urine of an animal before and after preventive inoculation of anthrax, and careful comparison of the action of these substances upon the life of anthrax bacilli. But the whole question is a very wide one, and an enormous amount of patient and laborious investigation will be required before we get any accurate knowledge on the subject.

CHEMICAL STRUCTURE AS AN INDICATION TO THE CHOICE OF ANTISEPTICS.

But there is one inquiry which is of still more immediate practical interest, and that is, which compound is likely to be most powerful as an antiseptic, and least likely to produce at the same time unpleasant or dangerous symptoms. Phenol itself has an antipyretic action, but its poisonous and antipyretic properties run too nearly parallel to allow of its being much used to reduce temperature. On comparing the action of phenol with similar compounds in which two or three atoms are replaced by hydroxyl instead of one, as in phenol, it has been found that the toxic action is, upon the whole, rather increased with the increased number of hydroxyl groups, phenol being hardly so poisonous as resorcin, and this in its turn less poisonous than phloroglucin.

The rapidity of action of these drugs is in inverse ratio to their toxic power; phenol, which is less toxic, acts most quickly, and phloroglucin mostly slowly. Resorcin is apparently intermediate.

But we have not merely to consider the number of hydroxyl groups in the body. We must consider also their position in relation to the benzene nucleus. This nucleus consists of six carbon atoms united together to form a close ring, and to each one an atom of hydrogen is attached, so that we have six hydrogen atoms attached to six carbons, and the formula is C_6H_6 . It is not quite certain how the carbon atoms are united amongst themselves. According to Kekulé, they are alternately united by double and single affinities, while others have proposed connections between atoms on opposite sides of the ring.

We must bear in mind that this ring is simply hypothetical, but it gives us a convenient means both of representing aromatic substances and of studying their relationship.

Whatever the real nature of the connection may be, it appears that the benzene nucleus is symmetrical; and that if we replace an atom of hydrogen in it by hydroxyl, chlorine, methyl, or any other radical, the product is the same whichever atom of hydrogen is replaced. But, if we replace a second atom, the case is different, for the fact that one atom in the original nucleus has been already replaced has rendered the nucleus unsymmetrical. If the second replacement occurs on a carbon atom next to the first, it is represented in a formula by the figures 1:2, and is said to be in the ortho position. If on the next atom but one it is represented in a formula by 1:3, and is said to be in the meta position, and if in the next but two, it is represented as 1:4, and is said to be in the para position. The position of radicals replacing hydrogen in the benzene nucleus affects the chemical behaviour of the compound very considerably.

Thus if an alkyl, such as methyl, be attached to one carbon atom, the attachment of a second negative radical, such as hydroxyl, to the nucleus in the ortho position prevents its oxidation in acid solutions, but hastens it in alkaline ones, and there can be little doubt that the relative position of the radicals attached to the benzene nucleus will affect the processes of oxidation and reduction which it undergoes in the organism, as much as it would do in the hands of a chemist. We have, perhaps, too few data as yet to come to a definite conclusion regarding the exact alterations which the position of a group in the benzene nucleus will effect in its physiological action, but a number of most interesting data have already been obtained. Thus it has been found that in the case of the dioxybenzenes, where two hydroxyls occupy the ortho position, the action is most powerful. It is weakest in the meta position, and is intermediate in the para position in the benzene nucleus.

In the case of the trioxybenzenes where we have three hydroxyls, we find that when these are in position, 1, 2, 3, or are consecutive, as it is termed, the toxic action is greater than when they are in the position 1, 3, 5. In the first instance, as in pyrogallol, any two hydroxyls are to each other in the ortho position, whereas

in the second, phloroglucin, any two are in the meta position to each other. If we replace the hydroxyl in phenol by carboxyl ($COOH$), we lessen its toxic power very considerably, though the substance we obtain—benzoic acid—still has considerable antiseptic power. If we replace one atom of hydrogen in the benzene nucleus by hydroxyl, and a second by carboxyl, we find that the same rule holds good as for the di-oxy compounds. Here, too, the rule regarding position holds good, for salicylic acid, in which the hydroxyl and carboxyl are in the ortho position, is more powerful than either of its congeners meta and para-oxy-benzoic acid, in which they are in the meta and para position respectively.

SUMMARY OF THREE LECTURES ON SOME AFFECTIONS OF THE GENITO- URINARY ORGANS.

Delivered at the Royal College of Surgeons of England.

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LECTURE I.

DIMENSIONS OF THE NORMAL URETHRA.

BEFORE describing the conditions caused by chronic urethritis, the lecturer briefly enumerated the conditions and variations of the healthy urethra when tested by the meter and examined by the endoscope. The natural condition of the urethra when at rest is that of a tube with its elastic walls closely contracted, capable of yielding to the flow of urine and the passage of a sound much larger than any stream of urine. This expansibility varies in different parts of the canal: being greatest in the prostatic portion. There it reaches to fifty or sixty millimetres in circumference. At the aperture in the triangular ligament it ranges from about forty to about twenty-five millimetres, most commonly it is about thirty millimetres. At the bulb, expansibility of the urethra again is sometimes forty millimetres, when the rest of the penile portion is only thirty millimetres. The meatus varies greatly, twenty-five millimetres being the common size.

When seen through the endoscope, the colour of the mucous membrane is pink, or bluish-pink, varying in different individuals, but identical with the hue of the buccal mucous membrane. The surface has a fine gloss or brilliancy given to it by a thin lubricating layer of mucus. Along the floor two fine furrows course forwards, and towards the deeper part minute carmine tinted papillæ are visible. The openings of ducts can be seen in health in the prostatic portion, but seldom or never in the part anterior to the triangular ligament. The lumen is generally linear when closed, and in the penile part transverse, except at the fossa navicularis, where it is vertical and lozenge-shaped. At the membrano-prostatic portion the lumen is saddle-shaped or arched.

CHRONIC URETHRITIS.

The morbid changes seen in the urethra in chronic urethritis were illustrated by drawings taken by Mr. Frank Collins, and by diagrammatic enlargements of them.

MORBID CHANGES IN URETHRITIS.

Varieties of Urethritis.—Inflammation may invade the tissues in several ways; first, simple mucous catarrh; next, inflammation of the whole substance of the mucous membrane and sub-mucous tissue, and even the erectile tissue; lastly, the glands of Littre and lacunæ of Morgagni are chiefly affected. Near the meatus long ducts open, which occasionally become inflamed, and are very slow to heal. These ducts are most easily seen in persons who have slight hypospadias, as small dots from which muco-pus comes by slight squeezing, and through which a probe can be passed for half an inch. Further down the canal the inflammation may extend along the ducts into the glands of Cowper; and further still, by the ducts into the body of the prostate. Besides these simple catarrhal extensions there are other affections which may be classified as:

1. Superficial granular induration of the mucous membrane.
2. Inflammation of the glands and lacunæ.
3. Areas of deeper induration with proliferation of cells, ultimately converting the mucous tissue into fibrous tissue.

4. Patches of fibrous tissue penetrating into the submucous and erectile tissue.

Coincidence of these Varieties.—The readiness with which these forms relapse, makes it not uncommon to have them present together in the same urethra. In general inflammation of the mucous membrane itself, the membrane is bright red, with an absence of mucus, and is so swollen that the lumen becomes circular or oval. Later on, the general red congestion changes to isolated dark red patches, around which the natural colour reappears in the mucous membrane. Further, chronic inflammation goes on in the parts still left congested.

Erosions and Granulations.—The loss of epithelium from small areas forms shallow erosions, from which in some cases spring up granulations, which appear as uneven red areas, often dotted with grey adherent pus. The rows of granulations stretch obliquely or transversely along the urethra, leaving ultimately a palish grey streak of fibrous tissue, or which may rise into thin fibrous ridges, and thus forming the so-called bridle strictures. These terminations are usually permanent; in some patients they may disappear and their sites become indistinguishable; especially may the erosions disappear altogether and leave the tissue elastic as before. After the catarrh dies, the mucous membrane is often left paler than before, or with patches of brown pigmentation. Over the generally pallid surfaces large blood vessels may be seen.

Glandular Changes.—In the changes of the glands and lacunæ, the glands first appear as little red dots; around these red dots, owing to the shrinkage of submucous infiltration, little white circular areas develop. The ducts sometimes, owing to wasting of their walls, give cup-like greyish-brown depressions with yellow pus lying in their floor. Gradually the redness disappears from these dots and they become indistinguishable from the red areas in which they have been placed.

Deep-seated Inflammation.—The deep infiltration of the mucous membrane and underlying erectile tissue causes changes of more serious character, among which is the conversion of the parts affected into ordinary scar tissue without ulceration. The changes may reach considerable development before the superficial congestion and bright colour of the patch undergo diminution. The redness then subsides to a purple and greyish lilac hue, slowly becoming grey or yellowish-grey. The surface of these grey patches is often rough, and the lustre small, owing to the imperfect epithelium which covers them. A leading characteristic of these deeply spreading inflammations is their abrupt limitation. The superficial indurations shade gradually away into the surrounding non-inflamed mucous membrane; the deep ones, on the contrary are quite isolated nodules. Their presence is indicated as the inspecting tube passes them by the way in which the lumen wriggles from side to side through their want of contractility. After some months' duration, the surface of the scleroses becomes irregular or ridged. The lumen, instead of being transverse or linear, is pushed into various positions, arched, sinuous, or guttered. Probably these deep nodules of sclerosis are not absorbed; the superficial ones doubtless are frequently cleared away, but the deeply spreading ones remain to form fibrous stricture of the urethra.

Symptoms of Chronic Urethritis.—The symptoms of chronic urethritis were dwelt upon, being little more than a drop of milky white muco-pus occasionally seen at the meatus, or as shreds and flakes in the urine. This in most cases was due to patches of granulations at the bulbous or membrano-prostatic portions of the urethra. These were shown to be the source of the frequent recurrence of scalding and free discharge during the course of chronic urethritis, if the patient departed from his régime or discontinued the use of his injections. The uncertainty of the length of time during which contagious power continued in a discharge was remarked upon, and it was acknowledged to be impossible to lay down a hard-and-fast rule as to the time when liability to communicate disease was lost. It was suggested that the discharge produced by a few granular patches on the surface of the urethra would no longer provide a contagious discharge; but so long as discharge came from crypts and ducts of glands there was probability that it contained the power of communicating gonorrhœa.

Narrow Meatus.—Narrowness of the meatus was shown to be a common cause of the maintenance or prolongation of discharge, and moreover that symptoms of much greater importance might be produced by this abnormal condition of the outlet, such as difficulty in micturition—spasm at the deeper part of the urethra during the passage of a sound so great as to suggest the presence

of real stricture. The localities where granular patches and indurated areas were most commonly met with were pointed out, being the bulbous portion, and about three inches from the meatus.

The Relation of Glandular Changes to Gleet.—The occurrence of inflammation in the glands and closed ducts, causing small abscesses and fistula, as a source of gleet, was explained. The occasional extension of the inflammation to Cowper's glands was indicated by circumscribed perineal swelling away from the mesial line and near the crus penis, by the sudden disappearance of the swelling and the inconvenience caused by it, with simultaneous abundant discharge of pus during an act of micturition. The occasional formation of large abscess or perineal fistula, instead of evacuation of the Cowperian abscess, along the duct of the gland, was mentioned. The frequency of acute prostatitis, or of acute epididymitis, occurring at any period of the existence of a chronic urethritis, was also mentioned.

ABSTRACT OF THREE LECTURES

ON

THE MORBID ANATOMY, PATHOLOGY, AND TREATMENT OF HERNIA.

Delivered at the Royal College of Surgeons of England.

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LECTURE II.

IN the course of these lectures it will be shown that the sac of an acquired hernia is a late and extreme manifestation of the morbid state of the abdominal wall. The data which have been collected indicate that before the sac of an acquired hernia is created there is a preliminary bulging of the abdominal walls, especially in the region of the hypogastric fossæ, and therefore it is proposed, as a preliminary, to mention those fossæ; and this is the more called for because they are variable, and the non-recognition of some of their conditions leads to error and confusion.

The hypogastric fossæ have been described so often that an account of them is quite unnecessary. It is proposed to mention them under two headings, namely, congenital hypogastric fossæ and acquired hypogastric fossæ.

The congenital hypogastric fossæ are caused by the folds of peritoneum which are raised by the urachus, the obliterated hypogastric arteries, and by the epigastric arteries. They are given in the accompanying drawing (Fig. 3) of the front wall of the

Fig. 3.—The hypogastric fossæ of a male subject beyond middle age. The trunk was divided by a coronal section. The right hypogastric fossæ are deepest. B, bladder. Ex., external hypogastric fossa. I., internal hypogastric fossa. M., middle hypogastric fossa. Hy. L., left hypogastric fold. Hy. R., right hypogastric fold. Ep. A., fold of epigastric artery. Ur., fold of urachus. Sketch from a photograph by C. S. Patterson.