

The commercial bark is of a rather dark gray brown color, and occurs in slender, rather tough, tightly curved quills, rarely so thick as a lead pencil, with more or less adhering rootlets. Occasionally the wood is contained in them, but they are commonly so tightly closed and cord-like that they appear solid, as though containing the wood, when in reality they do not. The bark is decidedly thick for so small a quill. The drug has little odor, and a very astringent, slightly bitter taste.

Rubus contains about twelve per cent. of tannin and nearly one per cent. of the bitter glucoside villosin, which is soluble in alcohol and slightly so in water. Its properties are merely astringent, due to its tannin. The dose is 2 to 8 gm. (3 ss to ij.), and the fluid extract is official. The leaves of blackberry, raspberry, and strawberry are similarly used. They combine considerable gum with their tannin.

H. H. Rusby.

BLADDER. (ANATOMICAL).—The urinary bladder presents a body, a neck, an apex, and a base, or bas-fond. It is sometimes absent as a distinct organ, owing to an arrest in the development of the parts, when it forms but one cavity with the rectum. It is never double.

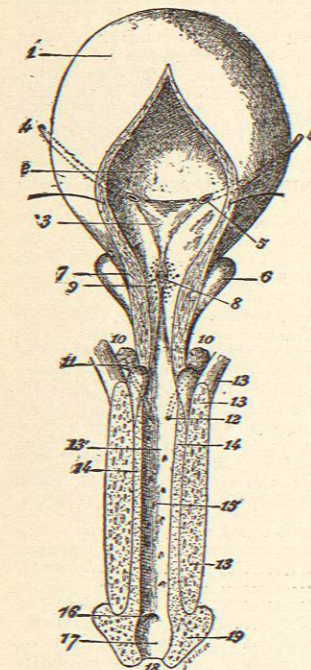


FIG. 483.—Bladder and Urethra. (After Charles Debierre.) 1, Bladder; 2, fundus of the organ; 3, triangle of Lieutaud; 4, 4, ureters; 5, vesical orifice of one ureter; 6, prostate; 7, section of the anterior portion of the neck of the bladder; 8, verumontanum, pierced by the orifice of the prostatic utricle and by the ejaculatory canals; 9, orifices of the prostatic glandules; 10, membranous portion of the urethra; 11, Cowper's glands; 12, opening of outlet from these glands; 13, 13, corpora cavernosa of the penis; 13', spongy portion of the urethral canal; 14, 14, corpora spongiosa; 15, sinus of Morgagni; 16, valve of Guérin; 17, fossa navicularis; 18, meatus; 19, glans penis.

The bladder is held in its position by the connection of its neck with the pelvis through the short glistening fibres of fibrous tissue called the ligament of the bladder; also by the connection of the apex with the urachus and the umbilicus opening. The reflection of

the peritoneum from the abdominal wall to the rectum, along its posterior surface and over the upper part of the lateral surfaces, assists in keeping the organ in position. The bladder is also supported by the rectum upon which the base rests. Thus fixed, it may expand and contract more or less, but it possesses no movement in its entirety.

The shape of the organ is more or less conical, with the base situated below. The anterior surface is in relation below with the posterior surface of the pubis, and,

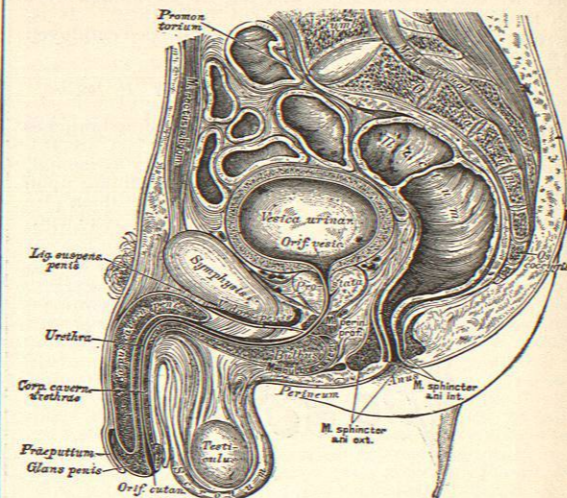


FIG. 484.—Sagittal Median Section through the Male Pelvis. About one-third natural size. (After Heitzmann.)

above the pelvis, with the abdominal walls, *i.e.*, with the posterior surface of the rectus abdominis muscles. It is almost always free, in this locality, from peritoneal covering. There is a thin layer of fat between the walls of the bladder. The posterior surface is in relation with the peritoneum, with coils of the ileum, and with the rectum. The peritoneum forms there the recto-vesical cul-de-sac.

The lateral folds of this recto-vesical cul-de-sac are called by some the posterior ligaments of the bladder. They enclose the obliterated hypogastric arteries and the ureters. The lateral surfaces are covered by peritoneum in the upper and posterior half and are there in relation with the coils of the ileum. But the lower and anterior half of these surfaces is free from peritoneum and is in relation with the pelvic areolar tissue. The obliterated hypogastric arteries cross, obliquely downward, the lateral surface; the peritoneum does not extend in front of this cord. The spermatic duct curves backward along the posterior portion of the lateral surface, passing on the inner side of the ureter.

The apex gives attachment to the urachus. It is covered with peritoneum.

The base is in relation, on the middle line and in front, with the prostate and behind with the rectum. On the side it is in relation with the spermatic duct, seminal vesicles, and the ureters.

The bladder is of a white flesh color. It is a resistant organ; it is contractile. It presents first a peritoneal coat which invests only its apex, its posterior surface, and the upper part of the lateral surfaces. The anterior surface, the lower part of the lateral surfaces, the base, and the neck are entirely free from peritoneum.

The second coat is a muscular coat composed of three layers or sets of fibres. The superficial fibres are formed of longitudinal fibres and are composed of three groups. The upper group comes from the urachus and spreads

over the apex of the bladder. The anterior group comes from the pubis, to which they are attached by glistening aponeurotic fibres called the ligaments of the bladder; they spread over the anterior surface. The posterior group comes from the base of the prostate and expands over the posterior surface of the organ. The middle muscular fibres are more or less circular. They are in greater number around the neck, where they form the sphincter of the bladder or vesical sphincter. They form a sort of elliptical sphincter around the orifices of each ureter. The last and innermost layer of fibres are the plexiform fibres, which have no definite direction. These fibres are not uniformly distributed over the organ, but form bundles more or less prominent which cross one another in all directions. Some of the bundles make quite a projection on the inner surface of the bladder, and may give rise to small pouches or alveoles. The muscular fibres are all of the smooth variety.

The submucous areolar layer is marked, but presents nothing special.

The mucous layer presents nothing of interest except at the base. There the organ presents posteriorly a slight depression called the bas-fond. In front is seen a triangular surface called the trigone; it corresponds to the prostate. The front angle corresponds to the urethra, and the two posterior angles to the openings of the ureters, remarkable for their slit-like shape. The surface of the trigone is smooth, and there the submucous layer is scanty and the mucous membrane is adherent to the subjacent muscular tissue.

The mucous membrane is continuous in front with that of the urethra, and behind with that of the ureters.

The exact nature of the glands which secrete the mucus of the bladder is not well settled as yet, but they are more like single racemose glands than anything else.

The bladder is provided with three arteries on each side, the upper, middle, and inferior. They are derived from the internal iliac.

The veins are specially abundant around the neck of the organ, where they form a marked plexus, the main formative branch of which is the dorsal vein of the penis.

The lymphatics open into the pelvic glands.

The nerves of the body of the bladder come from the sympathetic. Those of the base and neck come from the third and fourth sacral nerves.

The bladder is developed from the cloaca, *i.e.*, the cavity formed by the terminal point of the primary intestinal cord and the pedicle of the allantois. In course of development there is thrown out a transverse partition which separates it from the rectum, and the pedicle of the allantois becomes obliterated and is then known as the urachus.

PECULIARITIES OF THE BLADDER.—The bladder is the largest of all cavity organs and of all the receptacles that are found in the course of the excretory apparatuses of the organs of the body. It corresponds to the gall bladder and to the seminal vesicles. Together with the stomach it is the only organ that is susceptible of considerable enlargement within the bounds of health.

It encroaches upon two large cavities, the pelvis and abdomen. When empty it is flat against the pelvis. The difference of direction of the various axes is worthy of notice. The organ is as it were suspended by its two extremities, the neck and the urachus; but the neck is the most immovable. The urachus recalls the pyramidal process of the thyroid body. Upon close examination the bladder will be found to be really fusiform, the two pointed extremities corresponding to the apex or urachus and to the neck.

The absence of peritoneum on the anterior surface when the bladder is distended is the reason why that surface is the spot chosen when it is desired to penetrate into the bladder. The relation of the base with the rectum makes the exploration by way of the rectum indispensable in many bladder troubles. The presence of the urachus is noteworthy. The mode of attachment and the fixed character of the neck are evidently intended to direct the action of the fibres toward the orifice of the urethra.

The presence of three muscular coats is noticeable; so also is the triple origin of the longitudinal fibres, recalling the similar arrangement of the longitudinal fibres of the stomach. The sphincters formed by the outer fibres around the neck and around the orifices of the ureters are to be noticed. The bundle arrangement of the plexiform fibres is unique. The formation of alveoles on the mucous surface by the projection of these fibres is an arrangement worthy of notice.

The presence of the bas-fond, of the trigone, and of the slit-like orifices of the ureters is peculiar, and so also is the indistinct character of the glands of the mucous membrane. That a small organ like this should be provided with six arteries is remarkable. It is true that the organ is hollow and that the arteries are small. The presence of an abundant venous plexus around the neck of the bladder is to be noted. That the body and the neck possess each a different nerve supply is also striking.

The development of the bladder in common with the rectum is to be remembered; and so also is its common development with the allantois. Arrest of development by which the partitioning of the bladder from the rectum does not take place accounts for those cases in which a cloaca persists into adult life. Failure of obliteration of the pedicle of the allantois explains the persistence of umbilical fistula. The fact that the bladder is developed separately from the urethra accounts for the cases of unperforated urethra in which the development is arrested before the proper time. The arrest of development before the abdominal wall is closed accounts for the cases of exstrophy of the bladder. In fetal life the bladder is distinctly fusiform in shape.

Owing to the smallness of the pelvic cavity in the child the bladder encroaches at that age more on the abdominal cavity.

In old people the muscular fibres become more fibrous and the glands secrete more mucus.

The bladder of the female is said to be larger than that of the male. The transverse diameter is also more apt to be greater than usual in the female sex. The posterior surface is in relation with the uterus, and the base with the vagina. The reflection of the peritoneum on the bladder upon the uterus is called Douglas' cul-de-sac. It extends down to the upper part of the posterior wall of the vagina.

Edmond Souchon.

BLADDER AND URETHRA OF THE FEMALE, DISEASES AND INJURIES OF.

—The mode of origin of the female bladder and urethra makes them liable to developmental defects; their situation in the pelvis and their relation to neighboring organs may influence their size, shape, and mobility, and may render them specially subject to trauma and to the introduction of foreign bodies and infectious micro-organisms. Their connection with the kidneys and ureters subjects them to the ever-changing character of the excretion from those organs. Finally, the nature of their anatomical structures is such as to afford a favorable starting point for benign and malignant neoplasms, with or without inflammatory conditions. Either a single one or several of the above factors may be of clinical importance in so far as they possess the power to modify the function of the bladder as a reservoir, to qualify its power to expel its contents, and to interfere with the urethra as a conduit.

DEVELOPMENTAL DEFECTS OF THE BLADDER AND URETHRA.

For information in regard to the nature and mode of origin of these the reader is referred to the article on *Teratology* in a later volume.

ACQUIRED DEFORMITIES OF THE FEMALE BLADDER AND URETHRA.

The anatomical relations of the urethra and bladder to the pelvic and abdominal viscera subject them to numerous changes in calibre, contour, and position, and more or less seriously affect their functional activity.

Dilatation of the Urethra.—The lumen of the normal female urethra differs greatly in diameter, varying with age and social condition, whether single or married, nullipara or multipara. An imperforate hymen, vaginal atresia, or absence of the vagina may lead to coitus per urethram, and thus ultimately result in the greatest possible dilatation of the whole canal. In some this condition brings about complete inability to retain urine; in others the disability is only partial, manifesting itself during coughing, sneezing, straining, or lifting; in a few cases, finally, the control remains perfect. The condition is easily recognized by the readiness with which the finger can be introduced into the bladder.

Forcible Dilatation.—Kelly emphasizes the fact that "with the cases of dilatation of the urethra where a large finger has been bored in for diagnostic purposes . . . the extensive rupture of the muscular fibres is then followed by an incontinence which is often permanent. These cases are fortunately becoming rare, as this barbarous way of examining the bladder is being given up. With our present facilities for examination, we are never warranted in introducing the finger through a urethra which is not already dilated so as to admit it without resistance." The vestibular end may be distended by a cyst, by the presence of pus in Skene's ducts, by a chancre or chancroids or by other growths, or by the presence of foreign bodies within the meatus.

Dilatation of the middle portion of the urethra (urethrocele) is the commonest form. "The anterior (superior) wall of the urethra maintains its normal position, but the central portion of the canal being distended settles down so that in time the urethra, in place of being a straight or slightly curved canal, becomes (nearly) triangular; a cavity is thus formed in the central portion of the urethra." Within this pocket urine may collect and undergo chemical changes; stones are liable to form or lodge therein on their way through the urethra; and new growths may be arrested or may develop there, inciting a urethritis and causing obstruction to the outflow of urine. Dilatation of the middle third is most likely to be confounded with thickening of the urethro-vaginal septum or with a suburethral abscess. A curved sound passed along the floor of the urethra will enter the pocket, and its point can then be readily felt through the anterior vaginal wall which will be of normal thickness. Pressure upon an abscess will force pus into the urethra.

Excision of the redundant portion of the middle third can best be accomplished after the method of Frank, who places a small catheter in the urethra, excises a wedge-shaped piece from the urethro-vaginal septum, including its whole thickness, and extending from the external urethral orifice to within about 1 cm. of the internal orifice, and continuing the incision as an ellipse along the vaginal wall beyond the neck of the bladder. The whole wound is then to be closed by transverse sutures.

"By flattening the outer end of the urethra and at the same time bending it, Pawlik (*Wien. klin. Woch.*, 1883, Nos. 25 and 26) relieved several patients of incontinence. His plan is to draw the orifice of the urethra well forward toward the clitoris and sharply to one side; then, marking the point on the side to which it could be drawn without excessive traction, a narrow denudation about 2 cm. (three-fourth inch) long is made in the sulcus and sutures passed to hold the urethra in that position. After a week, when the sutures are removed, the other side of the urethra is drawn upward and outward in the same manner, and the sulcus on that side denuded and sutured. By this means the urethra receives a sharp bend forward and the posterior wall is strongly flattened against the anterior by traction on both sides" (Kelly).

Gersuny (*Centralbl. f. Chir.*, 1889, p. 433) dissected out the whole urethral canal as far as the neck of the bladder, twisted the urethra one and a quarter times on itself, formed a series of spiral folds, and then sutured the canal in this position.

Dislocation of the Urethra.—The protected position of the urethra under the pubic arch, and its dense fibrous

attachments, tend to prevent injury; yet in spite of these conditions dislocation is one of the affections frequently met with in women with relaxed pelvic floors, lacerated perineum and uterine displacement, conditions which are often associated with rectocele and vesicocele. Under these conditions an examination reveals the fact that the whole urethra has been displaced outward and forward, having rotated around the symphysis, assuming nearly a U shape. In other cases the upper portion of the canal with the base of the bladder descends, the lower section remains *in situ*, converts the urethra into an S-shaped tube, and renders the introduction of a catheter somewhat difficult. When associated with complete prolapse of an hypertrophied cervix uteri the whole urethra lies outside the vulva. The presence of large subperitoneal or intraligamentous tumors, or the existence of a full bladder during pregnancy or labor, may draw the bladder and urethra, changing the long axis of the latter from the horizontal to the vertical, and often rendering it very difficult to introduce a catheter, which under these circumstances should always be of soft rubber.

As a prophylactic measure, during labor, whether normal or instrumental, the bulging mass (anterior cervical lip, urethra, or both) between the symphysis and the descending head, should be pushed upward behind the symphysis so as to permit the occiput to descend under the pubic arch.

The symptoms of dilatation and dislocation of the urethra are similar to those of other urethral diseases. Dilatation of the whole canal is characterized by complete or partial incontinence, loss of control on lifting, coughing, sneezing, etc. Dilatation of the lower portion does not interfere with function, and is manifested only by the symptoms of the accompanying urethritis. Dilatation of the middle portion, like dislocation of the urethra, adds to the symptoms of urethritis the need of making an increased effort, as in overcoming an obstruction, much less marked when lying down than when urinating in the erect position.

The diagnosis is made by the use of the curved sound for the purpose of determining the exact curve of the urethra; by the introduction of the bulbous sounds or the urethrometer to ascertain any variations in the calibre and the portion involved; and the use of the urethroscope to locate the seat of the urethritis, and at the same time to facilitate the application of appropriate remedies. The finger introduced into the vagina will appreciate any thickening, the presence of a new growth or foreign body, and the point of greatest tenderness.

The treatment of dilatation following labor, the recent extraction of stone, the introduction of an instrument or finger, consists in waiting for a time in the hope that the urethra will contract, the patient being kept quiet in the mean time, and vaginal douches being administered from time to time. Urethral dilatation and dislocations other than the acute varieties do not tend to spontaneous recovery, but, from repeated sexual contact and succeeding labors, increase in size and importance. In chronic conditions the first duty is to remove the cause; next, to relieve the urethral inflammation; and, last and most important, to overcome the incontinence. With an intact or firm pelvic floor the urethra can be lifted up and, to a certain extent, compressed by a well-fitting, hollow-round, funnel-shaped ball, or by an Albert Smith pessary.

Prolapse or Eversion of the Urethral Mucosa.—As a rare accompaniment of a dilatation of the external urethral meatus, the mucous membrane of its lower third becomes detached from its submucous connections and gradually protrudes through that opening as a pale, deep red, or purplish tumor. As it increases in size it becomes very sensitive, and oedema, ulceration, and sloughing sometimes intervene. On the other hand, the prolapse may be limited to one side and may, in that location, resemble a caruncle. Eversion is an affection incident to any age, but is far commoner in young strumous children. Its etiology is not definitely known; it may follow a blow, straining, coughing, or rape.

Treatment.—In a recent case, cocainein the everted

membrane, and by taxis reduce it within the canal; keep the patient in bed, and give morphine enough to prevent spasmodic contraction during urination.

If reduction cannot be maintained or proves impossible, cut off the protruding membrane circumferentially, and unite the edges with fine catgut sutures. "Catch the edges as they are cut to prevent inversion and excessive hemorrhage."

Contraction of the urethra in any portion of its length is considered by Skene and others to be of much more importance and of more frequent occurrence than is usually accorded. Van de Warker (*Medical News*, July 16, 1887) says truly that "the lumen of the normal female urethra is not the same throughout its length. It is contracted toward the meatus, expanded in the middle portion, and narrows again as it approaches the bladder. The use of the urethrometer proves this. One must not, therefore, allow error to occur from the introduction of too large a bulb, which would move with more freedom at one point than at another." Van de Warker believes that *urethral strictures* are both as frequent and as important in the female as in the male, and he urges the importance of an examination with bulbous sounds in various urinary difficulties in the female. Sometimes the constrictions are arranged in series, and bulbs varying from No. 24 to No 27 will slip along in a series of jerks that offer but the slightest resistance to the surgeon's hand. More commonly, however, one or two of these bands are found located at the upper portion of the urethra. The sensation of meeting one of these bands is so characteristic and unmistakable that there is little danger of error.

Herman, quoted by J. W. White, reported the results of his examination of fifty-five female urethrae, in which cases no urinary trouble was complained of. In the majority a No. 17 catheter would pass, and in all but two a No. 14. He tabulated six of his own cases of stricture and collected twenty-three others, and found that etiologically child-bearing, the cicatrization of chancres (and chancroids), sometimes the so-called lupus of the vulva, and, in the young and middle aged, gonorrhoea are the chief factors. In the old women there was found stricture due to general fibrous thickening and induration of the urethra, occurring without any history of gonorrhoea or other discoverable local disease.

Contraction of the *meatus externus* (the form which is most frequently observed) is either produced by the too liberal use of caustics, in the attempted removal of new growths, or it results from severe vulvitis.

TREATMENT OF URETHRAL STRICTURE.—"In women it is not safe to regard every case of urine retention as hysterical until, after a urethral examination by the bulbs, the passage is shown to be free from strictures, large or small" (Van de Warker). For the purpose of dilatation he makes use of the graduated steel sounds, the same as are used in treating male strictures. "The action is twofold—to dilate and to cause gradual absorption of the constricting exudate. In strictures of large size, forcible dilatation or division may be used. The treatment, made two or three times a week, extends over a considerable length of time (from two to three months), but the relief given to the patient by the use of sounds is very satisfactory. As the dilatation of the urethra which they produce is no more important than the absorption caused by their use, the latter implies a more or less prolonged treatment" (Van de Warker). He believes that any one can verify this position upon the living subject by the habitual examination of the urethra with the exploratory bulbs in every case of pelvic disease that presents itself for treatment.

Herman found that rapid dilatation was so successful that he preferred it to any other method.

DISLOCATIONS OF THE BLADDER.

Certain changes in the position, size, and relation of the pelvic and abdominal contents bring about, in the bladder, certain changes which distort that organ and interfere with the performance of its functions. The

bladder being hemmed in by the symphysis in front, by the uterus and broad ligaments behind, and by the small intestines above, it is not surprising that its transverse diameter is increased at the expense of the antero-posterior diameter. In extreme distention the bladder rises vertically into the abdomen, even as high as the umbilicus; the urethra being at the same time put on the stretch. The bladder may be carried upward by ovarian tumors, fibroid growths, pelvic neoplasms, intestinal adhesions, the anteverted uterus of Alexander's operation, and the pregnant uterus. The laterally displaced bladder may form a part of the contents of the sac in inguinal or femoral hernia, and it has been found pouching into the foramen ovale. Inflammatory masses or large growths on one side force the bladder in the opposite direction, and thus lead to mistakes in diagnosis. These, however, can easily be avoided if the examiner himself passes the catheter in every case in which he is called upon to determine the nature of an abdominal enlargement. Adhesions between the fundus of the bladder and a uterus which is thrown backward will drag the bladder backward. Acute retroversion of the uterus, on the other hand, throws the cervix against the urethra, causes obstruction, and makes urination impossible. Of all changes in the position of the bladder, downward dislocation is the most common and important, often taxing to the utmost the surgeon's resources. The chief etiological factors are those which bring about prolapse of other pelvic viscera, viz.: the general lack of muscular tone common to most of our women, with relaxation of the pelvic floor, destruction of the perineum, malpositions of the uterus, etc.—in fact, all of the pathological conditions which involve those structures included by Hart and Barbour in the "displaceable portion" of the pelvis.

As exciting causes, we have the expulsive efforts of child-bearing, defecation, lifting, and violent jarring. Downward pouching of the floor of the bladder, *cystocele*, while most frequently met with in multiparae, is at times found in both young and old nulliparae.

Cystocele presents itself as a soft, round, elastic body projecting into and distorting the vagina. It is easily replaced, but soon returns, and it is enlarged on coughing, straining, or lifting. In severer grades the bladder can be forced through the introitus, by which it may be constricted, giving to it an hour-glass shape. In an extreme case of cystocele, the vaginal wall with the bladder, uterus, and rectum is extruded through the vulva. Its surface then becomes cracked, eroded, ulcerated, and very sensitive; the ureters are dragged down and bent at an acute angle; the outflow of urine is impeded, and dilatation of the ureters and renal pelvis with hydronephrosis intervenes.

Retroversion of the bladder through a dilated urethra, with involvement of the whole thickness of the bladder wall, is a most unusual form of dislocation. It presents the appearance of a deep red or purplish tumor emerging from the meatus, and very sensitive to touch and on contact with the clothing. Careful examination may determine the urethral orifices within the furrowed mass. The inception of the difficulty may be due to torsion of a pedunculate growth which arises from the trigone and makes its way through the relaxed meatus internus and urethral canal. Under repeated straining efforts, more and more of the bladder is slowly dragged along the canal until it protrudes from the meatus externus. Infants and young children are the most frequent victims, while those past middle life rarely suffer from this form of dislocation.

The symptoms, as described by Skene, are as follows: "The patients, even before the tumor appears, feel strong pressure in the organ on urination, and may have stoppages in the stream, and retention. After a time these symptoms become aggravated, a small red tumor appears at the meatus, and with each urination enlarges. In some cases, when the desire to urinate is felt, severe contraction of the bladder takes place, but no urine flows. Then suddenly the little tumor disappears inside, and the urine flows freely. With each appearance of the tumor there is considerable constitutional disturbance, and after a