially at night. It was thought there was attempt at masturbation which caused the manipulation of the penis. Upon examining the penis, the prepuce was found to have been thoroughly removed. The meatus was not much larger than an ordinary probe. Dr. Fisher believed this small meatus to be the possible cause of the troubles, and consulted the author, who quite agreed with him, and a few days afterward saw the child, and made a careful examination. The difficulty of locomotion was marked, the child falling every few steps. No alteration in the curve of his spine; no prominences along its course and no tenderness at any point. Erections reported as almost constant during sleep. Upon examining the penis, it was found to be  $1\frac{3}{4}$  inches in circumference; the meatus measured No. 9 F., was red and pouting. The normal calibre of urethra was estimated at not less than No. 22 F. The urine was examined, but found to be normal. It was reported that the acts of urination during the day

were accompanied by escape of flatus from the bowels on account of straining. This was readily explained by the obstruction to urination caused by the contracted orifice. On November 8, the meatus was divided to No. 17. After the child recovered from the immediate effects of the ether, it slept quietly, and on awakening showed no disposition towards handling the penis, which had before been almost constant. After the operation there was no trouble in urinating and no escape of flatus; there was a marked improvement in gait, and no disposition to be carried as before. The sleep during the night following the operation was quiet, and without erections. Subsequent treatment by separation of wound by means of a bent probe. Improvement in sleep and temper till the seventh day, when erections returned, sleep disturbed, and in the morning stumbling in the gait. The meatus was found retracted 4 mm. It was carefully divided to No. 22 F. No. 22 F. bulb passed easily along the urethra. Relief was as before. Improvement to December 22, when again persistent erections. Recontraction was found to No. 13 F., which was divided to No. 22 F., with immediate relief of irritation and improvement in gait. Subsequent treatment as before. Doing well up to January 23, 1882, when there was a return of the erections and of the stumbling, and a recontraction to 19 F. was found. Divided the cicatricial stricture up to 22 F. (the full extent to which it seemed possible to incise without producing hypospadias) with

prompt relief to symptoms. After-treatment as before. Improved in general health, and no irritation or erection up to February 22, when a recontraction to 15 F. was found, and divided with the same prompt relief. On March 3 reflex symptoms and recontraction again present, and Dr. John T. Metcalfe was called in consultation. He found no spinal disease, and coincided in a suggestion previously made, to examine for stone. This was done with negative result. He then advised a continuance of the cutting as long as relief of the symptoms followed and relief through other means failed. Again divided up to No. 22 F., without enlarging the orifice, with immediate and complete relief up to March 18, when erections recurred and gait became unsteady. Recontraction found to No. 19 F., which was divided to No. 23 F. After twelve days, during which the child steadily improved in health, there was a recurrence of reflex symptoms with a recontraction, which was again divided with complete relief for twenty-eight days. Child was well and improving up to April 28, when No. 22 F. passed with slight catch; there was some return of erections and slight unsteadiness in gait. Divided again, but still some slight catch on withdrawing bougie. On May 3, 1882, divided again, on account of incomplete disappearance of symptoms. No. 24 F. passed easily. From this time the child remained well, dilatation being continued by means of a specially constructed dilator, somewhat like a glove-

stretcher, capable of being dilated up to No. 24 F., at first every other day for one month, and then every week, two weeks, and one month for two or three months, then stopped. Child to-day, nearly four years from date of last operation, in perfect general health, in every way well developed, without any noticeable deformity of penis, and has been well of all genito-urinary troubles up to this date, Feb 20, 1888.†

The tendency to the excessive production of indolar tissue, a marked feature in this case, seemed to be the sole cause of embarrassment in effecting permanent relief. Fortunately such tendency is not frequent. Recontraction, however, should always be searched for on the reappearance of any symptoms which have been removed by previous operative measures.

SPASMODIC URETHRAL STRICTURE SIMULATING OBSTRUCTION FROM ENLARGED PROSTATE.

There is a variety of reflex urethral difficulty, which there is reason to believe has escaped the observations of surgeons generally, viz: urethrimus or chronic spasmodic stricture simulating obstruction from an hypertrophied prostate gland. The author has met with quite a number of such cases, one of which may serve as the type of this class.

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†Division at every operation was carried as far as was considered possible without producing hypospadias.

Mr. W., æt. 64, came under observation Dec. 25th, 1876, with the following letter from his family physician: "Mr. W. is suffering from enlarged prostate gland and the symptoms that usually accompany that condition of things, and his trouble has been coming on for some time past—difficulty in passing urine, pain and straining requiring use of catheter. Treatment has been: use of catheter, warm hip baths, suppositories of opium and belladonna, laxatives, infus. buchu, mur. tr. iron, as the symptoms from time to time indicated, with regulation of diet, etc." From the patient I gleaned the following: Never had gonorrhœa. First trouble of urinary apparatus was an attack of dysuria, March, 1875, without any apparent cause, except, perhaps, drinking largely of carbonic acid water; lasted nearly a day, and passed off without treatment. Second four months after, similar to first; quite well in the interval. Again free for a month, when urinations became gradually more frequent during the day, and obliged him to rise four or five times during the night; walking gave him relief. Finally had a retention of urine, lasting, with much suffering, for twelve hours. Introduction of catheter resisted. Dr. Stephen Smith (visiting surgeon to Bellevue and St. Vincent's Hospital), who was called in consultation, passed a catheter and drew off the urine. From this time, catheter used three times in twenty four hours. No urine passed voluntarily; great urgency and frequent agonizing pain before

passing catheter ; great straining, involving diaphragm and abdominal muscles. This condition continued up to the date mentioned, Dec. 25th, 1876.

Examination of prostate by the author showed but slight, if any, enlargement. Ordinary catheter passes in without force. Urine drawn is thick with pus and mucus.

Examination of penis: circumference  $3\frac{3}{4}$  inches, meatus 32, size of urethra 36, from this to bulbo-membranous junction, as shown by urethrometer. Quiet and infus. triticum repens prescribed. January 2, careful examination made for stone; none found. Bladder irrigated with solution of borax twice a day. Examination of several specimens of urine showed nothing but catarrhal elements. No abnormal condition could be detected about the neck of bladder, and yet the patient could pass no urine voluntarily, and as soon as he made the effort, tenesmus of the vesical neck came on, which gave great distress.

Passing urine every two hours through catheter, which he has been taught to introduce. The author, having seen cases of somewhat similar character and unable to find any cause for the trouble, except a spasmodic one, *introduced with great care, bearing in mind the importance of such a procedure in a man of his age, and suffering with disease of the bladder*, a 32 solid steel sound, without force, through the entire urethra. Then followed it quickly with No. 34, in order to over-distend the membranous urethra, which was believed

to be the seat of the trouble. A few minutes after Mr. W. was seized with his accustomed desire to urinate, rushed into an adjoining closet and introduced his catheter as usual. Returning somewhat hurriedly to resume conversation thus suddenly broken off, in two or three minutes he again felt a desire to urinate, and believing his bladder had been emptied, simply took up the chamber, without any idea of urinating, when, to his infinite astonishment and delight, he passed over a gill of urine. This was the first passed voluntarily since first relieved of his retention by Dr. Stephen Smith. From this Mr. W. passed his urine *without the aid of a catheter*, on an average of every two hours for the next four days, introducing the catheter only night and morning for the purposes of irrigation. Great and rapid improvement in health, and entire from freedom straining and tenesmus.

Jan. 4th.—To carry out the treatment by over-distension more fully, I incised the meatus to 36, the pre-ascertained normal calibre of the urethra, and passed a 36 solid steel sound with complete ease through the entire urethra and well into the bladder.

From that time the recovery from cystitis was rapid, and urine was passed voluntarily and in full stream up to Oct. 18th (over nine months), when the patient called to say that he had remained quite well up to two weeks previously, not having, in the interval, to rise during the entire night to urinate; but that, since then, having taken cold by sitting on a cold

stone, his urine had presented some sediment, and his urination was with increased frequency. The only treatment (aside from *infus. triticum repens*, which he had been using on his own responsibility) was by introduction of a 33 solid sound, and to do nothing else until result has been ascertained.

Oct. 19th.—Mr. W. called to say that the irritation at the neck of the bladder, and referred to end of penis, disappeared at once, on introduction of the sound the day previous. Intervals of urination increased to between three and four hours, rising only once during the night. Recovery from the vesical catarrh, which was but slight, was complete within the week, and Mr. W. has continued entirely well of his urinary trouble from that date over two years and a half. Then some increased frequency of urination occurred, and on examination distinct enlargement of the prostate was recognized, about twice the normal size. There was also a small amount of residual urine. The habitual use of the catheter was recommended, and his vesical irritation subsided. From that time he continued the systematic use of his catheter, enjoying excellent health with only occasional catarrhal difficulty resulting from temporary neglect of the catheter up to February, 1888, when, having for some time failed to use the necessary measures for emptying and irrigating his bladder, a sharp recurrence of the catarrhal difficulty ensued, suppression of urine followed, and he died at the ad-

vanced age of 76, having since 1864, when he first recovered from his supposed prostatic trouble, been engaged in active business pursuits.

During a conference with Dr. Stephen Smith, subsequent to Mr. W.'s recovery, he remarked that at his first visit to the case (which had been represented as one of enlarged prostate) he was struck by the ease with which a catheter of ordinary curve entered the bladder, and, passing his finger into the rectum, he was equally surprised to find the prostate very slightly enlarged. Concluding, however, that only the enlargement of the third lobe could produce the retention, in the absence of all stricture, he had accepted the case as one of centric prostate enlargement. A previous case in his own experience, where a patient had been apparently cured of frequent and difficult micturition by the introduction of a large sized sound, enabled him to accept the author's explanation of the case of Mr. W. without hesitation.

One of the significant features in cases like that above cited, is the absence of any marked prostatic enlargement. In several, strictures of large calibre have been present. The case of Mr. D. J., (author's work on Syphilis and Genito-urinary Diseases, p. 481) is one of these.

Is it not possible that many cases of urinary trouble, now attributed to centric prostatic enlargement, may be due to urethrismus? The absence of marked prostatic enlargement or other vesical obstruc-

tions, or close deep urethral stricture, in any case of retention, in my opinion, will warrant the introduction of a full sized sound,\* as a means of clearing up the diagnosis. One which may possibly result in prompt and permanent cure.†

OF THE NORMAL URETHRAL SECRETIONS.

The mucous membrane of the urethra is made up of three layers; the superficial or epithelial, com-

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\*By the term full sized sound, is meant one up to the full calibre of the urethra, as indicated by the rule of proportionate relation, or by actual measurement with the urethrometer.

†M. Civiale writes of The Influence of Slight Strictures of the Urethra, upon Atony of the Bladder, thus: "It will not be out of place to mention a circumstance, which has contributed, more than anything else to fix my attention upon the influence which strictures, slightly developed, of the urethra, exercise upon vesical contractions.

I have treated a great many subjects affected with obstinate atony of the bladder. In one case, among others, after having employed different means without success, I undertook a search in the urethra or bladder for some organic lesion sufficient to produce this accident. I recognized that the introduction of a large bougie (10 or 11), was rendered impossible by a band at the meatus urinarius. I divided this band, in view solely, of facilitating the introduction of instruments for exploration. To my surprise, in a few days I saw disappear, by this alone, all symptoms of atony of the bladder and stagnation of urine." *Traite Pratique*, Vol. 3, page 295.

posed of one or several layers of epithelial cells. These rest upon a thin reticulated layer of connective tissue—the basement membrane—which forms the upper boundary of the third, the deeper or areolar tissue layer, which corresponds to the corium of the cutis vera (Quain, vol. 2, p. 232).

In the mucous membrane of the urethra the superficial layer of the epithelium is in the form of laminated scales, and the secretion which is associated with it is the result of the gradual development of this scaly layer. Formative germinal cells come up through the basement membrane, laden with germinal juices, which, as the cell develops into the epithelial scale, exude and lubricate the canal, thus protecting it from the action of the acrid secretions that pass over its surface. This is the natural process by which the fluid that is necessary for lubrication is obtained, and the quantity in health is never sufficient to constitute a discharge. Any discharge from the urethral mucous membrane is pathological, with a single exception, and this is the slight transparent exudation from mucous glands which comes on through venereal excitement. This secretion has an alkaline reaction and serves for the protection of the spermatoza during their passage through the urethra. Even a brief contact of these organisms with the acid urinary secretion is found to be destructive to their vitality.

THE INFLAMMATORY URETHRAL SECRETION.

In the normal growth of the epithelial layers there is just enough material furnished for the gradual development of the germinal cell into the complete epithelial scale. But set up an irritation, and nature responds to such irritation by sending up an excessive supply of "pabulum" (Beale). The upper layers of cells are detached with greater rapidity than in health, an increased quantity of mucoid or lubricating material is thrown out, and we then have the first signal that a pathological process is coming on. This process continues, and within a short time the undeveloped germinal cells appear upon the surface of the mucous membrane as a discharge. If you examine the urethral secretion when inflammation is present, you will find it to consist largely of cells, which, to all appearances, are the same as the white blood-corpuscles. They are not normal white blood-corpuscles, however, but cells which have been emasculated by too rapid development. They retain the power of proliferation and movement, but they are incapable of elevation into useful tissue, and finally emerge from the urethra as a discharge that is called pus. These cells may appear in such quantities that we see them as a profuse discharge, and, in the highest stage of the inflammation, this discharge has a greenish color, which indicates the additional presence of red blood-corpuscles that have been exuded with them.

OF THE CONTAGIOUS ELEMENT IN URETHRAL  
SECRETIONS.

Beale says that when this inflammatory process has gone on for a little time, a kind of proliferation of cells takes place upon the surface, in addition to those which come up from the tissues beneath, and that the rapid disintegration of material produced in this manner gives rise to the infective element of the discharge. Cells thus proliferated constitute what he terms disease germs, and he claims that they may be produced in this way; that they retain life with great tenacity, and may be carried for a long distance, and when brought in contact with a healthy mucous membrane are capable of setting up an inflammation, of like character as that from which it originated. Whether this view is correct or not, we have sufficient knowledge to state that all pus, under certain circumstances or conditions becomes more or less irritant and contagious.

SPECIFIC AND NON-SPECIFIC URETHRITIS.

Practically all diseases of the urethral mucous membrane are of inflammatory origin. Inflammation of the mucous membrane of the urethra is termed urethritis. Of this two forms are recognized, one resulting from contact with various irritating materials such as the urine in lithiasis, irritating uterine

or vaginal secretions of non-contagious origin or from traumatic causes. To urethral inflammation occurring from such influences the term "simple," or "non-specific" is applied. The second form of urethritis is that resulting from contact with the purulent secretion of a mucous membrane affected with the disease called gonorrhœa, and claimed by some to be always of specific origin, that is to say, is always acquired from a preceding gonorrhœa, its secretions always capable of producing a similar contagious disease when brought in contact with any mucous membrane. The medical profession has heretofore been pretty equally divided in regard to the validity of the distinction between specific and non-specific urethritis. One side claiming that all forms of urethritis are of non-specific origin. That, when subjected to aggravating causes or conditions, the contagious property is developed in the urethral purulent secretion of a simple urethritis, and when thus developed this purulent secretion does not differ in any material respect from that acquired by contact with the secretion of a well-marked gonorrhœa. That in a medico-legal aspect, the diseases are practically identical. The other side claiming that the discharge from a urethritis of non-specific origin is non-contagious, and that the property of contagion wherever present proves the specific character of that particular discharge, and also proves it to have been the result of contact with a pre-existing gonorrhœa.

MICRO-ORGANISMS THE SOURCE OF GONORRHŒA.

The opinions on both sides of this important issue up to a recent date have been based upon clinical observations. The advocates of a specific origin for gonorrhœal urethritis have, however, within the past few years, received material support from scientific investigations into the micro-organisms which are found in the purulent secretions of the different forms of urethritis. Neisser, in 1879, claimed the discovery of a peculiar form of micrococci in gonorrhœal pus not to be found in the secretions of simple urethritis, and gave to them the name of *gonnococci*. Since then this claim has been admitted by various distinguished observers, and although not yet fully adjudicated, is accepted as true, at least in so far that the characteristic organisms are proven to be found in all cases of well-determined gonorrhœa, and are always an evidence of the discharge, having its origin in a previous contagious discharge; in other words, has originated more or less remotely through an active inflammatory muco-purulent discharge.

VALUE OF THE GONOCOCCUS IN DIFFERENTIAL DIAGNOSIS.

In a practical point of view this step is already of great advantage, inasmuch as when the gonococci are found to be present in any recent urethral discharge it distinguishes it at once from discharges due to irritation from lithiasis or from contact with simple leuchorrhœa or menstrual secretions or from urethral

stricture and in the author's opinion determines its origin to have been from contact with a discharge already possessing the contagious property, although not of necessity of gonorrhœal antecedents. The claim has been made by the authorities claiming the gonococci as the sole cause of gonorrhœal urethritis, that the disease can be set up in a healthy urethra by the introduction of the higher cultivations of the gonococcus. Thus far, however, this claim has failed of authentication. Observers claimed to be as able and conscientious as Neisser and his followers, have reported that their most careful and ample efforts in this direction have been followed in every case by failure.\* The ease with which the examination in any case of urethral discharge can be made enables the general practitioner to avail himself of this important aid to an early and intelligent diagnosis.†

It is claimed that when careful examination is made of the secretion from catarrhal inflammation of the urethra, and the gonococcus is not found, this fact may be considered as conclusive proof of the non-gonorrhœal origin of the difficulty. A careful investigation of this claim, through numerous microscopical examinations, has confirmed the statement to so great

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\*Elaborate experiments made by Dr. Giovannini, of the University of Bologna, and quoted in the last number of *Hay's Journal* (February, 1888), asserts that "it is not possible at present to cultivate a micro-parasite possessing the pathogenic properties attributed to the gonococcus."

†See note on page 57.

a degree that the author has now no hesitation in assuming that the secretion in a suspected case is of gonorrhœal origin if the gonococci are present. He is not, however, prepared to accept the claim that urethral disease, apparently identical in all respects with the so-called specific gonorrhœa, may not be set up through various causes independent of the previous presence of the gonococci. In short, he accepts these micro-organisms as an evidence of acute inflammatory origin of a discharge, but not as necessarily due to a specific microbe. Microscopical examination of a suspected purulent or mucoid secretion may be very readily and satisfactorily made under a one-quarter inch objective—having previously stained the specimen after the manner described in the appended note.\* The enlarged reproduction of the author's sketch of gonococci on page 58, will be found to re-

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\*A simple method of staining consists in placing a small drop of the suspected pus on a glass slide, spreading it out into the thinnest possible layer by drawing a second slide over it. On drying the specimen, it is covered with a solution consisting of equal parts of a saturated alcoholic solution of fuchsin or methyl blue, and aniline water; this is allowed to remain on for ten or twenty seconds, then washed off with water, and the specimen is ready for examination. If doubt exists as to the authenticity of the micro-organisms revealed by this method of staining, the specimen may be covered for a few minutes with Gram's iodo-iodide liquid, and decolorized with absolute alcohol; the pus cells may now be restained with a solution of eosin. Under this treatment the gonococci will disappear, all other micro-organisms retaining their color.

present the usual appearance of the gonococci in acute gonorrhœa. The organisms will be observed as small black dots, grouped in twos, fours, eights, etc., this resulting from their characteristic mode of proliferation.

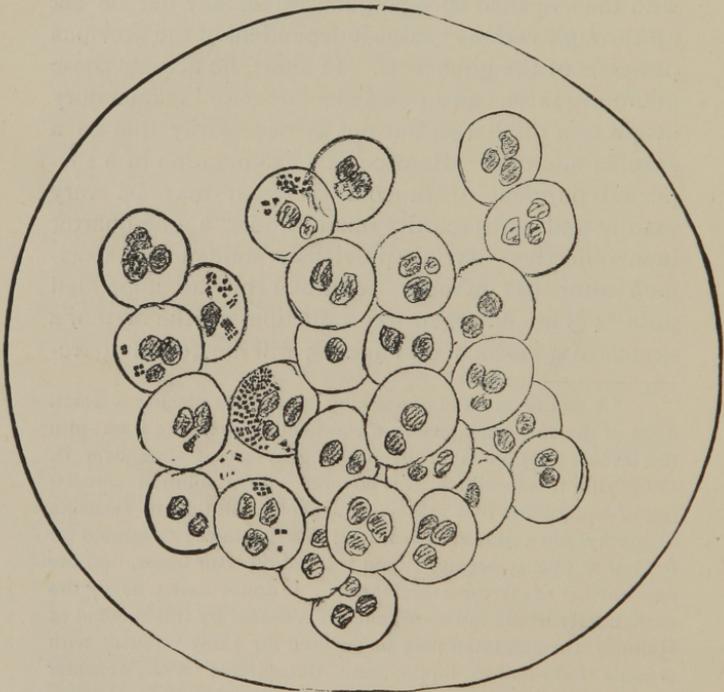


DIAGRAM OF GONOCOCCI, AS SEEN IN THE PURULENT DIS-  
CHARGE OF AN ACUTE GONORRHŒA.

EARLY SYMPTOMS OF DIFFERENT VARIETIES OF  
URETHRITIS.

Urethritis from mechanical irritation, as from instrumental interference, or from mechanical obstruction as from stricture, commences at the point or points where the injury has been inflicted and thus is recognized by sensitiveness at corresponding points, the catarrhal discharge resulting, often only appearing at the meatus when pressure is made along the urethra from behind forward. All those forms which are the result of a contagion are first seen in congestion and swelling at the urethral orifice, followed by a greater or less degree of inflammation, which extends more or less rapidly by continuity of surface to the deeper parts of the urethra. The activity of the inflammation and the rate of progress depends much on the activity of the inflammation from which the contagion has been derived. Also on the predisposition, or otherwise, to inflammation of mucus membrane in the individual affected. Many cases present only a scanty, white purulent discharge which if not aggravated by irritant injections or irritating urine will pass off in a day or two either without treatment or by avoidance of stimulation in diet and drinks; rest, alkaline diluents internally, and a weak sedative and astringent injection. By irritant injections, or other attempts to abort a gonorrhœa these cases may be made to take on a more active form of urethritis not

easily distinguished from a true gonorrhœa. A second class of cases exhibit the foregoing symptoms simply in increased degree.

#### EARLY TREATMENT OF URETHRAL DISCHARGES.

If gonococci are not present, the same treatment is indicated and especially rest in the recumbent position, frequent soaking of the penis in hot water and urinating in the same if much pain is present. These may yield to such measures in perhaps a week or two. A third class of cases begins with a florid and pouting meatus two or three days after the vicious contact. Acute pain in urination soon follows and gradually increases, in spite of the treatment advised for the foregoing cases, for ten or fifteen or even twenty days, accompanied by painful erections—with or without general constitutional disturbance. Treatment by rest and hot water still more rigidly insisted on, diluents, dog grass tea (*triticum repens rad.*) with act. or citrat. potass. and pot. bromide added. This plan of treatment or its equivalent was practically all that the author has used and recommended in acute cases for several years past, virtually excluding all injections until the inflammatory stage had passed entirely, and all medicines like copaiba, cubebs and sandal oil or other so-called anti-gonorrhœal medicines, except where patients, in the anguish of a first experience, could not be prevented from taking them on their own responsibility. In some of these cases

amelioration seemed to ensue for a few days but the majority were apparently none the better for the use of the so-called specifics and suffered much from disgust and dyspepsia.

REASONS FOR AVOIDANCE OF SPECIFICS IN VARIOUS  
FORMS OF URETHRITIS.

The cause of this wholesale avoidance of all the numerous forms and kinds of injections and internal specifics, was the result of examinations by the author of his records of stricture cases, several hundred in number. In each, careful inquiry was made as to the history of every antecedent attack of supposed gonorrhœa. In some cases not less than four to six attacks were recorded. The record included the various forms of treatment pursued in each case and each attack.

The greater proportion were treated by regular physicians and with injections which often caused great suffering. Copaiba especially was given internally which often caused grave forms of dyspepsia—lasting in some cases for years. Treated in this way, frequently, from first appearance of the disease until the last, never lasting less than a month and often that length of time acutely and followed by months of gleet. Then there were cases treated by homœopaths without copaiba or injections; others treated in Germany in water-cure establishments without even a homœopathic pilule. There were not a few cases es-

pecially of over-sensitive young men and boys, who wholly neglected every sort of treatment. *The average duration of all the cases thus variously treated, in point of time, was practically the same.* This showing of the failure of treatment heretofore in use to shorten materially the course of a gonorrhœa, was practically supported by the best authorities abroad and at home and whose opinion was tersely formulated by the late distinguished Prof. Bumstead. In closing his article on the treatment of gonorrhœa, he said that under the best treatment known to science in the present day (1879) "any urethral discharge that gets well within four weeks, never was a true gonorrhœa."

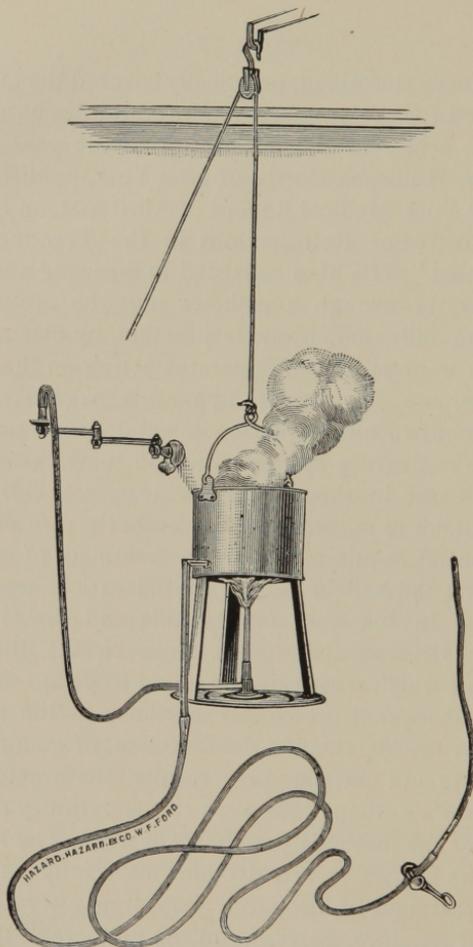
The fact is that by far the greatest number of the cases which present for treatment are not true gonorrhœa. There is even a peculiar micro-organism which is claimed to set up only mild form of urethritis. This runs its course, and gets well without treatment in about fifteen days. This microbe, it is claimed, is only to be distinguished from the true gonococcus by its persistence in the microscopic field on use of chemical reagents, which promptly cause the disappearance of the genuine gonococcus.

THE AUTHOR'S TREATMENT OF RECENT URETHRAL DISCHARGES, INCLUDING DR. CURTIS'S PLAN.

The treatment of all recent urethral discharges, first, by rest as complete as possible; second, by diluents and alkalies; third, by applications of hot water

as previously described, practically covered the ground advocated for the treatment of urethral discharges of whatever origin by the author up to the year 1883, when Dr. Holbrook Curtis, of New York, published in the New York Medical Record of April 21st, an article on "Hot Water Retrojections in the Treatment of Gonorrhœa." His plan consisted in throwing a stream of hot water through a catheter into the urethra as far as the bulbo-membranous junction, by means of a fountain syringe (or an apparatus acting on the same principle, see Dr. Curtis' apparatus, page 64), and using from two to ten quarts of water of a temperature of 120 degrees Fahrenheit, or in some cases even higher, twice in the twenty-four hours. This plan was so much in accord with the author's own view of the essential requirements in the treatment of gonorrhœa that the salient points in the article were reproduced in his work on Syphilis and the Genito-Urinary Diseases (Putnam's Sons, N. Y.), the first edition of which was then just going to print.

A subsequent practical experience in the use of hot-water retrojections in the treatment of gonorrhœa, both acute and chronic, gave results confirmatory of the author's anticipations as to the superiority of this plan over the methods previously in use. The author found the hot-water retrojections especially valuable in the treatment of discharge persisting after the removal of stricture, carrying up the temperature of the water in some cases, gradually, even to 130°. The



DR. CURTIS'S RETROJECTION APPARATUS.\*

\* Cuts pages 64, 66 and 67 from Dr. Geo. E. Brewer's article, Jour. of Cutaneous and Genito-urinary Diseases, New York, May, 1886.

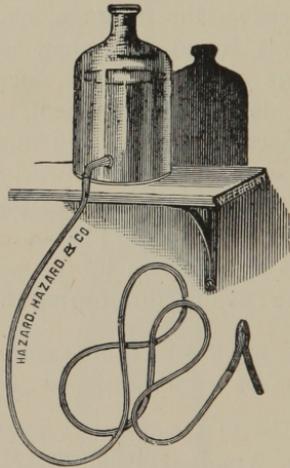
*medicated* injections advised by Dr. Curtis were found also of value, in the more acute cases, in relieving irritation and in diminishing the discharge, but there was a failure to reduce the ordinary duration of the well-marked gonorrhœa below the period of four to six weeks—the average claimed by old methods. It was found also that, as was feared, prostatitis, more or less grave, occasionally occurred as an incident in the treatment, and apparently due to the impact of the injected fluid against the deep urethral tissue as had been previously observed in the use of Harrison's plan (see page 358 *ibid*). Subsequently the trouble from this source was avoided in my own cases by pressure in the perineum, sufficient to close the deep urethra, during the retrojection.

DR. HALSTED'S PLAN OF IRRIGATION WITH WEAK SOLUTIONS OF BICHLORIDE OF MERCURY.

Another plan of treatment, suggested and first practiced by Dr. Wm. S. Halsted, of New York, has received much attention within the past two years particularly, viz., the irrigation of the urethra with a weak solution of bichloride of mercury, of ordinary temperature, by means of a two-way nozzle (Kiefer's tube) attached to a rubber tube leading to the reservoir, which may be like the apparatus of Dr. Curtis for retrojection purposes, or even an ordinary fountain syringe, and precisely in the same manner as that described on page 63, for the hot-water retrojec-

tion, except that instead of the catheter the two-way tube of Kiefer is used. (See page 67).

This is in shape like a Y, the shaft of which is perforated by two openings at the top, and running

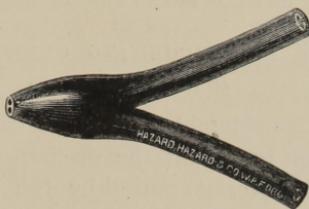


IRRIGATION APPARATUS OF DR. HALSTED.

parallel through the shaft, terminates at the end of either arm. To one of these arms is attached the rubber tube connecting with the reservoir, which carries the medicated fluid into the urethra, while the overflow finds its way out by the other arm. By stopping the overflow with the finger the urethra becomes distended with the fluid as much as may be required

to secure complete application of the fluid to every part of the canal.

The importance of closing the urethra at the bulbo-membranous junction during the irrigation should not be lost sight of, not only on account of the mechanical effect, but to prevent the passage of infec-



KIEFER'S TUBE.

tious material into the deeper portion of the canal. The strength of the solution in acute cases is one part of the bi-chloride to 40,000 of water, increased in chronic cases to 10,000, and the quantity from one to two quarts. Under this treatment the discharge gradually lessens, and as it becomes thin and serous a saturated solution of boric acid or a solution of permanganate of potash  $\frac{1}{8}$  to  $\frac{1}{4}$  gr. to the ounce, or alum and carbolic acid 2 to 4 grs. is substituted until the cure is complete.

THE PLANS OF DRS. CURTIS AND HALSTED COMBINED  
MOST EFFICIENT.

Rest, preferably in the recumbent position is a most essential adjuvant to this treatment, but without

this the results of the thorough irrigation with the weak bichloride solution at 120° twice daily, have been in the author's later experience more satisfactory than by any other method. In quite a number of instances when the attack was unquestionably of gonorrhœal origin and of a severe type, the discharge ceased entirely in from ten to twenty days.

CHIEF CAUSE OF FAILURE TO CURE URETHRAL  
DISCHARGE.

In a very considerable portion of cases, however, by any form of treatment the discharge will persist beyond even the average period by the old methods, or by any methods. This, if not distinctly attributable to excesses or indiscretions on the part of the patient, may be always safely attributed to SOME OBSTRUCTION IN THE URETHRA, EITHER AT THE ORIFICE FROM A CONGENITAL OR ACQUIRED CONTRACTION OF ITS NORMAL CALIBRE, OR FROM SOME LOCALIZED CONTRACTION AT SOME DEEPER POINT IN THE URETHRAL CANAL. Cases in which the discharge continues beyond the sixth week may be designated as chronic gonorrhœas and their continuance due, as a rule to which there are few exceptions, to the conditions above alluded to.

INFLUENCE OF A CONTRACTED URETHRAL ORIFICE.

All cases of urethritis either simple or of gonorrhœal origin, associated with a contracted urethral orifice, are from this cause alone more or less rebell-

ious to treatment. This condition is one of the most frequent causes of the persistence of chronic urethral discharges, and the simple restoration of the orifice to its normal calibre is often sufficient to bring about a cure in cases which have resisted every other measure. The influence of this contraction when congenital is greatly increased by the inflammatory process which has given rise to the discharge. Plastic material is deposited into the sub-epithelial tissues to greater or less extent and becoming organized into cicatricial tissue, changes the simple, resilient, congenital contraction to a more or less unyielding stricture. From the fact that urethritis due to contagion always begins at the urethral orifice and continues more or less active at this point during its entire course, it is always the most liable of any point to become narrowed through cicatricial deposit, and its resiliency diminished, thus causing increased friction and irritation during the act of urination, and also inducing urethral discharge from slight cause. Besides this, it becomes a fruitful source of reflex irritations of various kinds and degrees.

STRICTURE ALWAYS OF INFLAMMATORY ORIGIN.

Except at the urethral orifice there is no evidence to show that urethral stricture is ever of congenital origin. Urethral stricture—or constriction—with this exception, is invariably the result of some preceding irritation sufficient to cause the plastic exudation into

the sub-epithelial tissues. It may occur through irritation caused by urine in lithiasis, and thus stricture may be found in infants. It is quite common in boys at or near puberty, and many cases in the author's experience have been associated with a previous aggravated habit of masturbation. The intense urethral congestion which sometimes results from this habit would appear to be a reasonable cause for localized plastic exudation finally resulting in stricture. This latter cause may, in the author's opinion, be held responsible for the presence of urethral stricture in cases where it is discovered soon after the occurrence of a gonorrhœa and before the time when stricture would be naturally expected to occur. The first effect of a plastic deposit in the sub-epithelial tissues is to prevent the normal development of the epithelial structures.

TREATMENT OF GLEET AND INCIPIENT STRICTURE BY  
LOCAL APPLICATIONS.

Superadded to the original causes of the origin and continuance of the discharge we have now an organic change in the affected region which tends to prevent recovery. Dr. Robert Ultzmann, of Vienna, who has an enviable reputation as an investigator and authority in such matters\* says: If a clap has lasted more than four or eight weeks we call it Chronic Gonorrhœa. Chronic gonorrhœa is caused *principally*

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\* See Ultzmann on Pyuria, Am. Ed., Appleton & Co., N. Y. 1884, page 68.

*by the fact that the mucous membrane in isolated places has not covered itself with epithelium, and for this reason these patches continue to secrete. Patches affected in this way sometimes present the appearance of a fine granulating surface of the mucous membrane, sometimes like a superficial ulceration of the same.*" Such patches may be readily brought into view by means of the endoscope and treated through local measures appropriate for the relief of superficial granular surfaces. In the author's experience the most satisfactory is by solution of nit. argent 40 to 60 grs. to the ounce, applied two or three times a week by means of a camel's hair brush, or a flexible wire tipped with a bit of absorbent cotton. This may have the effect of healing the lesion, but this is only where the plastic deposit is confined to a patch here and there, which through the effect of the stimulating and alterative application and its normal tendency to shrink may cause the absorption of the exudate. But when the exudate extends to the entire calibre of the urethra, as is most likely to occur, then the contraction inherent in the nature of plastic exudations, takes place at the expense, not of the isolated deposit but of the lumen of the urethra; here, then, instead of a localized granular spot, we have a more or less thoroughly organized stricture of the urethra to consider. Hence it is that many cases treated in the most approved manner through local applications by means of the endoscope are rebellious under these meas-

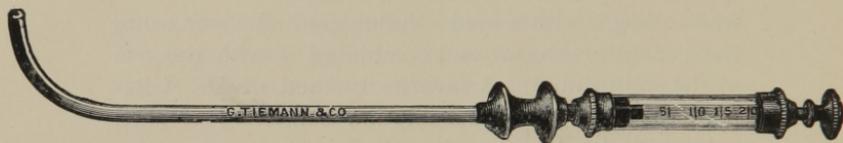
ures, and often when healing under them constantly recur, bringing both the endoscope and the operator into disrepute. It has, also, been shown by Ultzmann that where the granular patches in the ante-membranous portion of the urethra disappear under suitable local treatment and the discharge is still present in the first washings of the urethra in urination, like shreds and flecks of muco-purulent matter, that this is because the disease has extended into the membranous and prostatic portions of the canal, from which after the anterior portions of the urethra have been restored to a comparatively healthy condition the disease again crops out and re-establishes the urethral discharge. For the relief of this condition Ultzmann has devised a convenient and efficient treatment, viz: by the application of various solutions to the membranous and prostatic urethra, also extending to the mucous membrane in the immediate vicinity of the vesical neck. For this purpose he uses either his own silver catheter, with slit openings, or an ordinary stiff catheter coudé 15 F., having two lateral openings. This is annointed with glycerine and introduced just beyond the compressor urethræ muscle. A hard rubber syringe of three or four ounces capacity, filled with a medicated solution, is then attached by means of a short piece of soft rubber tubing to the end of the catheter, and the fluid gently injected into the membranous urethra, whence easily overcoming the resistance of the weak internal sphincter vesicæ it flows into the bladder. This is re-

peated two or three times in succession the patient immediately emptying the bladder through the urethra. That the end of the catheter is correctly placed is known by the fluid neither flowing out alongside of it through the urethra, or when the syringe is removed through the catheter itself. It is well to begin with a mild solution gradually increasing the strength each day and combining it with the use of the solid sound. A favorite method of Dr. Ultzmann, is to begin with a solution consisting of zinci sulphatis, alum crud, acidi carbolici, ää 1 part; water, 500 parts. On the first day diluting this with water three times, on the second twice, and on the third once, then using it full strength. If this is well borne it is changed for a solution of permanganate of potash, 1-2000, increasing to 1-1000, when a 1-2000 solution of argentic nitrate is substituted and gradually carried up to 1-1000. The solutions should be warmed. At about the end of the second week, in place of the irrigation, on every third day an injection or "etching" of a few drops of a 5 per cent. solution of argentic nitrate is made into the neck of the bladder by means of his drop catheter or syringe.\*

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\*It is claimed that such accidents as epididymitis and prostatic inflammation do not result in this mode of practice. In some thirty cases where the discharge came from the deep urethra, where this plan has been more or less thoroughly carried out in the author's practice during the last few months, no such accident has occurred, and the results have been very satisfactory.

This consists of a capillary tubed catheter with straight shaft of rather abrupt curve to which is attached an ordinary hypodermic syringe. The desired amount is drawn into the syringe—the catheter introduced until the end has passed the membranous portion, which is indicated “when the long axis is  $45^{\circ}$ ”



ULTZMANN'S DROP CATHETER OR SYRINGE.

from the vertical (1) indicating that the triangular ligament has been passed. If the application has been properly made none of the injected fluid will return and a desire to urinate will be felt soon after the application. This treatment is especially effective in cases of irritability of the vesical neck. Applications are advised to be repeated only after a period of three or four days or a week; *i. e.* after the effects of previous application have passed entirely away. It is the custom of authorities to continue the use of general and more especially the local measures (of which the plan of Ultzmann may perhaps be considered the most efficient) until the persistence of the discharge demands further measures for its cure. In furtherance of this Ultzmann says, (*ibid* page 70): Since in chronic gon-

(1) Ultzmann.

norrhœa the process is not always confined to the superficial layers of the mucous membrane, but on the contrary very often involves the deeper layer also, it does not answer to employ simply astringents or caustics and to try to effect a cure in this way. For if a chronic process is thus brought to a close the deeper layers may still remain cicatricially changed, and from this results a rigidity of the walls of the urethra, or a cicatricial contraction in isolated places, which has unpleasant after-effects. If we wish to obtain the most perfect cure, we must at the same time bring the lumen of the urethra back to the normal and the walls of the tube itself. This can never be brought about by the local application of medicaments. This is virtually the view originally advanced by the author in his work on the radical cure of stricture (Putnam's Sons, 1878). The chief point of difference seems to be that Ultzmann accepts the localized patches of plastic deposit as capable of permanently interfering with the urethral walls, and contracting the urethral lumen, while the author would suggest that all such patches having no hold around the urethra, ultimately disappear through the contraction of the deposit upon itself. On the contrary when the deposit involves the wall in its entire circumference, contraction of the lumen results. The former may be cured perhaps by local applications, the latter calls for a restoration of the urethral canal by the use of sounds or by complete division of the

stricture. Ultzmann advises division of the urethral orifice "so that instruments (sounds) of 30 Charriere and larger, can be easily passed into the bladder" and systematic dilatation to restore and preserve the normal urethral calibre; "in many cases," says Ultzmann, page 71, *ibid*, "this treatment of chronic gonorrhœa is sufficient for a perfect and permanent cure." The correctness of this position has frequently been substantiated in the author's experience, but has been found by him to apply chiefly to those cases where the plastic exudation has only partially surrounded the urethral lumen—where the deposit involves the entire circumference, *stricture* is the inevitable result, and while dilatation may serve to cure the discharge for the time, recontraction of the stricture sooner or later is sure to occur—not necessarily bringing back the discharge, but producing a permanent point of friction which forever after predisposes to its recurrence.

#### DIVISION OF THE MEATUS URINARIUS.

Division of the urethral orifice when found below the normal size, constitutes the first step towards the restoration of the urethral calibre. (Ultzmann says, "urethræ which do not admit No. 27 F. at least, must be carefully slit up along the frenum.") The object of division of the orifice is two-fold, first and most important to relieve at once and permanently the obstruction which hinders free passage of urine and causes more or less retention of discharge and urine

(producing dribbling after urination); second to allow the passage of sounds, or other instruments (bulbus sounds or bougies) for more definite diagnosis and for treatment. Objections have been made to division of the meatus except in cases of extreme narrowness, from the alleged fact that such division is often excessive. In such cases it has been claimed that the force of the stream in urination is impaired as well as the sexual capacity of the individual. In the first place no division is excessive which does not exceed the normal urethral calibre, inasmuch as this has been shown to be the the highest type of meatus and presenting as a congenital condition in at least from three to five per cent. of all normal urethræ (see Otis on Stricture of the Male Urethra, page 179), and constitutes a condition the most free from liability to irritation from any cause. In the second place the force of the stream is dependent upon the power of the bladder and not of the urethra, which is simply a conductor. In cases of atony of the bladder associated with stricture or a contracted orifice, removal of either of these would increase the volume of the stream at the expense of the projectile power, but that any objectionable impairment of the force of the stream ever occurs as a result of division of the urethral orifice to any extent aside from pronounced atony may be confidently denied. A noteworthy proof of this position is presented at page 496 in the author's work on Syphilis and the Genito-Urinary Diseases,

where, on account of grave reflex troubles dependent upon a contracted meatus, repeated divisions became necessary before permanent relief was obtained, the last division being up to 40 of the French scale. After healing at this point the patient was able to propel a strong and compact stream fully three feet. He was married subsequent to operation and has now (1888) a large family of healthy children. In the third place, in a recorded experience of many hundred cases, and covering a period of at least twenty years, a case of impairment of the sexual functions from division of the meatus has not been met by the author. On the contrary, in a very large number of cases from the removal of a constant source of irritation by division of the meatus, as well as of deeper contractions, the sexual power has been markedly improved.

LONG-STANDING GLEET OF PROVEN CONTAGIOUS  
CHARACTER CURED BY DIVISION OF A  
CONTRACTED MEATUS.

A most important fact connected with divisions of the meatus is that it is the sole cause of keeping up a gleety discharge in very many cases, and that this discharge is always either capable, or through slight excitement, vinous or sexual, may be made capable of communicating disease to a female through sexual contact. A case illustrative of this and other important points seems worthy of citation here. Five years since a Hebrew aged 28, was brought to the author's office by his

physician for consultation in regard to a slight urethral discharge of two years' standing. This was preceded by a gonorrhœa which was prolonged and severe, under much treatment by various physicians. The last having for the previous several months made diligent use of all the ordinary injections and medicines in vogue for the cure of gleet. The patient was engaged to be married and insisted upon more active measures. Examination disclosed a flattened, stellate, cicatricial urethral orifice of 20 F. while the circumference of the penis was  $3\frac{1}{2}$  inches. The peculiar condition of the orifice was accounted for by an accident through which the tip end of the glans had been excised in the performance of the rite of circumcision. Apparently no trouble had resulted up to the time of the acquirement of gonorrhœa. During the later treatment of this, several attempts to dilate the orifice had been made but was always painful and soon omitted. Immediate and free division was advised, also the statement volunteered that the discharge though scanty and painless was capable of becoming contagious, if not so at that time. Patient absolutely declined to submit to operation. About three months after he called alone, apparently in great mental distress. He said that on leaving after former visit he was assured by his physician that cutting was wholly unnecessary; he would find other means to cure under a careful diet. By internal medicines, injections and medicated bougies in variety, the discharge was re-

duced to the fraction of a drop, which was described as almost transparent. Remaining in much the same condition for several weeks he was finally informed by his physician that he was practically well and might marry with absolute security against communicating any disease. He made haste to avail himself of this permission. A week after marriage, while visiting his brother-in-law, a physician in a neighboring state, he found some discomfort on urination, and on examination he discovered that his discharge had returned. Under plea of sudden and urgent business he posted back, a two days' journey to New York, to ascertain if his discharge was contagious. Comforted by the assurance that his wife might possibly have escaped acquiring the disease, he readily submitted to the division of his contracted urethral orifice, as originally proposed. Within a few days he received an indignant and scathing letter from his medical brother-in-law, charging him with having given his sister gonorrhœa. A separation from his wife was the immediate result. After healing of the wound of the meatus, the discharge promptly ceased.

After a three months' probation, the patient continuing well, his wife condoned his offence.

ANY MUCO-PURULENT DISCHARGE FROM THE MALE  
URETHRA CAPABLE OF COMMUNICATING DISEASE.

In this connection the author desires to express his conviction that *any* muco-purulent urethral discharge

from the urethra may be capable of communicating catarrhal inflammation of greater or less severity to any woman. Not seldom appearing as a vaginitis of a mild type so as to be scarcely differentiated from a simple leucorrhœa, this may be followed by extension of the catarrhal inflammation to the uterus, the Fallopian tubes and the ovaries, finally in some cases producing conditions which may require removal of the uterine appendages. This opinion has been forced upon the author, not only by personal observation, but by the unequivocal statements of several leading gynecologists. Not unfrequently cases of husbands, whose wives were under treatment for recurring salpingitis and ovaritis, have been referred to the author for examination as to the presence or absence of urethral stricture when no urethral discharge has been observed, but where a history of early gonorrhœa has been admitted. In a number of such cases, while no discharge has been detected in the anterior urethra on causing the patient to urinate the first part of the urine passed, the washings of the prostatic and membranous urthræ have been found filled with flecks and strings of muco-purulent material. Strictures of large calibre, even down to 18° F., were found at points anterior to the prostatic urethra, when no suspicion of any stricture or any diminution in the size of the stream in urination had been suspected.

In the treatment of chronic gonorrhœa, the author goes a step farther than those who are content with

division of the orifice and the subsequent treatment for the restoration of the urethra to its normal calibre by dilatation.

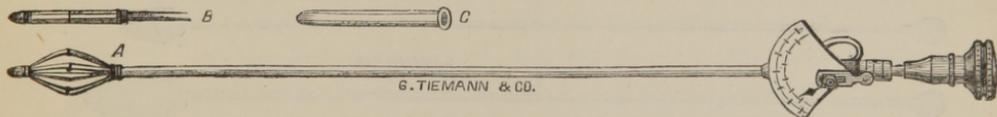
As soon as the presence of stricture of the urethra is demonstrated, he recognizes it as an obstacle to recovery, wherever situated and while it might for various reasons be desirable to temporize by adopting for the time the plan of dilatation, it always would be with the understanding that as far as the stricture was concerned, this plan was never curative, but palliative, and that complete division of the stricture alone could effect a radical cure.

At the present time the effect of stricture in prolonging urethral discharge in whatever way originated, will now scarcely be questioned. It has been proven that strictures may arise from various causes independent of a gonorrhœa. It is not unusual to find strictures, sufficiently contracting the urethra to intensify and prolong a first attack of gonorrhœa. It is therefore desirable at as early a period as possible after the occurrence of a urethral discharge to examine the urethra for the purpose of ascertaining whether any localized contractures are present from any cause, at any point between its commencement or orifice and the bulbo-membranous junction (whether there is a history of previous gonorrhœa or not), in order that the prognosis in gonorrhœa may be intelligently made. Contractions at the orifice, congenital or otherwise, of more than ten millimetres below the normal

urethral calibre as estimated by the proportionate relation between the circumference of the penis and the circumference of the urethra, will warrant the apprehension of a prolonged attack and a subsequent gleet. Contraction to greater extent will threaten not only great severity from retention of the acrid purulent discharge in the canal, but will favor the engagement of follicles and follicular sinuses in the inflammatory process, and in all probability require its free division before the discharge ceases. Division, is, however, to be deprecated during the active stage of a gonorrhœa. Examination for stricture should be made in every case as soon as the active stage has passed, *i. e.*, as soon as pain on urination has ceased. This should be made with the urethrometer, except perhaps in those somewhat rare cases when the urethral orifice corresponds in size with the normal urethral calibre.

THE URETHROMETER.

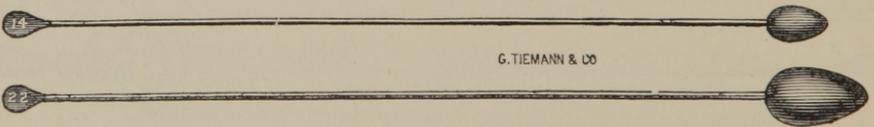
With the urethrometer an accurate measurement of the normal urethral calibre may be made in any



THE AUTHOR'S URETHROMETER.

case within the compass of the measurement (from 18 F. to 45 F.). The dial, near the handle, indicates in millimetres the exact amount of expansion in the bulb.

Introducing it closed (and covered with the rubber cap, which serves to protect both the instrument and the urethra) down to the bulbo-membranous junction, by means of the screw at the handle, the bulb expands up to the point of the sensation of fullness felt by the patient. The hand on the dial will then point to the figure representing the normal calibre of the canal under examination. Strictures in the regions anterior to the bulb may also be accurately defined and measured by this instrument. When the bulb is suddenly arrested in withdrawal, the screw should be gradually turned until the bulb is permitted to pass. The position of the hand on the dial will then indicate the calibre of the stricture. It should, however, be borne in mind that when the urethra is very sensitive, spasmodic contraction may simulate an organic stricture. Previous introduction of a 4 per cent. solution of cocaine is therefore often necessary not only for the comfort of the patient but to secure against the error of mistaking spasmodic contraction for organic stricture. It is also desirable to verify the results of this ex-



THE AUTHOR'S BULBOUS SOUNDS.

amination with the bulbous sound before deciding that true stricture exists. If the latter instrument defines

a contraction at the same point, by measurement, and when passed beyond it, is distinctly held on return, the proof of organic stricture is complete. When the urethral contractions are below the calibre of the closed bulb, or when they are numerous and close together, the normal calibre of the canal may be assumed from the circumference of the flaccid penis. When the circumference is 3 inches the urethra has a normal calibre of at least 30 f; if  $3\frac{1}{2}$ , 34 f; if  $3\frac{3}{4}$ , 36; if 4 inches, 38; if 4 inches 40, or more.

It is more especially the object of this little book to deal with the urethra and its diseases rather than with the results of such difficulties—such as strictures of the urethra—which have been fully treated of in the author's volume on Stricture of the Male Urethra, its Radical Cure, published by G. P. Putnam's Sons, New York; also the complications of gonorrhœa which have received careful consideration in the author's work on Syphilis and the Genito-Urinary Diseases (Student's Edition) published 1888, by the same. It will, however, be perhaps not wholly unacceptable to the readers of the present volume to know that the views of the author in regard to urethral stricture are unchanged since their first publication in 1875, and he is now thoroughly satisfied that complete division of stricture always results in absolute permanent cure. This has been abundantly proven by subsequent critical examinations. (See report in Transactions of International Medical Congress,

London, 1881, Vol. II; also Syphilis and Genito-Urinary Diseases, Otis, page 449, *et seq.*). Since the presentation of those records much additional proof of the same kind has accumulated in the author's experience. Re-examinations in three cases have been made during the last two months, one is 13 years after operation, one 14, and the third, 16 years—the last being the case for division of whose stricture the author's dilating urethrotome was originally constructed. In each case absolute freedom from every trace of stricture was demonstrated. To produce similar results, however, operation for stricture must be performed under precisely the same conditions as in the case of those above cited. The division of stricture must be complete. This can be effected with any degree of certainty only by means of the dilating urethrotome. That instrument alone fixes and thins the stricture so that complete division is, as a rule, easy, and sure. Division on the superior aspect of the canal is also essential. When these conditions are fully and generally met by competent surgeons the claim that radical cure of urethral stricture can readily be effected in the greatest majority of cases operated on, will not long fail of general acceptance.













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