Genito-urinary and venereal diseases : A manual for students and practitioners / By Louis E. Schmidt.

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GENITO-URINARY AND VENEREAL DISEASES

SCHMIDT

PEDERSEN

The Medical Epitome Series.

GENITO-URINARY

AND

VENEREAL DISEASES.

A MANUAL FOR STUDENTS AND PRACTITIONERS.

BY

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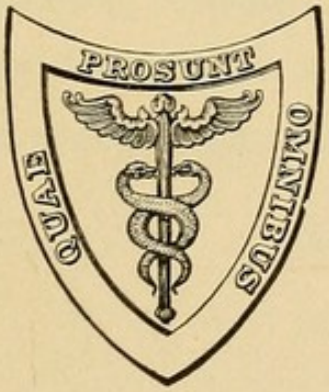

LEA BROTHERS & CO.,

PHILADELPHIA AND NEW YORK.

ELECTROTYPED BY
WESTCOTT & THOMSON, PHILADA.

PRESS OF
WM. J. DORNAN, PHILADA.

AUTHOR'S PREFACE.

THE present volume endeavors to cover the subject of Genito-urinary and Venereal Diseases briefly and clearly, to afford a comprehensive survey within a compact space, as a camera condenses a landscape, preserving all essentials in their proper place and proportion. In this way it has been possible to devote special attention to the more important diseases, their diagnosis and treatment, and to present the most trustworthy and practical medical and surgical therapeutics.

Though this work represents in a large measure the results of personal experience, reference has been freely made to the standard works of Keyes and Chetwood, Hyde and Montgomery, Neisser, Finger, Joseph, von Fritsch, Zuckerkandl, Jadassohn, Kümmel, Fuller, Taylor, Fürbringer, Sonnenburg, Schede, and Posner, to whose teachings I wish to render my grateful acknowledgment.

LOUIS E. SCHMIDT.

CHICAGO, *September, 1902.*

EDITOR'S PREFACE.

In arranging for the editorship of *The Medical Epitome Series* the publishers established a few simple conditions, namely, that the Series as a whole should embrace the entire realm of medicine; that the individual volumes should authoritatively cover their respective subjects in all essentials; and that the maximum amount of information, in letter-press and engravings, should be given for a minimum price. It was the belief of publishers and editor alike that brief works of high character would render valuable service not only to students, but also to practitioners who might wish to refresh or supplement their knowledge to date.

To the authors the editor extends his heartiest thanks for their excellent work. They have fully justified his choice in inviting them to undertake a kind of literary task which is always difficult—namely, the combination of brevity, clearness, and comprehensiveness. They have equalled the conscientious efforts with which the editor has performed his duties from first to last. Co-operation of this kind ought to result in useful books, in brief manuals as contradistinguished from mere compends.

In order to render the volumes suitable for quizzing, and yet preserve the continuity of the text unbroken, the questions have been gathered at the end of each chapter. This new arrangement, it is hoped, will be convenient alike to students and practitioners.

Victor C. Pedersen.

New York, *September, 1902.*

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GENITO-URINARY AND VENEREAL DISEASES.

INTRODUCTION.

THE term venereal diseases, applied strictly, should include only those diseases acquired during sexual intercourse. Necessarily the organs most often affected are the genitals, although other parts may first become involved.

Three distinct types of venereal disease are recognized: gonorrhœa, chancroid, and syphilis. They have one characteristic in common, and that is they are transmitted by contact. It is possible to transfer or to inoculate these diseases with instruments or objects which are infected, although the usual manner is during the sexual act. Gonorrhœa most always infects the urethra, although other mucous membranes may become affected without the urethra first becoming involved. As regards syphilis and chancroid, they appear most often on the genitalia, yet it is possible to inoculate their virus anywhere on the mucous membranes or skin of the body, *whenever there is a loss in their continuity.*

In the case of gonorrhœa and simple venereal ulcer there occur instances of pseudo-prototypes which show almost every point of similarity, yet differ only in their etiologic factor; that is, the bacterial origin is different. In these instances it is necessary to bear in mind that they may be non-venereal in character. They may, however, be acquired during the sexual act. Their clinical appearances are practically alike, consequently they may be mistaken for each other, unless the use of the microscope and the culture-media are brought into play. Therefore, whenever the absence of the gonococcus in a discharge or of the bacillus Ducrey-Unna in the

secretions of an ulcer is established, it is possible at times to believe that they did not arise from extra-marital relations. Their presence does not exclude the possibility of their having been acquired in an innocent manner. Their absence also gives the outline of the treatment to be established.

There are positive instances of other diseases transmitted during the sexual act, but these are, as it were, simply of an intercurrent type, and cannot truly be classified under the heading of venereal diseases. The more common of these are pediculosis pubis, molluscum contagiosum, and scabies. As they are comparatively rarely transmitted at these times, and only accidentally, their description will be omitted. Properly, most of such diseases belong to the domain of dermatology, and will be found suitably described in the volume on that subject.

QUESTIONS ON THE INTRODUCTORY PART.

What is meant by venereal disease?
Mention the three venereal diseases.
Have they any characteristic which is common to them all?
What is the usual manner of infection?
Does gonorrhœa ever become inoculated primarily in any other place than in the urethra?
Are there discharges from the urethra that are not gonorrhœal?
Are there ulcers which resemble the chancroid, but differ in the absence of the Ducrey-Unna bacillus?
Can these be venereal?
Of what value is it to know the etiologic factor in these cases?
What other diseases can be transmitted during the sexual act?
To what general class do such other diseases belong?

PART I.

VENEREAL DISEASES.

SYPHILIS.

Definition.—Syphilis is a disease characterized by a definite course and certain pathological changes. It is classed among the infectious diseases and pursues a chronic course. In the early stages it assumes the appearance of an acute exanthematous disease, and in the later period the characteristic appearances of tuberculosis and leprosy occur.

Etiology.—It is peculiar to the human race, and up to the present time the carrier of infection is unknown.

ACQUIRED SYPHILIS.

Syphilis is transmitted :

1. By *inoculation.* The infectious material enters the usually broken surface of either the skin or the mucous membrane. There must be a loss of continuity of tissue in order for the virus to gain entrance. When so contracted, it is called "*acquired,*" and often "*contact,*" syphilis.

2. By the presence of the infectious material in the embryo, or by the transmission of the same through the placenta. This is called "*inherited,*" "*hereditary,*" and "*congenital*" syphilis.

Symptoms.—Acquired syphilis is commonly transmitted at the time of sexual intercourse, and for this reason is counted among the venereal diseases. Immediately following the inoculation the "period of first incubation" sets in. During this time, of from ten to thirty days, nothing noticeable to the eye occurs. Then a sclerosis, a hardness of the base

varying in thickness, makes its appearance. This is called the initial or primary lesion, or hard chancre. It is the beginning of the "period of second incubation"; in other words, the affection now becomes constitutional. Practically, in all cases the glands most directly connected with the lesion become markedly enlarged. Then, in the course of from four to six weeks, all the glands become more or less involved; in other words, a general adenopathy occurs.

Constitutional Symptoms.—Malaise, loss of appetite, headaches, etc., arise. It is during this period that reinoculation becomes impossible. There are a limited number of cases, however, that do not show either any subjective or objective symptoms in this period. At the end of the period of second incubation the first eruption, which manifests itself as a roseola, comes to view. Then the syphilis is recognized as having become constitutional and the primary stage has passed. The first incubation requires from three to four weeks; the second, from three to eight weeks; that is, from six to ten weeks elapse from the time of infection to the appearance of the first general eruption.

Course.—The course of syphilis from this point is variable, and recurrences at irregular intervals and periods of latency occur.

Divisions of the entire course of syphilis have been made from different standpoints, such as *initial* or *invasion period*, and again into *secondary* and *tertiary periods;* also into *early* and *late signs.* It must be understood that it is impossible to define sharply secondary and tertiary, and to distinguish fundamentally between early and late, as they necessarily overlap each other, and in some cases both are present in the same patient. The most marked differences between secondary and tertiary symptoms are:

Secondary.	Tertiary.
1. Arise and develop quickly.	1. Arise and develop slowly.
2. Symmetrical, disseminated, and multiple.	2. Asymmetrical, scattered, and usually isolated.
3. Rarely grouped.	3. Usually grouped.
4. Highly infectious.	4. Not regarded so.

Secondary.	Tertiary.
5. Heal without scars.	5. Scars always follow loss of substance.
6. Therapeutically react to mercury.	6. React to iodides.
7. Predilection for skin.	7. Tendency for deep-seated parts, notably viscera.
8. Usually within first year of infection.	8. Most often in later years.

Reinfection.—The possibility of reinfection is not an absolute law, although there are some apparently authentic cases. Probably, however, no reinfection can occur so long as any late symptoms are present, but only where a prolonged period of supposed health and of freedom from symptoms of syphilis has intervened, hence constituting a relapse.

Contagiousness.—All lesions belonging to primary and secondary periods, when not covered by epithelium, are contagious. The tertiary are, as a rule, probably not; nevertheless, if tertiary signs arise soon after the initial lesion, there is great likelihood that they are contagious. The blood, especially during the secondary stage, and crusts from other skin diseases removed with underlying secretion, may be contagious.

The contagiousness of syphilis, so far as is known, depends on: 1. The age of the disease. 2. The treatment and character of the same. 3. From the type and localization of the lesion.

Only hereditary syphilis, or from-mother-to-child syphilis, is recognized to exist without a primary lesion. In all other cases it is doubtful whether it occurs, hence *syphilis d'emblée* is exceedingly questionable.

The part played in syphilis by peculiar potency of the virus, by age of the individual, by idiosyncracy, and by place of inoculation, is not exactly determined as regards the severity of its course.

The Initial Lesion.—Whenever syphilitic virus without the addition of any other infectious material enters the skin or mucous membrane, a red papule appears as the *initial lesion*—*primary sore*, *ulcus durum*, or *Hunterian chancre*. It may appear in different forms: as an erosion, as a dry, scaling, and

indurated papule, as an ulcer, and with various other appearances which are more or less uncommon. Chancres vary in size from that of a minute pin-head to a silver dollar. All have their appearance more or less changed according to their location, whether on corona glandis, intra-urethram, on scrotum, tonsils, tongue, or on any other portion of the body. Their appearance always varies, whether or not inoculation occurred on a rhagade or a herpetic eruption. At the time of inoculation there may be more than one point; in fact, as many chancres may appear as there are points of inoculation. The size and number of chancres have no bearing on the course of syphilis. According to location, we divide chancres into two classes : *extragenital chancres*, as those on lips, fingers, etc.—these may, however, be gained by disgusting and unnatural practices in sexual relations. *Genital chancres* are those on the genitals or the parts immediately surrounding the genitals. "Lues insontium" includes hereditary syphilis and the innocently acquired genital or extragenital chancres.

Complications of Initial Lesions.—These are rare, but may arise. Those of a purely syphilitic nature—œdema indurativum—a dark livid to brownish colored thickening of skin about the lesion. Again, the lymph-vessels leading from the chancre may become excessively hard and large. If from the glans, a lymphangitis leads to a node at the pubes which may become of hazel-nut size, called "syphilitic bubonulus." Non-syphilitic complications, as phimosis, paraphimosis, balanitis, vaginitis, and others, are not uncommon. Occasionally chancres cause a permanent phimosis. Again, if chancre exists at the external urethral orifice, a stricture is readily caused.

Immediately following the primary sore the glands in direct connection with the lesion become enlarged, usually within one or two weeks, and are characterized by being isolated from one another; hard and painless, and increased in size : if on the penis, the inguinal glands; if on the finger, the axillary glands ; if on the tongue, the submaxillary glands.

The Differential Diagnosis of Extragenital Chancres.—To this subject especial study should be given. It has usually

been neglected, simply because too little thought is commonly given to the possibility. Whenever a sore of any kind occurs about the lips, anus, bearded face, finger, nipple, or elsewhere, which has a tendency to heal slowly, one must consider the possibility of its being a chancre. In these cases we will usually find all the glands of the first affected group much involved, and always still later general adenopathy occurs. The glands first involved may be enormously enlarged, and again but slightly in other cases. These glands have no tendency to lead to suppuration, and are called indolent buboes. With the development of the regionary glandular swellings the primary symptoms come to an end. During the period of second incubation the multiple general adenitis sets in. Without any inflammatory signs all the glands of the body enlarge *painlessly* and are of a hard consistence. If a lesion having some of the appearances of syphilis has been in doubt, when this adenopathy occurs, it clears up the diagnosis. During this period general symptoms arise, although in a large number of cases they are absent, or at least unobserved. They consist of rheumatic and neuralgic pains, headaches, slight rises in temperature, exaggeration of reflexes, enlargement of spleen, anemia, and even icterus. The period of second incubation ceases as soon as the first eruption makes its appearance. As an occasional occurrence, really severe or intense subjective and objective symptoms appear just prior to or accompanying the outbreak of the eruption. At times this is marked enough to simulate the invasion of one of the exanthemata, and a differentiation must always be carefully made. During any eruptive period there is a diminution of hæmoglobin, a reduction in red blood-corpuscles, and an increase of leucocytes. By syphilides or syphilodermata, early eruptions and infiltrations are meant. By syphiloma, the gummatous deposits are considered. All are readily classified as follows :

I. Macular : (*a*) Erythematous ; (*b*) pigmentary ; (*c*) purpuric.

II. Papular : 1. *Dry*—(*a*) miliary ; (*b*) lenticular. 2. *Moist*—(*a*) mucous patches ; (*b*) condylomata lata.

III. Pustular: (*a*) miliary; (*b*) lenticular.
IV. Tubercular.
V. Gummatous.

I. Macular Syphilodermata.

This first *exanthem* develops either acutely or oftentimes quite slowly. It may be exceedingly mild in character and scarcely noticeable, or it may be very evident. It becomes more prominent when the patient removes the clothing, being due to a change in temperature of the body. It occurs usually about the sixth week after the appearance of the chancre. Then multiple round or oval spots up to the size of a split pea, of color varying from yellowish-red to light-rose tint occur. Under pressure the color is made to disappear. The abdomen best shows the eruption, but it occurs as well over face, forehead, neck, and extremities. It is never restricted to any particular surface. In some cases the macules may have a tendency to group themselves. This eruption may disappear without any treatment. A late roseola occurs in which there are larger efflorescences grouped, having a tendency to scale slightly. *Pigmentary* syphiloderm is regarded as occurring without any previous eruption, and is apparently a circumscribed loss of pigment, most commonly noticeable in women about the neck. It consists of a network of brownish colored pigment. A pigment atrophy and hypertrophy are at the same time going on. It occurs early and is persistent, and is not readily amenable to treatment, called leucoderma. *Purpuric* eruption occasionally is seen, most often during the course of mercurial treatment or in those of low vitality. This eruption consists of small purplish spots which do not disappear under pressure.

II. Papular Syphilodermata.

These are exceedingly common. Their situation, grouping, and color are characteristic. They may follow a macular eruption, and vary in size up to that of a silver ten-cent piece; they may be flat or conical, dry or moist, with color varying

from a dark-red to a ham color. This eruption, usually slightly scaly, is common on the brow, and has received the name "*corona veneris.*" Whenever papules exist where surfaces come into contact they commence to secrete, enlarge, and become irritating.

Dry miliary papules occur in patients whose general condition is poor. They are usually pin-head in size, conical, sometimes umbilicated, symmetrical, diffusely arranged, copper-colored, and at the beginning may be surmounted by small vesicles and later become scaly.

Lenticular papules, discrete, rarely elevated, with the foregoing characteristics, are very common. These may become squamous, and are then termed papulo-squamous syphilodermata. This is the type mistaken for psoriasis. Here the scales are dirty, friable, and adherent. This is not uncommon on the palms of the hands and soles of the feet, being commonly called palmar and plantar "syphilitic psoriasis."

Moist papules or *mucous patches* occurring on the mucous surfaces are flattened infiltrations of varying sizes, slightly elevated above the adjacent mucosa, surrounded by an exceedingly narrow band of red, the surface covered with a whitish or grayish film. They may be single or multiple, and the patches vary in size; may be red for a time only, and then acquire an opaline hue and involve any part of the mouth; they are usually painful. These may become distinctly eroded, of a dark-red color, and a pellicle may follow. If about the vulva, a slight verrucous condition may appear after these erosions. Ulcerative processes may occur, these being exceedingly common on the tonsils and soft palate; usually superficial and exceedingly painful. Oftentimes, especially among smokers, spots or bands, silver white and smooth, are seen in syphilitic patients. This leucoplakia cannot be differentiated from the same condition which may occur in lichen planus. It is regarded by some pathologists as the premonitory step to epithelioma. A similar condition to mucous patches exists also when papules occur where surfaces come together, as between the nates, and are then called *moist papules.* If this condition exists for any length of time they metamorphose,

and *condylomata lata* make their appearance, become disc-like, flat and warty, and give off an offensive odor and a thin, serous to seropurulent, *very highly infective* discharge.

III. Pustular Syphilodermata.

These usually follow papules, but may arise as pustules. External application and internal medication of various kinds may be the cause of the vesicles, and these in turn be infected. They occur most commonly in unclean and poorly nourished individuals, are miliary in type, usually pin-head in size, and then pass into the lenticular variety. These pustular syphilodermata are again divided into *pustulo-crustaceous* or *pustulo-ulcerative* syphilodermata. A peculiar, oyster-shell-like eruption of this type is met with, and is known as "*rupia.*"

IV. Tubercular Syphilodermata.

Tubercles may be few or numerous, grouped or generalized, and are usually observed after the second year; they are circumscribed, subcutaneous infiltrations, reach the size of a large pea, or are commonly roundish, and the cause of no special symptoms. They may ulcerate and become covered with crusts or atrophic changes may occur. These tubercles may be serpiginous or "creeping," although almost every syphilitic eruption may have this tendency. A vegetating type of syphilis is often seen in the moist forms of syphilis.

V. Gummatous Syphilodermata.

When we apply this term to skin lesions we mean circumscribed nodules, involving often both skin and subcutaneous tissue; but they may attack underlying tissues. The size is variable, up to that of a lemon; the color of the skin is normal, but when breaking down is threatened, the color of the skin becomes purplish. They are regarded as late syphilitic forms, most often localized to one part of the body. When softening has set in, a gummy discharge occurs after

rupture of the degenerated area. Considerable deformity often remains.

Any of the appendages of the skin may be involved. There are two types of loss of hair: one in which the loss of hair is due to the action of the virus of syphilis, probably upon the nerve-endings; and, secondly, where there is destruction of the scalp. The first is an early sign, and all hairs of the body may be involved, and the *alopecia* may be diffuse or more or less circumscribed. Syphilitic affection of the nails and surrounding tissue occurs: *onychia*, when changes are limited to the nail itself, and *paronychia*, when involving the substance about the nail.

The lesions appearing in the later period of syphilis are manifold, although affections of the eye, as iritis and periostitis, are also seen quite often in the early months of syphilis. In *iritis* we have a discoloration of the iris, cloudiness of the pupil, which is usually irregular, and severe hyperemia of the adjacent parts. It does not readily react to light, and is usually quite small, often with pain in the temporal region. The sight is necessarily impaired. The prognosis is good if treated immediately.

Periostitis manifests itself often as nodes, especially over the tibiæ and forehead, accompanied by pain, and is readily amenable to iodide of potassium.

It is impossible to enter into a description of the manifold affections in a short review. *Suffice to say that syphilis can enter as a direct or indirect factor in the cause of disease of any part of the body. It may completely destroy or impair the function of any organ of the body.*

To repeat, it can be stated that for differential diagnosis of secondary syphilides—

(1) The larger number show no acute inflammatory symptoms; (2) but rarely cause pain or itching; (3) and are mostly polymorphous.

Whenever doubt of the lesion exists, the mucous membranes, glands, and the remains or the scar of an initial lesion should always be looked for systematically in the regions of possible occurrence, both genital and extragenital.

Prognosis.—In considering the prognosis, syphilis must always be regarded as a grave and chronic disease. In no instance is it possible to state the length of time necessary to prevent any recurrence. *It can be stated with truthfulness that there is scarcely any other disease that is more amenable to proper, persevering, systematic treatment than syphilis.* As cases of reinfection are known, it has come to be thought that syphilis is curable. At the beginning of an attack the prognosis should be guarded, and later, after a thorough course of treatment of several years' duration, and then following a period of years without any signs or symptoms one must be hopeful for a complete cure. It is desirable to speak in the most favorable and hopeful manner to avoid hypochondriasis and syphilophobia, as fear and anxiety often cause these conditions. If at any time during the course of syphilis vital organs are affected, it is termed "*syphilis gravis.*" If gummata occur early,—that is, during the early secondary period,—it is referred to as "*syphilis gallopans,*" or "*syphilis maligna.*"

HEREDITARY SYPHILIS.

Definition.—Under hereditary syphilis we regard all those cases of syphilitic infection which exist previous to birth, no matter whether any syphilitic signs are present at the time of birth or whether they first appear at a later period.

Theories of Hereditary Transmission.—To illustrate, take the most simple case: If syphilis is present in both parents or in the mother at the time of conception.

If the mother is free from syphilis at the time of impregnation, we have possible:

1. From the father, if syphilitic, the syphilitic virus or germ, and then theoretically: (*a*) The mother at the time of conception becomes infected with the sperma (*syphilis d' emblée*). (*b*) The mother becomes infected during the time the living, from-the-father-infected fœtus is in the uterus—called "*choc en retour.*" (*c*) The mother during gravidity is healthy and remains so; but she becomes through the placental circulation of the embryo immune against syphilis,

and can be infected neither by the hereditary syphilitic child nor in any other manner (*Colles's law*). However, in a much later period the mother may suddenly show tertiary syphilis without any previous symptoms, and again the mother may remain immune only during gravidity, but become infected at any later period.

2. If both father and mother are healthy at time of conception, but if mother becomes affected during gravidity one may have: (*a*) The child may escape infection. (*b*) The child may become infected through the placenta and be aborted or miscarried, or show positive signs of syphilis at time of birth, or may show signs of hereditary syphilis at a later period. (*c*) The child may be immunized up to the time of birth or longer, or may be in other cases infected at birth or at a later period.

If aborted, it is due to infection on the part of the mother. In these cases syphilitic changes can usually be seen either in the fœtus or placenta, or both. Rarely are they entirely absent.

The more recent the syphilis of the father or mother or both, the more certainly will there be hereditary transmission, and the more severely is the embryo affected. If both parents are affected the danger is greatest. When the mother only, hereditary infection is more certain than when the father alone is infected. Wherever these conditions exist there has been noticed a gradual diminution of the severity. At first abortions would occur; then miscarriage; then children at term, with syphilitic manifestations; and, finally, apparently healthy children. Profeta's law holds that "*Healthy children begotten from syphilitic parents are immune against syphilis.*" This statement cannot be substantiated. Reinfections upon hereditary syphilis have apparently been proved.

The clinical appearances of hereditary syphilis depend entirely on the severity of the infection. In the cases of syphilitic fœtuses and children, visceral changes play an important rôle. Changes in the spleen, liver, kidney, pancreas, lungs, testicles, and marked anæmia are not unusual.

In the more severe cases the child may be born too early or at term, and then show grave nutritive conditions. When miscarriages occur, the fœtus usually has been dead for some time, and the skin is always in a macerated condition. When the child is born the skin is flaccid and withered and of grayish-yellow tint; the child has the appearance of senility, with wrinkles leading from the angle of the mouth and about the nose and eyes, and is weazened. Coryza, or "snuffles," pemphigus syphiliticus neonatorum, affecting especially the soles of the feet and the palms of the hands, if not present at birth, arise soon after. Certain exanthemata occur which have been described under Acquired Syphilis. Besides, rhagades affecting the lips, ulcerating plaques in the mouth, condylomata lata about the anus, alopecia, and changes in the nails may all occur. Bone affections are not at all uncommon: circumscribed periostitis, dactylitis, joint-affections, and the sabre-blade deformities of the long bones are also seen. Hutchinson set up a triad of stigmata; they consist of *parenchymatous keratitis, accompanying a sudden deafness in connection with labyrinth deafness, and especially Hutchinson teeth.* These teeth occur variously; but typically the upper incisors must have crescent-shaped erosions. *In addition to these three a choroiditis is frequently noticeable.*

Whether syphilitic lesions can appear as late as from the seventh to the eighteenth year without having shown any symptoms of syphilis in childhood is doubted. Fournier refers to it as "*syphilis hereditaria tarda.*" The question whether or not syphilis can be transmitted to the third generation is questionable. It can at present be stated almost positively that there are no known authentic cases.

TREATMENT OF SYPHILIS.

General Principles.—Since syphilis is recognized as a chronic disease, the treatment must naturally be governed by this fact. Hence it requires an extended, thorough, and systematic management. As cases vary from one another they must be, to a certain extent, treated accordingly. However,

it is of prime importance to pay especial attention to the general health of every patient. Whenever an intercurrent sickness is present, this always demands the proper attention. In addition to this, it is imperative, for the welfare of the individual, to secure the *best hygienic condition.* The *diet* should consist of plain but substantial food. Alcoholic beverages should be allowed with discretion. The use of tobacco in the early stages should be forbidden. *All the functions of the body should be kept active.* The skin should receive a great deal of attention. Frequent, in fact daily, warm baths, followed with cool spongings and rubbing with sea-salt, are helpful in keeping the skin in perfect condition. The kidneys should be kept active and the bowels should be kept regular.

Aims.—In the treatment of syphilis we purpose: 1. To suppress any signs or symptoms which exist. 2. To destroy the existing virus and thus preventing any recurrences of infection and transmission by heredity.

Abortive Treatment.—It is pertinent at this point to ask: "Is there an abortive treatment for syphilis?" In other words, can the virus be prevented from entering the circulation? The large majority of authorities agree that this impossible. However, it can be stated that *if but a few hours intervene after the appearance of a lesion,* and if easily accessible and complete excision is allowable, it should be done. It is true that in such a case the correct diagnosis is not possible. But should we wait? In doing so it will be too late, for the lymphatics will become invaded. Should the chancre be within the urethra or at a point where an excision is impossible, thorough cauterization with strong carbolic acid (100 per cent.) is to be advised. *If the lesion has existed for some time,* neither cauterization nor excision should be practised.

Specific Treatment.—In case this abortive treatment could not be instituted, should the specific treatment be commenced at once, or should we wait until the macular eruption appears? *There can be no denial of the fact that it is absolutely wrong to commence treatment until the diagnosis is positive.* If the

diagnosis of an initial lesion is certain, general treatment, often called preventive treatment, is instituted. It is quite positively known, however, that it will not prevent, in the course of time, the appearance of symptoms. In some respects it appears rational to attempt to destroy by general treatment the further ingress into the system of the virus, *yet experience in a large number of cases has shown that it is advisable to wait for the roseola to appear.* In doing so we neither endanger the patient in any way nor interfere with the results of the treatment which is to follow. In regard to the length of time required for treatment, again no definite answer can be given.

Duration of Treatment.—Some cases may require but fairly mild treatment for three or four years in order to avoid any further sign or symptom. Again, others may require energetic and uninterrupted attention for twice that number of years. *So long as any evidences persist the treatment should continue, and for one-half as long again.* It can, however, be stated that the course of the disease, whether or not vital organs are affected, the character and the course of the lesions, influence the mode and the duration of the systemic treatment.

Medicinal Treatment.—This consists of the imbibition, by the mouth, of remedies—the so-called "*internal*" *treatment;* or applied externally—the "*external*" *treatment.* Besides these, there are certain other methods. The "*tonic*" *treatment* consists of establishing for each individual a maximum dosage of certain drugs which give effective results, and then to continue constantly for months or even years. The "*symptomatic*" or "*expectant*" *plan* consists in waiting for the appearance of symptoms and then treating accordingly. This method must be condemned in the strongest terms. The "*interrupted*" *plan* follows a more or less definite plan of treatment, covering a period of years. External or internal treatment, followed by varying periods of rest, with the purpose of allowing time for the mercury to be eliminated, the entire time covering some years, is what is also termed the "*chronic intermittent*" *form of treatment.*

Mercury in some form, and given in a definite manner, is

the remedy and is practically the *specific* for syphilis. It not only causes symptoms to disappear; influences not only the virulency of the disease; but prevents hereditary transmission. Mercury is given by the mouth, hypodermatically, or by the skin. The last way allows of different methods, as by rubbings, baths, vaporizations, and other methods. It is almost the general consensus of opinion that the hypodermatic or rubbing methods are energetic modes of treatment. Each has its advantage and disadvantages, and must be used with some definite purpose in view. Rubbings are uncleanly and require strength and also time; but, again, are usually followed by apparently the desired results. Hypodermatic injections may be painful and occasionally followed by emboli, abscesses, and other bad results. Both modes, however, avoid the stomach, and can be given in those cases where mercury would cause distress. Internal treatment often is not followed with the immediate and satisfactory results of other methods. Besides, when taken by the mouth, complications from the gastro-intestinal canal arise more easily. For these reasons one of the methods of giving mercury is selected and the chronic intermittent treatment is then begun. *In the first year at least three or four such courses; the second, two or three; and the following years, one or two; interspersing throughout, internal treatment.* In addition to this, exceedingly small quantities of *iodide of potassium* should be given at regular intervals during the first year, increasing at stated intervals in the later years. At least four to five years' treatment and an interval of three years without any symptoms or treatment whatsoever must elapse before the average patient can be pronounced cured. Even later, the so-called "*prophylactic*" *treatment*, in order to avoid any possible recurrence, should be regularly instituted.

Inunctions.—Official unguentum hydrargyrum, mercury vasogen, mercury soap, and mercury resorcin—all 50 per cent. of hydrargyrum—are the preparations to be used. The latter preparations, however, are proprietary articles, yet have distinct advantages. Usually from 1 to 8 grammes ($\frac{1}{4}$–2 drachms) daily are used. Definite parts of the body are

inuncted for at least twenty to thirty minutes each time; best regularly at the same time of day. *Daily baths* or at regular intervals are essential. The body should be mapped out into areas and no area should receive a second inunction before all the others have each been anointed once in turn. Examples of such areas are: neck, chest, back, abdomen, loins, buttock, thigh, leg and foot, arm, forearm and hand of each side, etc. *It usually requires thirty to sixty inunctions for an energetic treatment.* As a rule, at least one-half that number more of rubbings are required in order to have a syphilide disappear. If it requires thirty, one-half more would be fifteen; in all, then, forty-five rubbings. This mode of treatment may cause follicular dermatitis and other complications, which can, as a rule, be easily treated. Taylor teaches that after having anointed each of the above zones once a respite of a few days before repeating the series is advisable.

Applications of mercurial plaster covering large areas of skin, or putting mercurial ointment in bags or on lint and placing about the body, or using in a pillow, are methods lately introduced (Welander, Blascho). In these the mercury need not come in contact with the patient.

The Hypodermatic Mode of Treatment.—This has come into general use in past years. Both soluble and insoluble salts of mercury and mercury itself are used. As a rule, 30 to 50 injections of a 1 per cent. solution of a soluble salt given on consecutive days if no contraindication arises are used, and again 8 to 12 injections of insoluble salts—one about every five days—are regarded as energetic treatment. These injections are given subcutaneously, intramuscularly (then called deep), or intravenously. Some of the more common formulas used, subcutaneously, intramuscularly, or intravenously, are:

℞. Bichloride of mercury, 1.0 gramme;
Sodium chloride, 6.0 grammes;
Distilled water, 100.0 "

℞. Cyanide of mercury, 1.0 gramme;
Cocaine hydrochlorate, 1.0 "
Distilled water, 100.0 grammes;

These are types of solution belonging to the *soluble salts of mercury.* One cubic centimeter injected daily or every second day.

℞. Calomel, 5.0 grammes;
Paraffin oil, 100.0 "

℞. Salicylate of mercury, 5.0 grammes;
Liquid paraffin, 100.0 "

℞. Peptonate of mercury, 5.0 grammes;
Sodium chloride, 5.0 "
Water, distilled, 100.0 "

These are types of the *insoluble salts of mercury.*

℞. Bichloride of mercury, 5.0 grammes;
Sodium chloride, 5.0 "
Distilled water, 100.0 "

The last is a soluble salt, but is used like the insoluble salts—1 c.c. every five days.

Eight to twelve injections are regarded as sufficient for each individual treatment. Possibly four such courses the first, and three the next, and then shading off in the following years.

Lang's gray oil is a preparation of metallic mercury with lanoline and oil. Of this, only 0.1 c.c. about every fifth day.

For intravenous injections, and only when mercury is imperative, the following formula is serviceable:

℞. Bichloride of mercury, 0.1–0.5 gramme;
Sodium chloride, 5.0 grammes;
Distilled water, 100.0 "

1 to 2 c.c. once to twice daily.

Fumigations and baths of *soluble salts of mercury* may be of service in individual cases, especially where there are pustular or ulcerative eruptions, which essentially preclude other cutaneous applications, although they demand local medication.

Internal Medication.—If mercury is given by mouth, one should establish the maximum dose and then continue until symptoms disappear. It is advisable to decrease the dose as as the indication arises. The remedy selected must give the desired results, and must not interfere with digestion. The protoiodide of mercury is the form most extensively used internally. Occasionally it is necessary to give some preparation of opium so as to prevent diarrhœa, and so that larger quantities can be given.

Protoiodide of mercury in pills, each 0.01 to 0.02 gramme, and from 3 to 9 pills each day.

Tannate of mercury in pills, each 0.05 to 0.10 gramme, and from 3 to 6 pills each day.

Calomel in powders, each 0.01 gramme, from 3 to 6 powders each day.

Gray powder, a mixture of mercury with chalk, in powders, each 0.05 to 0.25 gramme, from 3 to 6 powders each day.

Throughout the course of syphilis the large majority of patients take with advantage some form of iron. If mercury is given internally, it may be incorporated with it. Blaud's pills, or elixir of iron, quinine, and strychnine, syrup of iodide of iron, are useful preparations.

Sequelæ of Treatment.—During the course of any of the mercurial treatments mercurial stomatitis and also diarrhœa may arise. Besides, there may be a peculiar mental depression during which the patient is restless and downcast. Salivation may be caused by an idiosyncrasy, or the patient may not have observed cleanliness of the mouth. When it sets in, there is a free flow of saliva; the breath becomes fœtid; gums, tongue, and lips are swollen and bleed easily; the teeth ache, loosen, and may fall out; and there is a peculiar metallic taste. *When this condition sets in, it should be remembered that*

the mercury is the cause. Therefore, it must be our object to eliminate it as quickly as possible by using general hygienic principles and giving the mouth a great deal of local attention, as by the use of mouth-washes of peroxide of hydrogen or saturated solution of chlorate of potassium ; or applications of—

℞. Tincture of iodin,
Tincture of myrrh, of each, 15.0 grammes.

Or

℞. Ten per cent. chromic acid solution.

Mercurial dermatitis occurs in some cases. Stop the external application and treat with bland ointments or dusting powder. Folliculitis readily follows in hairy individuals. In such a case no inunctions are given to these parts.

In addition to mercury there is *iodine* or its *preparations,* which react especially in those forms of syphilis where infiltrations occur. This is in the later forms of syphilis, and consequently they have a more limited use. However, the symptoms,—often called general symptoms,—as fever and headache, react only to iodides. Again, when symptoms arise from the bony or nervous systems, we must use iodine in some form in order to get relief. In these cases iodide of potassium, 1 gramme three times a day, is to be taken with plenty of water, after meals. If this is not sufficient, the dose can be gradually increased. Where destruction of tissue is threatened, as may occur in the late forms of syphilis, even so high as 10 grammes, or more, may be given three times a day. Iodipin, 10 to 25 per cent., an iodine preparation, iodine vasogen, 6 to 10 per cent., are more or less useful preparations. They may be given either by the mouth or hypodermatically, from 1 to 5 c.c. once or twice a day. Whenever there are signs or symptoms, even in the earliest period, iodine in some form should be given. In an ordinary case there is not much need for it in the first year. However, it should be given in the following years with regularity, even if signs or symptoms are absent.

Occasionally iodinism makes its appearance and the mucous membranes may show symptoms. Atropine sulphate is then to be given until physiological reaction follows. Sulfanilic acid, from 3 to 5 grammes two or three times a day, has given fair results in some cases. In order to work up to extreme doses Starr recommends a saturated solution of potassium iodide, with an initial dose of 5 to 10 drops, increased by 1 drop each day for one or two weeks, according to indications of tolerance, then decreasing 1 drop each day for half this time, followed by a regular series of similar increases and partial recessions; thus a daily dose of 500 drops can in a few months be established without poisoning.

Mixed treatment refers to the imbibition of both mercury and iodine at the same time. They may be given in the same manner, or one by mouth and the other by inunction, or in any other combination. This method is usually desirable in the later forms of syphilis. When given internally, mercury and the iodides may be combined as follows:

℞ Hydrargyri bichloridi, 0.12 gramme;
Potassii iodidi, 10.00 grammes;
Tincturæ cinchonæ, 30.00 "
Elix. simp., q. s. ad 120.00 "
M. & Sig.—One teaspoonful with water after each meal.

℞ Hydrargyri bichloridi, 0.05 gramme;
Potassii iodidi, 10.00 grammes;
Pulv. liquiritiæ, 5.00 "
Ext. liquiritiæ, q. s.
Fiat massa et div. in pil. No. xxx.
Sig.—One pill after each meal.

Protoiodide of mercury is virtually mixed treatment. This combination retains both the properties of mercury and iodine, yet is usually given in small quantities for very prolonged periods of time, with the object of preventing both secondary and tertiary changes.

In all antisyphilitic internal medication it must be borne in mind that certain individuals will accept it best about two hours after meals, when the stomach is presumably empty, with a large quantity (at least a tumblerful) of water. Given at other times such persons' stomachs will react unfavorably.

Local Treatment.—It is often necessary to treat the individual syphilitic sores. The initial lesion should be kept clean with 1 : 1000 bichloride of mercury solution. If this is an erosion, it may be covered with mercurial mull or with calomel. In some cases mercurial salve may be desirable.

Enlarged glands are treated with iodine vasogen or inunction of—

℞ Ung. potassii iodidi,
Ung. hydrargyri, āā 12.5 grammes ;
Ung. belladon., q. s. ad 30.0 "
M. & Sig.—Apply several times daily.

Again, hypodermatic injections of mercury directly into the glandular substance.

Moist papules are to be kept clean with bichloride of mercury solution, and the part covered with calomel or dusting-powder as follows :

℞ Calomel, 10.0 grammes ;
Dermatol, 5.0 "
M. & Sig.—Dust parts and keep them separated with gauze.

Plaques of the mouth require spraying with peroxide of hydrogen, or gargling with chlorate of potassium solution, or permanganate of potassium, 1 : 5000. Occasionally applications of—

℞ Bichloride of mercury, 1.0 gramme ;
Alcoholis,
Ætheris, āā 50.0 grammes.
M. & Sig.—External use, as directed.

give quick relief.

As a rule, daily applications of stick silver nitrate bring the best results.

In the cases of syphilomata, covering the parts with mercurial ointment is almost necessary in order to gain a good outcome.

When loss of hair occurs, applications of weak bichloride of mercury solution, 1 : 5000, or of ammoniate of mercury salve, avail.

The treatment of *hereditary syphilis* is practically the same as that of the acquired, using, of course, minimum doses and gradually increasing. In addition, the iodides may be given more freely in the early period.

QUESTIONS ON SYPHILIS.

What is syphilis?
How is syphilis transmitted?
What is the most common manner of transmission?
What is the period of incubation?
Describe the course of syphilis.
What are the constitutional symptoms of syphilis, and when do they usually arise?
Mention the most marked differences between secondary and tertiary lesions.
What do we mean by reinfection? Is it possible in the case of syphilis?
What lesions of syphilis are contagious?
On what does the contagiousness of the lesions depend?
Describe the various appearances of the initial lesion.
Can there be more than one "chancre" at one time?
What is meant by "lues insontium"?
What are the complications of the initial lesion?
What do we mean by an extragenital chancre?
What are the changes in the blood in the secondary stage of syphilis?
What is meant by syphilides—by syphilomata?
Describe the different individual forms of syphilitic eruption.
What is syphilitic psoriasis?
What is meant by leukoplakia?
Mention the more common syphilitic affections of the appendages of the skin.
What are the important features distinguishing secondary syphilitic lesions?
What is meant by syphilis gravis?
What is meant by syphilis gallopans or maligna?
What is the prognosis of syphilis?
What is meant by hereditary syphilis?
How may it be transmitted?
What is syphilis d'emblée?
What is Colles's law?
What is Profeta's law?
What is meant by syphilis hereditaria tarda?

Is syphilis ever transmitted to the third generation?
Describe the clinical course of a syphilitic conception.
In the treatment of syphilis why should the general health be considered?
What do we attempt to attain in the treatment of syphilis?
Is there an abortive plan for the treatment of syphilis? If so, describe it. Should it ever be instituted?
When should the systemic treatment be commenced?
What is the preventive treatment?
Is there a definite length of time for the treatment of syphilis?
What are the different forms of medicinal treatment?
Describe the different individual forms of treatment.
What is mercurial stomatitis?
How would you treat it?
What preparation is used in the late forms of syphilis?
In what particular instances are the iodides valuable in the early stages of syphilis?
How would you treat an initial lesion?
How would you treat a syphilitic bubo?
What is iodinism, and how would you treat this condition?
What is mixed treatment?
How would you treat mucous patches?
How would you treat condylomata lata?
How would you treat gummata?
How would you treat syphilitic alopecia?
How would you treat a case of hereditary syphilis?
Describe the method of establishing tolerance for large doses of iodine in severe cases.

CHANCROID.

Definition.—Chancroid is a contagious disease of local type, usually acquired during the sexual act. It often occurs on the genitalia, although it may appear on any of the mucous membranes or on any part of the body. It is never accompanied by constitutional symptoms. Usually there are several suppurating and ulcerating lesions which vary in size and appearance. We refer to these lesions as *simple* or *soft chancre* or *ulcus molle.*

Etiology.—Their cause can, at the present time, scarcely be doubted, and the micro-organism, as described by Ducrey, Unna, and others, can be found in every case. It is a short, thick bacillus, with slightly rounded extremities, occurs often in chains, sometimes in groups, either in the cells or between them, and is readily stained with borax-methyl-violet, methylene-blue, or with carbol-fuchsin solution.

Symptoms.—*The Period of Incubation.*—This rarely lasts longer than from one to three days. The general condition

of the patient remains undisturbed, and there is complete absence of fever. By contact and irritation severe pain can be elicited, and frequently the pain is intense at the time of urination, if the sore is within the urethra, on contact with the urine, and at time of defecation, if at the anal opening. Usually within twenty-four hours of inoculation a small macule arises, and within forty-eight hours a pin-point-sized vesico-pustule, surrounded by a reddish colored zone, is noticeable. If not subjected to maceration and irritation, this pustule in the course of a few days may become the size of a split Lima-bean. If the roof is removed, the outline will correspond to the size of the pustule; the edges are fairly abrupt, somewhat steep, and have the appearance of being punched out with a stamp; the floor is somewhat sloughy, and later, when repair sets in, has a bright red, velvety appearance, typical of a granulating surface. In all cases there are an inflammatory zone and, on the whole, more or less pain, differing thus from the initial lesion of syphilis. Whenever, on account of maceration, there is no pustular lesion, an erosion covered with thick, creamy yellow pus is noticeable. The floor often has a purplish hue, and the shape of the ulcer is usually determined by its location. Occasionally the floor of the ulcer becomes elevated above the surrounding parts, and then we have the so-called *ulcus elevatum*. No matter what the size of the soft chancre, the peculiar leathery hardness of the base is almost always wanting. There may be thickening, yet the characteristic hardness is always missing. Chancroids may occur singly, but are most often multiple. There may be few or very many. This is accounted for by the auto-inoculability of the secretion. Their size ranges from that of a pin-point to that of a ten-cent piece, yet when multiple lesions coalesce, areas the size of the palm of the hand are occasionally seen.

Course, Sequelæ, and Complications.—The average chancroid, if uncomplicated, requires from two to five weeks to run its course. A faint cicatrix or an ugly scar may remain, often depending on the course and the treatment. In the male, a place of predilection is along both sides of the frænu-

lum ; and on account of loss of tissue, perforation is common. Within the urethra, at the urethral orifice, and also about the corona, and in the female, about the labia or on the vestibule, are places of predilection.

It is not uncommon to see typical lesions of chancroid progress toward involution, when quite often one commences to show the appearance of an initial lesion. In the course of time syphilitic symptoms follow. This is regarded as a *mixed chancre;* in other words, syphilitic virus was inoculated at the same time (or possibly later) as that of the chancroid. Other complications are *balanitis*, *phimosis*, *paraphimosis*, *vulvitis*, *vaginitis*, *dermatitis*, and *vegetations*. An acute *gangrenous chancroidal ulcer* occurs frequently when constitutional affections, such as diabetes or albuminuria, are present, or when phimosis or paraphimosis occurs. *Phagedenic ulcers* are occasionally met with. Often all therapeutic measures have no effect on their course. Probably the most common complications are *lymphangitis* and *lymphadenitis*, which, according to some statistics, appear in as high as 25 per cent. of cases. As chancroid is a local process, its virus must remain at the point of invasion, or confined within the lymphatics which are in connection with this point. If the lesion is on the penis, the dorsal lymphatic trunk is readily palpated as an indurated and painful strand. At the mons veneris there is oftentimes an enlargement, which is called a *bubonulus*. On either side or on both sides in the inguinal regions lymphadenitis may arise, but generally only one gland is involved. This condition is termed *bubo*, or "*blue ball*," in common language. These occur under different forms.

1. *Simple Adenitis.*—Here a small swelling and but slight pain exists, with scarcely any redness to be noticed.

2. *Acute Suppurating Adenitis.*—Here, in the course of a few days, the gland becomes greatly enlarged ; tenderness and pain become marked ; fever may set in. The gland often becomes attached to the skin, and all signs of inflammation appear. In some cases spontaneous rupture occurs, and grayish, pus-soaked walls of the abscess cavity are noticed. Again, similarly appearing glands, which break down, are

called *chancroidal buboes*, because the abscess takes on the appearance of a chancroid ulcer, having become infected with the chancroidal bacillus.

3. Finally, a *chronic swelling of glands*, where there is but slight or partial softening, which exists for an indefinite period of time, without any special pain or tenderness. This is called *strumous adenitis*.

Treatment.—The treatment of the chancroid depends on the exact condition. If not surrounded by an inflammatory zone, a daily application of Monsel's solution is useful. At the end of about the fifth day healthy granulations will appear. The application of 95 per cent. carbolic acid or of 50 per cent. chloride of zinc solution is followed by similarly favorable results. Previous to any of these applications a 5 per cent. cocaine solution may be used to anæsthetize the parts. Between the intervals of application nosophen, aristol, or other antiseptic powders should frequently be applied. When inflammatory signs, or even complications, are present, absorbent cotton soaked in 25 per cent. copper sulphate solution may be applied every four hours for from fifteen to thirty minutes each time, for several days. One-half of 1 to 2 per cent. carbolic acid solution, 1 : 1000 bichloride of mercury solution, are useful in some instances. Between applications, antiseptic powders should be dusted on the parts and the opposing surfaces separated with gauze.

In gangrenous or phagedenic ulcers the galvanocautery or thermocautery under general anæsthesia is almost imperative. In these cases moist antiseptic dressings or continuous irrigations are indicated. Iodoform, if there is no objection to the odor, is useful in the treatment of these cases. *No matter what method is used it is necessary to remove the crusts and keep the sore free from secretion at all times.* When destroying chancroids with caustics, it must be kept in mind that occasionally these sores become intractable ; besides, the condition may be aggravated and often obscures or makes correct diagnosis impossible, because all caustic treatment will cause more or less induration. Whenever complications are present, surgical interference is often necessary—in cases of phimosis, a dorsal

incision; in paraphimosis, the cutting of the constricting band; and in either case the curetting of the ulcers is indicated, to be followed with the usual antiphlogistic treatment. In cases of simple adenitis rest in bed, the ice-bag, and daily applications of iodine or iodine vasogen may abort and relieve swelling of the gland, provided the ulcer is treated in a rational manner. If the process continues, an attempt can still be made to abort suppuration.

℞ Calomel, 1.0 gramme;
Sodium chloride, 6.0 grammes;
Distilled water, 100.0 "
M.

This solution may be injected directly into the glandular substance, 1 c.c. at a time. Necessarily antiphlogistic treatment should be continued. If fluctuation arises, whether or not any general treatment has been instituted, the method of Lang has come into general use: A puncture is made, the pus removed, and 1 c.c. of a 0.25 per cent. solution of nitrate of silver injected. This treatment under a moist dressing is continued, but the nitrate of silver solution is increased gradually to 1 or 3 per cent. As soon as the discharge becomes serous in character the nitrate of silver solution injection should be made only every second or third day. In this manner ambulatory treatment may be given and scarcely a scar remain. When the gland does not pass on to the point of fluctuation, but when the suppurative process is present, the gland may be excised and the cavity treated with glutol, tincture of iodine, or other surgical applications, and packing with antiseptic gauze can be instituted. It is almost an impossibility to remove any infected gland in its entirety and suture completely and get union. Suppuration will occur, and, as stated above, general surgical means are then necessary.

Another very excellent treatment of single fluctuating glands is to incise to a moderate extent only, evacuate the pus, curette the cavity if necessary with a small Volkmann spoon, and then fill the cavity with a 10 per cent. solution of

iodoform in pure glycerine, suture the wound, and apply a wet dressing. The results are usually prompt, complete, and leave hardly any scar.

DIFFERENTIAL DIAGNOSIS BETWEEN SYPHILITIC CHANCRE AND SIMPLE VENEREAL ULCER.

Syphilitic Chancre.	*Simple Venereal Ulcer.*
1. Occurs in those who have never had syphilis.	1. May be inoculated repeatedly with this virus.
2. No positive germ recognized.	2. Bacillus of Ducrey and Unna present in secretions.
3. Incubation between ten and thirty days.	3. Incubation between one and ten days.
4. The appearance of lesion varies as to its site; may be rounded or oval; usually but a slight erosion, giving off a clear serous fluid; the whole on an indurated base. Usually single, and may appear anywhere on the body.	4. The appearance of lesion varies as to its site; has more or less stamped-out appearance; edges irregular; covered with crust underneath, which is a yellowish pus. Is autoinoculable. Base most often without induration. Secretion may have an offensive odor. Scar almost always remains. Most commonly on genitals.
5. May remain for weeks, but then followed by systemic symptoms.	5. May persist for weeks, but is never followed by any systemic symptoms.

QUESTIONS ON CHANCROID.

What is a chancroid?
Is it ever followed by constitutional symptoms?
What is the etiologic factor?
What is the period of incubation?
Describe the chancroidal lesions.
Are they always accompanied by pain?
What is the ulcus elevatum?
Describe the course of a simple venereal ulcer.
How long a time does a soft chancre require to run its course?
Do they leave scars, and if so, why?
What are the places of predilection?
What is a "mixed chancre"?
What are the complications usually seen?
What do we mean by bubonulus?
What is the complication that is most frequently met with?
Describe the different types of adenitis.
What is meant by a chancroidal bubo?
What is meant by a strumous adenitis?
Describe the different forms of treatment of the venereal ulcers.
How would you treat phagedenic ulcers?
How would you treat simple adenitis?
What is the Lang method of treatment for adenitis?
In which cases is it necessary to treat surgically?

PART II.

GENITO-URINARY DISEASES.

GENERAL CONSIDERATIONS.

The urinary organs are connected anatomically with the genital organs. This is especially true in the male. They consist of two kidneys, with two ureters which lead the urine to the bladder. From the last-named organ the urine is passed through the urethra. Ascending from the bladder toward the navel, a tube, the urachus, usually obliterated, exists.

The organs of generation in the male consist of the prostate gland, seminal vesicles, testicles, epididymes, vasæ deferentiæ, and penis.

The connection of the urinary organs with the genitalia is partly physiological. Of the former, the urethra is the outlet of the product of the organs of generation in the male.

To understand the subject fully it is necessary to note that there is a relationship between urinary diseases and the entire organism. There are local diseases of the organs without any distant effects. Gonorrhœa usually takes such a course, but may have most grave complications. Any chronic urinary or seminal disease may affect the general condition. In the course of a gonorrhœa complications, especially from serous surfaces, are not infrequent. Affections of the joints, pericardium, and pleura have been noted; also of the endocardium, conjunctiva, and rectum. Besides, peritonitis has been positively established, and spinal irritation associated with sensory and motor symptoms, and also local cerebral symptoms, have almost definitely been proved.

Some of the genito-urinary diseases are of venereal origin.

Many result directly from the changes caused originally by such an infection. Gonorrhœa needs only mention, which, in fact, after the gonococcus is extinct, but where inflammatory symptoms exist, may cause strictures. These, again, if severe, causing retention of urine, may be the beginning of bladder and later of ureteral and kidney diseases.

Normal urine contains no germs. The normal urethra may, however, even in health, be the habitat of non-pathogenic bacteria. In all urinary diseases it is necessary to look for the cause of infection. It may be:

1. Ascending, from germs in the urethra, introduced into the bladder by instrumentation or otherwise.
2. Descending, when kidneys eliminate germs, as in typhoid fever.
3. By continuity, whenever inflammatory foci in adjoining parts affect the urinary organs.
4. Metastatic, whenever emboli reach these parts.

It is almost unnecessary to state that here, as elsewhere, all suppurative inflammatory processes are due to germs. Those most often found and causing disease in the urinary and sexual organs are the bacterium coli commune, urobacillus liquefaciens septicus, bacillus of tuberculosis, staphylococcus pyogenes, streptococcus pyogenes, and the gonococcus.

QUESTIONS ON THE GENERAL CONSIDERATIONS OF GENITO-URINARY DISEASES.

Name the urinary organs.
Name the organs of generation.
What connection have these organs with each other?
Can urinary diseases affect the general organism?
Mention some complications of gonorrhœa.
Does normal urine in the bladder contain germs?
Describe the different modes of infection of the urinary organs.
What are the most common pathogenic germs found in the urine?

GENERAL COMPLICATIONS OF URINARY DISEASES.

URETHRAL FEVER.

Urinary fever, *urethral fever*, and *catheter fever* are not uncommon terms. They define a peculiar state which follows

instrumentation or operation on the urethra or the bladder, yet these interferences may be of the simplest kind. What is called shock may follow the contact of a sensitive urethra with an instrument. The patient may at once become faint, may lose consciousness, become chilly, pass into convulsions, and *exitus lethalis*—these may all occur within a few minutes. Fortunately, these cases are exceedingly rare. However, typical urinary infections are more common, and Guyon divides them into:

1. *Acute form*, with a single chill, fever, and sweat, or, where there is a repetition, called by Thompson "*acute recurring urinary fever.*"
2. *Chronic* urinary fever.

I. Acute Urethral Fever.

Following operative interference on the urethra or bladder the patient experiences usually within an hour symptoms of an indefinite character. Frequently after first urination a chill, lasting from a few minutes to hours, may set in. A rise in temperature, headache, backache, profuse perspiration, then a decline of temperature are noted. Within twenty-four hours all symptoms have passed away, but the patient feels tired. At times the chill is intense and prolonged, the skin cold and cyanotic, the breathing labored, and even slight delirium is seen. Again, the symptoms may be almost unnoticeable in character.

II. Chronic Urethral Fever.

This occurs in chronic cases of cystitis, pyelonephritis, and pyelitis. Here irregular chills and fever, or even a continuous fever, occur. In connection with these symptoms there usually occur loss of appetite, dry and coated tongue, headache, and a variety of common symptoms.

The **prognosis** in acute cases is favorable if there is only one chill, no matter how severe the reaction; in the recurring type the outlook is grave.

Treatment.—*Prophylaxis* is the most important—*i. e.*,

asepsis of the field of operation and instruments. To treat the condition, should it come on, the patient must be kept warm, and efforts made to encourage free perspiration. Later, saline purgatives are indicated.

As a prophylactic treatment previous to instrumental examination or operation 5 grains of quinine every three hours for twenty-four hours previous to such procedure is advisable. After the onset, 15 grains of salicylate of sodium are recommended by Posner to be given every two hours for three or four times in order to cause profuse perspiration.

℞ Diuretin, 15.0 grammes;
Aquæ bullientis, 250.0 "
Sig.—One tablespoonful every hour.

This is useful in order to increase the activity of the kidneys, as in these cases there is known to be a suppression of urine.

A very safe and certain abortive treatment of urethral chills in irritable subjects is to give immediately after any instrumentation of the urethra the following drugs: morphine sulphate, 0.005 to 0.015 gramme as sedative; quinine sulphate, 0.3 to 0.6 gramme as antipyretic; and tincture of aconite 0.2 to 0.4 cubic centimeter to combat congestion of the kidneys. All should be given at once. A single dose is usually enough.

Gonorrhœal Rheumatism.

Etiology.—This is distinctly a complication of gonorrhœa, occurring in both sexes, but most commonly in the male. It affects the joints, but the tendons, muscles, and bursæ may become involved. In acute attacks of gonorrhœa it arises after the posterior urethra has become involved. Rarely is this noticed in the first week of a gonorrhœa. Of late it has been almost positively established that the inflammatory processes are the result of the action of the gonococcus, as they have been found in a large number of cases in the parts involved, and not due to the presence in the circulation of the toxines or any other pyogenic bacteria for which the gon-

orrhœa may have prepared the way. The joints involved, and the order of frequency, are the knee, ankle, elbow, wrist, finger, shoulder, etc. In the majority of cases more than one joint is involved.

The **symptoms** may be of a mild character, scarcely noticeable except for a slight pain and stiffness, or to the opposite extreme, where, if one joint is involved, it may become enormously swollen and painful, showing marked redness and tenderness. If the effusion changes to a plastic condition, the symptoms increase as a rule or the disease may from this point on become chronic, with or without relapses. Occasionally it passes on to suppuration. Naturally such symptoms as anorexia and pyrexia intervene in the more pronounced cases.

Differential Diagnosis.—In differentiating from inflammatory rheumatism it is to be noted :

DIFFERENTIAL DIAGNOSIS BETWEEN GONORRHŒAL AND INFLAMMATORY RHEUMATISM.

Gonorrhœal Rheumatism.	*Inflammatory Rheumatism.*
1. Gonorrhœal infections.	1. No relation to gonorrhœa.
2. Usually a gonorrhœal discharge is present.	2. Absence of gonorrhœal discharge.
3. Rheumatic diathesis may be present but has no influence.	3. Rheumatic diathesis present.
4. Systemic symptoms comparatively mild.	4. Systemic symptoms severe and prolonged.
5. Usually more than one joint becomes affected, but one after another.	5. Usually simultaneous involvement of more than one joint.
6. When painful, relief given by fixation. Pain may be absent.	6. Always pain, and fixation does not give relief.
7. Cardiac complications usually absent.	7. Cardiac complications frequently present.
8. Relapses common ; especially with a new attack of gonorrhœa.	8. Relapses frequent but no relation to urethral discharge.

The more severe the attack, the worse are the results. Wherever the plastic or suppurative process has occurred, it is almost an impossibility to establish perfect motility again.

Treatment.—In these cases it is of prime importance to treat the urethra and free it from the gonococcus and inflammatory signs, because this is the source and cause of the trouble. The involved joints require exacting attention.

There should be complete fixation, thereby giving rest to the part. Cold lead-water applications or, later, hot moist antiseptic dressings should be frequently applied. As soon as the the acute symptoms have disappeared, blistering with cups or cantharides plasters or dry heated air and massage must be given in order to cause the absorption of any inflammatory deposits, and thus prevent ankylosis. Internal medication has no marked influence. However, if pain is severe, morphine must be given. Diluents and slightly alkaline diuretics may be given. Iodide of potassium in 15- to 30-grain doses, or ichthyol in 5-grain doses, may be given three to five times a day. Sodium salicylate in 15- to 60-grain doses two or three times a day may be given in selected cases. Methyl salicylate or oil of wintergreen may be painted on the skin over the joint once or twice daily, ½ to 1 drachm at each application, and will be found an excellent and reliable local analgesic and resorbent. The joint should be wrapped in non-absorbent cotton after each painting to stimulate absorption and local sweating.

Hæmaturia.

The presence of blood in any form in the urine is an absolute sign of disease or injury of the genito-urinary tract. Blood in the urine is not a disease *per se*, but is only a symptom. The quantity of blood may vary, and the urine may have the appearance of clear blood, may be smoky, or the quantity may be so minute that it may be found only with difficulty by means of the microscope. The appearance of the blood often varies with the origin: From the *kidney*, the urine may be smoky; from the *ureter*, there may be worm-like clots; from the *bladder*, irregular, clotted, and often scarlet, and appears usually at the end, occasionally at both the beginning and the end, of urination; from the *prostate*, clotted, with contour of prostatic urethra; from *anterior urethra* scarlet, and appearing at external urethral orifice. It was formerly believed that if red blood-corpuscles were crenated and had lost their color, they signified origin in the kidney or pelvis of the kidney. This is certainly an error.

Hæmoglobinuria.—Here there is absence of the red blood-corpuscles but presence of the coloring-matter; as seen in purpura hæmorrhagica.

Hæmaturia is the presence of blood-corpuscles, due usually to inflammatory diseases of the mucous membranes of urinary tract or due to tumors or injuries.

Pyuria.

The presence of pus in the urine is termed pyuria. To establish the location of its production is one of the most important factors of a correct diagnosis. If not otherwise possible, the urethroscopic and cystoscopic examination may reveal the location of the disease. If necessary to make the examination of the urine from the different kidneys, the ureters can be catheterized with one of the different methods in vogue, such as the Kelly, or with the aid of the Nitze, Casper, Brenner, or Preston cystoscope; or the urine may be collected by separating the ureteral openings by a water-shed with the Harris segregator, and collecting the urine from the two kidneys in different containers. Then chemical, physical, bacterial, and microscopical examinations should be instituted.

QUESTIONS ON THE GENERAL COMPLICATIONS OF URINARY DISEASES.

What is urinary fever? Describe the various forms.
What is the prognosis?
Give the treatment in detail.
What is gonorrhœal rheumatism? What joints may be involved?
Is posterior specific urethritis usually present?
By what is gonorrhœal rheumatism probably caused?
Describe the different types of gonorrhœal rheumatism.
Which joints, in the order of frequency, are most commonly affected?
What is the prognosis?
How would you make the differential diagnosis?
What is the treatment?
What is hæmaturia?
What is hæmoglobinuria?
Of what is hæmaturia a symptom?
Of what significance is blood in the urine?
Is it possible to recognize whence the hemorrhage occurs? If so, how?
What is pyuria?
How can you locate the origin of pus in the urine?
Of what significance is pus in the urine?

DISCHARGES FROM THE URETHRA.

Spontaneous Discharges.

Spontaneous discharges from the external urethral orifice can readily be divided into these three classes: 1. Non-purulent. 2. Purulent. 3. Bloody.

1. **The non-purulent discharge** manifests itself as a sticky, stringy, glairy, and light, grayish-colored fluid. Microscopically it is seen to consist of epithelial cells and leucocytes, but mostly mucus. It is called *urethrorrhœa*, and may be seen after a patient has passed through a chronic urethral disease. When noticed after erection, in which case it may be physiological, it is called *urethrorrhœa ex libidine*, and is really due to the activity of the glands accompanying the congestion of erection. It is a harmless condition in any of its forms.

2. **The purulent discharges** are the most common. Here we find that the gonococcus is the most frequent cause. When not due to this organism, it is said to be *non-specific* in character. Pus-corpuscles make up the greater part of the discharge, although a small or large number of variously shaped epithelial cells may be present.

3. **The bloody discharge** is characterized by the presence of blood. It may be due to new growths, injuries, or to inflammatory processes. This discharge may be mixed with either one or both of the aforementioned.

All these discharges designate the process as being located in the anterior urethra. However, other processes posterior to these may be present at the same time.

Involuntary Discharges.

Another class of urethral emissions are the involuntary discharges which appear at the external urethral orifice at times of defecation or urination. These are indicative of disturbances in the posterior urethra. If from the prostate, amyloid bodies and lecithin may be seen microscopically. After allowing the discharge to dry and adding a few drops of a 1 per cent. solution of ammonium phosphate, the well-recognized Charcot-

Leyden or sperma crystals are readily seen. If spermatozoa are noticeable, the discharge must have come from the seminal vesicles; if all these elements occur, then from both the prostate gland and the seminal vesicles; if pus in addition is present, it may come from either, but spermatozoa are absent when it proceeds from the prostate; if spermatozoa, pus, and a few red blood-corpuscles, then in all probability the source is the seminal vesicles. If sperma from the seminal vesicles is passed, it often appears in small sago or cylindrical masses called the Bence-Jones cylinders. This last condition is called either *defecation* or *micturition spermatorrhœa*, depending upon the time of appearance. If only prostatic secretion, then *prostatorrhœa* is the scientific term for it.

Another discharge is the one occurring at the time of the natural sexual relations: examined microscopically, if the spermatozoa are non-motile, it is then called *necrospermia;* if notably diminished in number, *oligospermia;* if absent, *aspermia;* if no ejaculate whatsoever has been voided during the coitus, the condition is spoken of as *aspermatismus.*

QUESTIONS ON THE DISCHARGES FROM THE URETHRA.

What are the spontaneous discharges from the external urethral orifice?
Of what significance are they?
What is meant by urethrorrhœa?
What is meant by *urethrorrhœa ex libidine?*
Are these conditions harmless?
What is the cause of the most common urethral discharge?
What is meant by involuntary discharges from the external urethral orifice?
Describe them microscopically.
What is meant by defecation and micturition spermatorrhœa?
What is necrospermia?
What is oligospermia?
What is aspermia?
What is aspermatismus?

URINARY EXAMINATION.

General Considerations.

Thompson Two-glass Test.

For our purpose it is of paramount importance to examine and collect the urine, with its products, from the different parts of the genito-urinary tract. In a crude manner the

Thompson two-glass method gives considerable information. If the patient is allowed to urinate into two glasses,—at least 60 to 75 c.c. in the first glass,—it will certainly contain most all the *urethral products*, while the second glass will contain the urine as it is in the bladder mixed with *bladder* and *kidney elements.*

In a simple case of anterior urethritis the contents of the first glass would be turbid and contain all the secretion, *but where the latter is adherent it may occur in the second glass*, which naturally gives rise to an error. In order to avoid this Jadassohn advised the irrigation of the anterior urethra by introducing a small Nélaton catheter into the urethra up to the external sphincter, and washing the urethra with warm distilled water with the aid of a syringe until the wash-water passes perfectly clear. Now, if the patient passes his urine, it must be absolutely clear if there is only an anterior urethritis. However, if passed into two glasses after this procedure, the first would contain the posterior urethral products and the second again the bladder and the kidney elements.

However, if after a patient has held his urine an hour the first glass shows turbid and contains threads and in the second the urine is clear, he is then permitted to urinate again after he has held his urine for three, or even more, hours. If, now, the contents of the first glass is turbid, and the second slightly so, it at once permits of a differential diagnosis, provided the turbidity is due to pus. It is accounted for in this manner: *In the first case the time was not sufficient for the posterior urethra to secrete sufficiently for the secretion to regurgitate into the bladder, as the internal sphincter of the bladder is much weaker than the external sphincter. In the second case, where the interval between the urinations was longer, the secretion passed into the bladder and mixed with the urine. Such examinations should enable one to make a differential diagnosis between posterior urethritis and urethrocystitis. In the latter case no matter how long the interval between the urinations both portions would be turbid.*

Necessarily, if purulent processes exist in the kidney or its pelvis or in the bladder, all the urine voided will be turbid.

However, in case of acute cystitis or tuberculosis of the bladder, the urine passed into two glasses will show the second glass with the greater turbidity and heavier deposit after standing.

Posner Three-glass Test.

In certain cases of posterior urethral disease it is advisable to examine the urine by another method. It is referred to as the Posner three-glass method, and the urine thus gained is called *expression urine.* Instead of permitting the patient to pass all his urine into two glasses he is instructed to pass the urine into three glasses, but to stop after the second glass. Then, by rectal examination and massage of the prostate and seminal vesicles, their products are expressed either into the posterior urethra or bladder, and the patient urinates into the third glass. These products are then passed with the urine, of course. *For detailed information it is necessary to examine the sediment of this portion microscopically.*

To separate the bladder from the kidney urine by voluntary voiding is impossible. The methods for this separation have been described elsewhere. Whenever the first glass shows filaments, or so-called "*gonorrhœal threads,*" and the urine in the second glass is perfectly clear, it can be stated that these threads arise in the course of the urethra and that no bladder or kidney disease exists.

Physical and Chemical Examination.

Whenever both portions of the urine are turbid it is necessary to determine the cause. This is readily done with physical and chemical examinations. It may be due to three distinct conditions: (1) the mineral salts of the urine may be held in *suspension,* (2) organic substances, such as blood and pus, or (3) bacteria, may cause the turbidity. The knowledge of a few chemical facts is necessary for the full understanding of this valuable and practical method of examination of the urine. A small quantity of urine is heated, and if the specimen becomes clear, the turbidity must have been caused by urates,

as these are more soluble in warm than in cold solutions. However, this may or may not occur, and instead the urine may become more turbid, due to a precipitation from solution of some of the phosphates. On adding an acid and causing an acidity of the fluid, the urine should clear up if due to phosphates. This turbidity is referred to as *phosphaturia*. If remaining turbid after the addition of acetic, but clearing up after the addition of mineral, acid, the turbidity must have been caused by oxalate of lime, called *oxaluria*. It is needless to go into details, but, of course, albumin with any of these additions will not clear up after heating.

Microscopical Examination.

Appropriate tests will distinguish whether or not turbidity is due to pus or blood.

Microscopically, this can also be distinguished. Whenever the urine is turbid, and when, by examining in a glass, a peculiar cloudiness appears, apparently made up of most minute specks, which microscopically is shown to consist of bacteria, this is then referred to as *bacteriuria*.

In an epitome of the character of this work it is imperative to omit further details regarding urinary examination, yet it has been found necessary to mention a few practical details of such procedures.[1]

As regards the cellular elements of the urine, it may be stated that in a perfectly normal urine epithelial cells and leucocytes are observed. For many years efforts have been made to give descriptions of epithelia, so that they can be recognized and the location of their origin identified, but it can be positively stated that it has not been accomplished up to the present time. *Exacting histological examinations have shown that from the external urethral orifice to the parenchyma of the kidney epithelial cells of changeable forms are found. This is of especial importance and has been recognized since the metaplasia of chronic inflammatory conditions have been under-*

[1] The full data on the examination of the urine will be found in the volume on Urinalysis.

stood. Not even cells of new growths can be recognized unless sufficient structure be present to permit of diagnosis.

Filaments can readily be stained. With the aid of a pipette place them on a slide and allow the excess of fluid to be taken up with blotting-paper. Then dry thoroughly and fix by passing through a flame with the filament uppermost. Place a few drops of a Loeffler's methylene-blue solution on the specimen for one minute, and then wash out the excess of coloring-matter. Dry and examine directly with oil-immersion lens. In this manner the gonococcus and other bacteria may readily be found, and also the outlines of cellular elements shown.

Whenever distinct masses of débris or coagula or particles passed with the urine are examined, this should first be done without any attempt at staining, the particles being teased and then covered with a cover-glass. If deemed necessary, other particles can be hardened and prepared and treated in the same manner as other pathological specimens—cut in paraffin and stained as desired. This frequently is of great value. Then coagula and masses can be examined for any definite structure.

The Bacillus Tuberculosis.—Besides the gonococcus there is one other kind of bacterium which is of the greatest importance in this field of work. It is the bacillus tuberculosis. Many methods are used for staining. If necessary, the specimen of urine should be centrifugalized, or the specimen, which in some cases of disease of the prostate and seminal vesicles passes from the external urethral orifice, after massage of these parts should be placed on a cover-glass, and dried and fixed in the usual manner. It should then be placed for ten minutes in a solution of—

℞	Fuchsin,	1.0 gramme ;
	Alcohol (95 per cent.),	10.0 grammes ;
	Carbolic acid (95 per cent.),	5.0 "
	Distilled water,	100.0 "

Then thoroughly washed, dried, and allowed to remain in a solution of—

℞ Methylene-blue, 2.0 grammes;
Sulphuric acid, 25.0 "
Distilled water, 100.0 "

until the specimen is of a sufficiently blue color and then dried and mounted in Canada balsam. The bacillus tuberculosis appears red; all else blue.

Weichselbaum's method for staining for the bacillus tuberculosis is especially adaptable for urinary sediments, as *smegma bacilli* lose their stain and can therefore not be mistaken for them. The specimen is stained in the regular manner with fuchsin solution, then decolorized in absolute alcohol, and then counterstained with an aqueous methylene-blue solution.

With the aid of culture-media and the injection of urine into animals we have additional means in important cases of deciding as to the character of the infection.

It is well to know what the relative number of pus-corpucles in a cubic centimeter, when counted with a *Thoma-Zeiss counting apparatus*, is: In light attacks of cystitis there are about 25,000 corpuscles to each cubic centimeter; 100,000 in the severe cases. Whenever the former are present it represents 1 to 1000 of albumin, estimated with the *Esbach albuminometer*. In other words, this amount of albumin is derived from the pus and corresponds to this number of pus-corpuscles in each cubic centimeter. If we would have 3 to 1000 albumin and 25,000 corpuscles, it would indicate that the excess of albumin is derived from some other source: that it is not serum-albumin from the corpuscles, but from the kidneys.

It need scarcely be emphasized that every means of examination of urine which may help in establishing a correct diagnosis of urinary diseases, especially where operative interference on one kidney has become necessary, is of vital importance in certain cases.

METHODS TO ESTABLISH THE EFFICIENCY OF THE KIDNEYS.

Cryoscopy.—In order to establish the "sufficiency" of the activity of the kidneys, Koranyi lately introduced a physical

method of examination. This depends entirely on the fact that the laws of osmotic pressure show that solutions of different concentration have also different volatilizing and freezing-points. Both become proportionately lower as the concentration increases. *The sinking to the freezing-point of an aqueous solution of a salt under that of distilled water is directly proportionate to the amount of dissolved molecules.* With this method the freezing-point of urine has given valuable information as regards its concentration, and hence in this manner it can show the activity of the kidneys. This method is called *cryoscopy.*

The **phloridzin test** is another method to establish the sufficiency of the kidneys. Phloridzin, 0.005 gramme, is injected subcutaneously. It depends on the property of phloridzin to cause sugar to appear in the urine. Diseased kidneys do not, or but very slowly, allow the excretion of sugar. Hence if urine is collected separately from the two kidneys, some idea as to the soundness of the kidneys can be established.

Methylene-blue has also been used as a test. This depends on the coloring-matter passing the kidney. In healthy kidneys, after taking a few grains of methylene-blue by the mouth, the urine can be observed to escape from the ureters with the aid of a cystoscope, or collected separately with the various methods described. If healthy, it usually requires from fifteen to twenty minutes. The severer the affection, the longer time does it require for the colored urine to appear from the ureters from the kidneys.

QUESTIONS ON URINARY EXAMINATIONS.

Describe the Thompson two-glass method for the examination of urine.

Of what significance is it?

Of what value for diagnostic purposes is it to irrigate the anterior urethra until the wash-water is free from all specks and threads, and then to allow the patient to pass urine into two glasses?

In which class of cases is the Thompson two-glass method of no value?

What is meant by the Posner three-glass method for the examination of urine?

Why should a specimen be passed into a third glass? What information does it give?

Is it possible to separate the urine in the bladder from the urine as it comes from the kidney by voluntary voiding?

If the entire quantity of urine passed is turbid, to what conditions may it be due?

How are they differentiated from each other?

Are there in a normal specimen of urine any cellular elements?

Is it possible to recognize by shape or size the point in the genito-urinary tract whence the epithelial cells come? Why not?

How would you stain a filament?

Is it possible to make sections from sediments consisting of débris in the urine?

Is the Bacillus tuberculosis ever found in the urine?

How would you examine for it?

Describe the different staining methods.

If not found in this manner, is it possible to decide their presence or absence in any other manner?

Of what value is it to know that we have, for example, 100,000 pus-corpuscles in each cubic centimeter and 4 to 1000 albumin estimated with the Esbach albuminometer?

Why is it necessary to examine the urine so thoroughly previous to any operative interference?

What is meant by cryoscopy?

What does it establish?

What are the phloridzin and methylene-blue methods to establish the "sufficiency" of the kidneys? Describe in detail.

ABNORMALITIES IN THE ACT OF URINATION.

NORMAL MICTURITION.

The functions of the bladder practically consist of holding and voiding the urine. The former is controlled by two muscles—*i. e.*, the internal and external sphincters of the bladder. If these were paralyzed, there would be constant dribbling. If a spastic condition affected these muscles, the opposite condition, or retention of urine, would result. Now, in voiding urine the detrusor muscles of the bladder contract, while at the same time there is a relaxation of the sphincter muscles. In addition, there is abdominal pressure, aided by the movement of the diaphragm, and finally the hydrostatic pressure also takes part.

Some physiologists believe that the sensation of urination is centered at the internal urethral orifice or at the internal sphincter muscle. Therefore the desire to urinate comes from the attempt of this muscle, by constant contraction, to withstand the expulsion of the urine by the detrusor muscles as soon as it becomes irritated by the quantity of urine in the bladder—that is, this causes the sensation of urination. Now, after the internal sphincter, an involuntary muscle, relaxes, the urine passes into the posterior urethra—into the so-called

neck of the bladder. As the quantity of urine increases the desire to urinate continues to increase. When the entire quantity becomes so large that pain or other sensations are caused, the individual allows the external muscle, which is partly voluntary, to become lax, and the act of urination sets in.

ABNORMAL MICTURITION.

There are two abnormalities which must be considered: 1. The *frequency* of urination. 2. The *pains* accompanying the act of urination.

Now, in pathological conditions the changes in the muscles which permit the act of urination come on more frequently and more rapidly. Take an irritation—an ulcer, stone, inflammation—at the neck of the bladder. This will cause the muscles to act more quickly and more forcibly. The constantly irritated and contracting sphincter becomes tired and gives way more easily, and the voluntary external sphincter is called into use oftener.

The exact number of times of urination and the length of the intervals should be elicited. This is of as much importance as the quantity of urine voided each time. In cases of diabetes insipidus, where enormous quantities are passed frequently, it would be an aid to diagnosis at once. However, if a patient urinates frequently, because large quantities are voided each time, he scarcely waits, and does not allow the desire to become strong. But whenever the pathological condition is in the neck of the bladder, this imperative desire sets in more rapidly. Patients complain about the intensity, and if it becomes severe, then it is referred to as *tenesmus*. What are the conditions that cause this? They can readily be seen. In chronic cases of inflammatory diseases the condition is not so apparent, yet it is present. It is in acute diseases, as in acute posterior urethritis involving the prostate or in tuberculosis of this area, that the tenesmus is almost constant. Polyps located at the external urethral opening may cause it. Rest relieves this condition and exercise irritates it. In cases of hypertrophy of the prostate there may be normal urination during the day, but an increased number of times during the night.

Under another division, classified as neuroses, there are diversified conditions causing the same symptoms. In cases of a stone in the pelvis of the kidney there is this symptom of frequent urination apparently both day and night. In neurasthenics or in former masturbators, where there are irritable conditions of the neck of the bladder, this again is not uncommon. Even if patients give themselves rest, this symptom of frequent urination exists both day and night.

Pain during the act of micturition is of great importance, often closely associated with tenesmus, but tenesmus is not necessarily associated with pain. With the aid of these symptoms we attempt to locate their origin and show their significance. This is done by the time referable to the act of urination. Whenever tenesmus is absent, the pain can exist only during, or it accompanies or follows, the act of urination.

In acute anterior gonorrhœa the pain is probably caused by the stream of urine forcing its way through the swollen urethra, and therefore exists only *during* the act of urination. Hence there is no pain before or after the act. Here the trouble lies in the urethra.

Again, if a patient complains of *tenesmus* and *pain almost simultaneously*, and if they continue *during* the voiding and disappear at the end of the act, the probable cause is a bladder affection—for instance, an acute cystitis.

If pain exists *before* and *during* urination and *increases after* the act, there may be several possibilities. In all acutely inflammatory disturbances of the prostate pain occurs in this manner and sometimes with stone.

Not an unusual complaint in urinary disease is pain *between* the intervals of urination. A dull ache in the suprapubic region may be significant of a bladder disease. Pain in the rectum and occasionally radiating down the thighs may indicate prostatic disease. Pain in the perineum may indicate periprostatic disturbances.

Dribbling of urine after urination is most commonly caused by stricture, although it may be due to nervous conditions. In the latter cases we find masturbators or individuals with incipient spinal diseases. Whenever this dribbling becomes

worse, so that the stream is passed only in drops; where there is slight pain during the act; and where there is a scanty discharge, the diagnosis of stricture is almost positive. In these spinal affections there may be either complete retention or incontinence. In prostatic hypertrophy acute retention may also set in, and whenever retention does appear occasionally dribbling may occur. If so, it is an overflow, the bladder being unable to hold any more, and is not a true incontinence, hence called "paradoxical incontinence."

Involuntary urination, as is common in children, especially during the sleeping hours, is referred to as *enuresis nocturna*. Whether or not it is due to undeveloped muscular tissue is not definitely known. Enuresis, however, may be caused by psychical disturbances.

If a patient does not urinate it is due either to retention of urine, caused by an obstruction to the outflow, or to a paralysis of the detrusor muscles, with or without the accompanying spasm of the sphincters, or to some form of anuria.

In kidney affections there are often pains in the lumbar region, even radiating into the testicles. Whenever pain, usually colicky in character and accompanied by general symptoms of great severity, is caused by stone passing from kidney down the ureter, it is referred to as "renal colic."

There are comparatively few diseases of the urinary tract which are not accompanied by pain. Of these, atonic conditions of the bladder are examples.

The intensity or the force of the stream as it comes from the bladder is of significance. It is influenced either by changes in the muscular structure of the bladder or by some mechanical impediment to the stream in the course of the urethra. They may be so great as to vary from a stream with intense force to one that scarcely flows from the external urethral orifice, or again to where the urine escapes only by drops.

If urine in the bladder cannot be passed, the condition is called retention. It may be due to acute inflammatory diseases, to obstruction, or to paralysis of the detrusor muscles, as it occurs in spinal diseases.

The form, size, and direction of the stream are influenced

to a large extent by the external urethral orifice, hence but little weight should be given to abnormalities.

If no urine is collected in the bladder, and therefore none voided, it must be because the kidneys do not secrete any. *This condition is called anuria.*

A tabulated review is as follows:

- Urination.
  - 2. Normal Urination.
  - 1. Abnormal Urination.
    - 1. The length of time between the acts, and gives rise to—
      - Increased frequency of micturition.
      - Diminished " "
      - Retention.
      - Overflow.
    - 2. The length of time associated with the act, and gives rise to—
      - Irrepressible micturition.
      - Urgent "
      - Retarded "
      - Interrupted "
    - 3. The effort necessary for the performance of the act, and gives rise to—
      - Difficult micturition.
      - Obstructed "
      - Incontinence of urine.
      - False incontinence.
      - Involuntary micturition.
      - Unconscious "
    - 4. The sensation attending the act, and gives rise to pain as follows:
      - *Painful micturition:*
      - Time of sensation
        - before.
        - during.
        - after.
      - Seat of sensation—direct and reflex
        - hypogastrium.
        - bladder.
        - perineum.
        - rectum.
        - glans penis.
        - elsewhere.
    - 5. Characteristics of the stream modified as to its—
      - Force
        - increased
        - diminished
          - feeble stream.
          - perpendicular.
          - dribbling.
          - slobbering.
      - Size
        - increased size.
        - diminished size
      - Form
        - oval.
        - flat.
        - spiral.
      - Direction
        - bifurcated.
        - radiating.
        - deflected.

QUESTIONS ON THE ACT OF URINATION.

What is the physiology of the bladder?
Explain the mechanism.
How is the sensation of urination derived?
What are the two most common abnormalities in the act of urination?
What symptoms would an ulcer at the neck of the bladder cause?
Why should the quantity voided, and the number of times of urination, be elicited?
What is tenesmus?
In what class of cases is there usually tenesmus?
In what class of cases, and enumerate some, does rest give relief from tenesmus?
In what class of cases, and enumerate some, do we find that rest does not alleviate the desire to urinate, neither by day nor night?
In what manner is pain, referable to urination, of importance?
Referable to the act of urination, when do we have pain?
When is there pain in acute anterior gonorrhœa?
Describe the character and the time of pain in an acute inflammation of the bladder.
In acute prostatic diseases, when is there pain?
Is there ever pain in the intervals of urination?
What diseases do they accompany?
Are there urinary diseases ever unaccompanied by pains?
Of what significance are the force, size, form, and direction of the stream of urine?
In what ways are these conditions influenced?
What is meant by retention of urine?
By what may it be caused?
Has dribbling after urination any significance?
If urine can be passed only by drops, does it signify anything in particular?
What is meant by "paradoxical" incontinence?
Does involuntary urination ever occur?
What is enuresis nocturna?
Whenever urine is not voided, to what may it be due?
What is meant by anuria?

GENITO-URINARY INSPECTION AND PALPATION.

In the routine of examination, after the discharge and urine have been examined, the physical examination correctly follows, although in daily work oftentimes it precedes the others.

First of all, malformations of the genitalia are to be observed: hypospadias, epispadias, openings about the urethral orifice, or other congenital affections.

During inspection the penis is the first to be examined and the presence or absence of inflammatory signs at the external urethral orifice noted. Lymphangitis, appearing as red bands along the dorsum of penis, and signs of inguinal adenitis,

edema of foreskin, phimosis, paraphimosis, balanitis, posthitis, and balanoposthitis can all be readily diagnosed.

Swellings or tumors involving the penis, as condylomata lata or acuminata; enlargements of the scrotum, such as hydrocele, varicocele, orchitis, epididymitis; affections of the skin, fistula of the urethra, bladder, or kidneys, urinary infiltrations, bulging of the perineum, or above the pubes or in the lumbar regions must be noted. Occasionally, in retention of urine, there is a marked bulging of the suprapubic region. In ectopia of the bladder there is absence apparently of the anterior wall, and the ureteral openings may readily be seen on the parts of the bladder exposed.

It is obvious that what is seen must be verified by palpation in order to substantiate the findings. Tumors of the external genitalia can readily be felt. Those of the testicle and epididymis are quite common. Along the course of the urethra fluctuating, pea-sized swellings, usually between the glans and scrotum, are not uncommon. Strictures which are hard and calloused can readily be felt along the course of the urethra, but especially if a sound is *in situ.* Necessarily the perineum is carefully examined and one or both of Cowper's glands may show acute or chronic enlargement. With a patient on his back, and the legs slightly flexed, a swelling reaching sometimes as high as the navel, occasionally more on one side than on the other, can readily be diagnosticated as a filled bladder with the aid of palpation and percussion.

As regards the kidney, one should recall that the upper two-thirds are under the lower ribs, the right slightly the lower, and both adjacent to the spinal column. It is possible to examine in different positions. The most common is on the back, legs flexed, and patient breathing with the mouth open. The flat of one hand is placed on the abdomen and finger-tips press down alongside of the spleen or liver, and the opposite hand just under the arch of the rib presses upward, both hands acting especially at the time of expiration in order to palpate the kidney between the finger-tips. The *ballottement of Guyon* is carried out in exactly the same manner, except that the hand which is below gives a quick snap in order to give to

the kidney a motion which is to be recognized by the finger-tips of the hand which is palpating from in front. The knee-chest posture is useful, with the idea that the kidney may partly take a position that will render it more readily felt. Another method in vogue is to place the patient on the *opposite side* to that which is to be examined; with the uppermost leg drawn upward, and the thorax brought downward. In both instances similar methods of palpation and percussion as the first method must be used.

Sometimes it is necessary to examine under narcosis in order to gain information, as some individuals involuntarily resist and consequently prevent any diagnosis being made.

It has become imperative, even in apparently undoubted cases of stone, to have skiagraphs taken. The X-ray will show the size, the number, and their exact location. Besides, ureteral and bladder-stones are readily shown. Encysted stones of the bladder have been found in this manner. The X-ray may also disclose other pathological conditions, as tumors, both solid and cystic.

Ureters and bladder are palpated and percussed when patient is in the dorsal position.

Following the external examination, the rectum must always be explored. Whenever an examination is undertaken for the first time, it is best, as patients under this examination become faint, to have them on their back or side. Sometimes it is desirable to allow them to stand and to stoop over a table. In any case they are to allow the perineum to become lax. The finger should be well oiled; it is best, in order to protect one's self, to put a condom over the patient's penis, or rubber gloves on one's hands. If no coverings are used, the patient may be directed to hold his penis away from the hands of the examiner, and the latter should scrape soap up and about his finger-nail in order to facilitate subsequent washing off of fecal matter. In normal cases, the index-finger immediately feels the prostate as a body the size of a chestnut, with the apex toward the perineum and a furrow in the median line, and both lobes of a fairly hard consistency. In acute prostatitis one or both lobes are irregular and painfully

enlarged, and may be of a softer consistency. In chronic prostatitis the gland may even be smaller but irregularly nodulated, hard, and painful. In prostatic abscess, fluctuating areas which may reach the size of an orange can easily be felt. Prostatic hypertrophy, whenever the prostate is enlarged toward the rectum, can readily be diagnosticated. Tuberculous prostatitis, *if involvement is especially toward the capsule*, can readily be palpated as large-sized, pin-head nodules. Usually these cases first come for examination when the entire parts are massed together.

The seminal vesicles when normal can usually, and when pathological can almost always, be readily felt, especially the duct as it passes through the prostate.

With the bimanual examination, with one finger in the rectum and one hand on the abdomen, ballottement can be instituted and the size, form, surface, and consistency of the gland and bladder made out. This can also be done with a sound in place.

QUESTIONS ON EXAMINATION BY INSPECTION AND PALPATION.

Why is it advisable to examine urethral discharges and urine previous to any instrumental examination?
What may be seen by inspection?
What information can palpation give?
How would you examine in order to palpate the kidney?
Why is it necessary to examine certain cases under narcosis?
What can the X-rays show?
What is meant by a rectal examination?
What can be felt?
What is a bimanual examination?

INSTRUMENTAL EXAMINATION OF THE URETHRA AND BLADDER.

Previous to commencing such an examination all points must be considered as to whether it is advisable to make an instrumental examination at the time, or whether it has become imperative to do so in order to make a more exact diagnosis. There are a group of cases where one should abstain from such an examination. These are acute inflammatory cases, such as acute urethritis, acute prostatitis, abscess, or acute cystitis. Again, it may become imperative to use a

catheter in these cases, as acute retention may set in at any time. If so, the anterior urethra should be thoroughly irrigated, external orifice cleansed, and a No. 13 to 15 Charrière-Nélaton catheter, well lubricated, should then be introduced. Again, old men, where there are symptoms of the first degree of prostatic hypertrophy, should not be subjected too quickly to instruments, for many of these run a bad course. If obligatory to introduce an instrument, this should be done only under aseptic precautions and with precision, deliberation, and gentleness.

It is unnecessary to state that previous to an examination one should consider what the object to be gained is—in other words, it depends partly on the history of the case. If led to believe that there is a stricture, the diagnostic sound should be the first instrument to be introduced. Similarly shaped instruments are made of flexible material, then termed diagnostic bougies. These are passed the entire length of the urethra, and infiltrations and narrowings can readily be detected. Usually the largest caliber permitted for introduction at the external orifice should be used. For more exact measurements of the urethra the Otis urethrometer is to be recommended. This is an instrument with a dilatable part, which registers the dilatation. It is to be used only in the anterior urethra. *The diagnostic sound, when passing into the posterior urethra, apparently meets an obstruction and is even held fast, but this should not be mistaken for a stricturous condition.*

Some information can be obtained with sounds as regards the type of the stricture—whether it is soft and acutely inflamed, or whether it is hard, fibrous, and chronically inflamed—when introducing and withdrawing the instrument.

Especially in the neurotic, apparently a spasm of the urethra is occasioned on the introduction, and if it happens to be a diagnostic sound, it may be held fast. These conditions should not be mistaken for strictures, but are urethral neuroses. Whenever withdrawing a diagnostic sound or bougie in order to obtain certain information, the enlargement of the sound should be held fast with the fingers as it is withdrawn.

In doing so, secretions are expressed from the urethral glands, which can readily be examined in the regular manner.

If diagnostic sounds cannot be passed, it may become necessary to use a metal conical sound. It is best to commence with about a No. 21 Charrière. If not passed, smaller sizes should be attempted, but it is best never to try a metal instrument less than No. 15 Charrière, as urinary infiltration following false passage can readily be caused. Below this size, bougies should be used, and one or more filiform bougies can be tried at one and the same time. If it is impossible to enter such a stricture it is referred to as an impassable stricture. So long as the patient can pass urine it is permeable; only when an acute retention sets in can it be called an impermeable stricture. Then if no instrument can be passed, it may also be referred to as an impassable stricture.

In order to measure the length of the posterior urethra, which is of value in cases of hypertrophy of the prostate, the diagnostic bougie may again be used. When passing the bulbous portion beyond the external sphincter, the length protruding from the external urethral orifice should be noted; then the sound is introduced further until the internal urethral orifice is passed, and this can readily be felt. Now, again, the point is noted, and the difference shows the length of the posterior urethra. Normally, it is about 4 to 4.5 cm. Another method which is probably more accurate is with the aid of a catheter. It is introduced into the bladder containing fluid, then the eye of the catheter withdrawn until the flow of fluid from the catheter stops. The part extending from the external urethral orifice is noted. Now, a syringe is attached to the catheter, borated water injected, and the catheter slowly withdrawn. As soon as the water escapes from the external urethral orifice along the side of the catheter the measurement of the catheter is again taken and this figure subtracted; the difference gives the length of the posterior urethra.

In the examination of the bladder it is necessary to traverse the entire length of the urethra with instruments previous to any intravesical procedure. The urethra has different

courses of direction, varying to a certain extent with the age of the individual. The suspensory ligament fixes the penis, then necessarily the urethra, and up to this point of fixation is called the pendulous urethra. From here it passes downward, backward, and around the os pubis. Just before the urethra enters the triangular ligament there is a widening which is called the bulbous urethra. These two anatomical conditions make the anterior urethra. From the anterior layer of the triangular ligament to its posterior layer is the membranous urethra, and from this point to the internal urethral orifice the urethra is surrounded by prostatic tissue; hence called the prostatic urethra; both parts are termed the posterior urethra. The membranous urethra is surrounded by the musculus vesicæ externus. The posterior urethra has a fixed curvature, and naturally the instruments that require the least force to pass it are the most desirable. The urethra has not the same calibre throughout, but just within the external urethral orifice there is a distinct narrowing. This is called the fossa navicularis, and on the upper wall there is often a mucous fold which forms the lacuna magna, which admits instruments, and where traumatism readily occurs. Variation in size is most marked, however, at the junction of the bulbous with the membranous urethra. There is apparently a sagging of the bulbous urethra, and it is at this point that false passages can easily be made, especially whenever force is required to pass it. *For this reason it is best to keep the tip of the instrument in contact with the upper wall of the urethra at this point.* The prostatic urethra has also an enlargement, especially in old age, and in some cases the course of the urethra changes entirely, due to the variable shapes which a prostatic growth may take. It is on account of the distortion of the urethra in these cases that we explain the difficulty of passing instruments. However, inflexible instruments which are to be used in the posterior or deep urethra should be made with a curve which corresponds with the fixed curve at this part of the urethra.

Instruments are made of non-flexible material, such as metal, and retain their shape; or of soft, elastic, or semi-

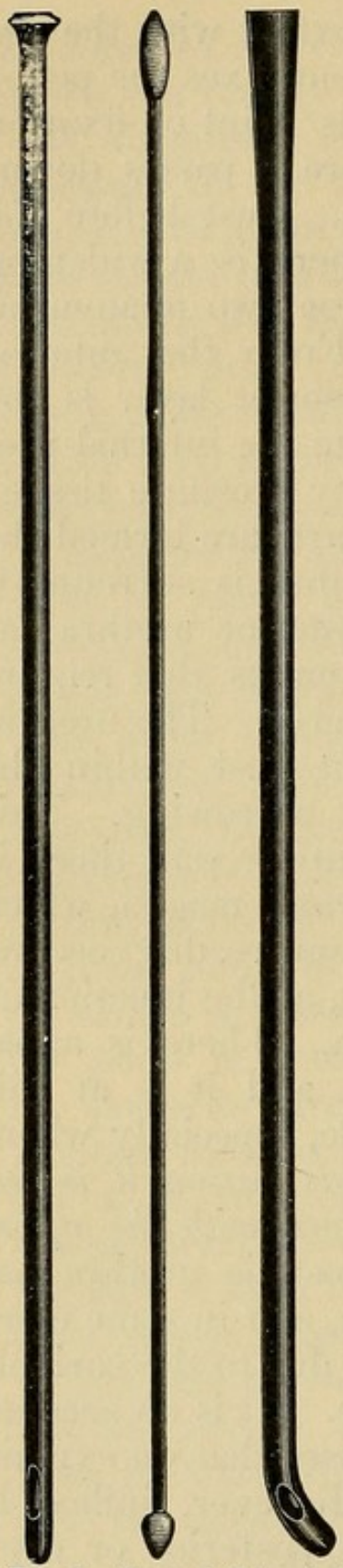


FIG. 1.—From left to right in series are the blunt-pointed, soft-rubber catheter, the double-end diagnostic sound (bougie-à-boule), and the single Coudé catheter (elbow catheter).

elastic material, which do not retain their exact shape. Instruments are of metal, then called sounds; or of elastic material, then called bougies. Both are used for the purpose of dilatation of the urethral canal. No matter of what material they may be made, instruments which have a channel through their length are called catheters. These are used either to withdraw fluid or inject it into the bladder. If made of soft rubber, termed Nélaton; if of woven silk, covered with shellac, and flexible at ordinary temperature, called French; if not flexible at ordinary room-temperature, but flexible in warm water, they are called English catheters. Shape is given to these latter by placing them in warm water and giving the metal mandrin the desired shape. On cooling, they retain the shape given to them.

Metal instruments are best kept sterile by boiling in water or sterilizing like any other metal instruments. The Nélaton catheters may be boiled, but become brittle after treating them in this manner. French and English instruments, as well as all other instruments, should be washed with cold water so that in case albuminous matter clings to them, it does not become coagulated. Then place in 1 : 2000 bichloride of mercury solution. *This is always to be washed off with cold sterile water.* Again, formalin vapors can be used for sterilizing instruments. They must remain in contact for some time, and *here again thoroughly washed before*

using, as formalin is irritating to the urethra. The subject of sterilization of these particular instruments still requires much consideration.

As regards lubricants, 5 per cent. boric acid in glycerin or olive oil, which must be sterile, are acceptable, although numerous preparations are made for this purpose.

French catheters having a tip which is set at more or less of an acute angle are called Mercier or Coudé. Occasionally the tip has a double curvature, and is then referred to as a bicoudé catheter. These instruments are to be recommended in cases of prostatic enlargement, as their tips readily pass into the posterior urethra. The bougie-à-boule (ball-sound), or diagnostic bougie, is made from similar material.

The Mercier or prostatic catheters are used wherever an enlarged prostate is suspected, or whenever a soft-rubber catheter cannot be passed. There are French catheters which have conical, cylindrical, olive-pointed tips, and each can be used to advantage in different cases, selection of which depends on experience almost entirely.

Retention of urine is of great importance. It is the amount of urine which remains in the bladder after a voluntary urination and is of significance in certain cases.

In acute retention of urine, when due to acute inflammatory troubles, the smallest caliber Nélaton catheter should be used. Not so in cases of retention in the course of a prostatic hypertrophy. Here at least a large size, if possible a 28-Charrière, should at once be used. English catheters are scarcely ever used, although there may be certain cases in which they may be desirable.

As regards metal instruments, they may have a two-fold use—either to act therapeutically on the walls of the urethra or for diagnostic purposes within the bladder. For the former, instruments should be so shaped that the urethra may retain its natural curvature when they are in the canal. When used for the second purpose, it suffices if they are able to pass.

Sounds used for narrow strictures should be conical, so that the tip may readily enter a stricture; if used where but localized areas of inflammation exist, the sounds may be cylindrical.

CATHETERIZATION OR SOUNDING OF THE URETHRA.

Too often rough handling and inability to pass instruments have caused much pain and ill results to patients. For this, if for no other, reason it is well for a student to give attention to this subject. To carry out the procedure in detail, the hands of the surgeon, the instrument, and the field of work should be sterile. The patient is best placed on his back, with the hips slightly elevated, and the external urethral orifice well cleaned with antiseptic fluid. The ordinary method for passing instruments is known as *tour du ventre.* With the little finger of the hand holding the sound or metal catheter resting on the abdomen, and parallel to it in the median line, the tip of the instrument enters the external urethral orifice, which is held apart with the fingers of the other hand, thus making the beginning step. *The glans is then pulled up and over the sound, while the hand on the abdomen still retains the original position. When the penis cannot be brought up any further, the tip of the instrument is gradually lowered and the handle raised until the instrument reaches the vertical position.* In doing this the tip should follow the upper wall of the urethra. If not, the tip reaches the bulging bulbous urethra, usually at its base. For this reason the finger-tips, those of the index and middle and of the thumb, apparently grasp or direct it at the perineum, but are not to be used as the fulcrum of a lever. Thus the tip enters the membranous urethra by being directed upward, so that it may take the correct course. Occasionally it may be desirable to introduce the index-finger into the rectum, and with the aid of the thumb on the perineum guide the tip of the sound. The usual error is either to raise the tip of the instrument before the membranous urethra is reached, and, if boring motion is used, false passages in the upper wall of the bulbous urethra are easily made; or the tip of the instrument is allowed to reach the lowest portion of the bulbous urethra, into which the membranous urethra partly overhangs; hence if force be used, the instrument passes through this tissue, which readily allows of urinary infiltration. Even after passing through this diffi-

cult space the instrument may still meet with obstruction in the prostatic urethra. If due to enlargement, and if the passage has become tortuous, great care should be taken not to pass the tip through the prostatic urethra. The tip may be caught where the sinus pocularis is patent, and a false passage readily established between it and the bladder, entering the same below the external orifice.

There are other modes of introduction of instruments, but practically all are modifications of the preceding method. *Wherever no severe pathological conditions exist, the weight of the sound, if rightly directed, passes the instrument correctly. In withdrawing an instrument the exact reverse motions are pursued.* When the beak of the sound is in the bladder, it should be movable from side to side, and also from above downward, and *vice versâ*. If it happens to be a catheter, the urine in the bladder passes from it.

Instruments which are used for diagnostic purposes within the bladder must be of such a shape that every part of the wall of the bladder can be reached with it. Thompson has shown that the beak should be almost at right angles to the shaft, and scarcely more than 2 cm. in length. The handle should be cylindrical and hollow, so that the sound of striking a calculus, for example, carried by the shaft, may be magnified. A modification of this instrument is that it is a catheter at the same time. In certain cases it is desirable to introduce or withdraw fluid, so that an examination may be more thoroughly carried out. Whenever such an instrument is inserted immediately after urination, and if urine remains in the bladder, it may be withdrawn and the quantity measured, which is called the residual or retention urine. If the urine is expelled so that it passes in a perfect stream from the catheter opening, it signifies the contractile power of the bladder-wall. If it falls abruptly from the catheter opening, it shows an atonic condition of the bladder-wall.

After the introduction of an instrument into a normal bladder, if the beak is turned downward, and then a stroking motion given to the beak both backward and forward and from side to side, the velvety sense of touch of the normal

mucosa is imparted. But a short distance back of the internal urethral orifice, and on both sides of the median line, an elevation is met with which corresponds to the interureteral ligament. Within this triangular region, called the trigonum, there is apparently a tenseness of the bladder compared to the rest of the bladder-wall.

This method of examination with such a sound, termed *stone sound*, has not the value that it was formerly supposed to possess, on account of other methods of examination. It should not be carelessly used, as pathological conditions become worse by interference with hard instruments; if hemorrhages or ulcers exist, these can become aggravated. Hard, infiltrating masses can be distinguished, but not polypoid tumors, unless of enormous size. It is adapted for finding stones in the bladder. If not encysted in the bladder-wall, the stone is in the most dependent portion of the bladder cavity, and can in most cases be readily felt, and a "click" is given to the instrument, which is characteristic of such a condition, varying in intensity with the size and character of the stone. Trabeculæ can readily be made out; besides, an idea can be obtained of the size, number, and contour of the lobes of the prostate when protruding into the bladder cavum.

QUESTIONS ON THE INSTRUMENTAL EXAMINATION OF THE URETHRA AND THE BLADDER.

In what class of cases is it necessary to make instrumental examinations?
Would you do so in an acute inflammatory disease? Why not?
How would you proceed in cases where you suspect a stricture? In hypertrophy of the prostate?
What is meant by a spasmodic stricture?
How would you diagnose an organic stricture?
How would you measure its calibre?
How would you measure the length of the posterior urethra?
What are the anatomical divisions of the urethra? What are the clinical divisions?
Has the posterior urethra a fixed curvature?
What are the enlargements of the urethra?
Of what importance are they especially when passing instruments?
Of what material are instruments made?
What are sounds? bougies? catheters?
What is a Nélaton catheter? French catheter? English catheter?
For practical purposes how would you sterilize this class of instrument?

What are lubricants? Mention those that are satisfactory for genito-urinary surgery.

What is a Mercier or Coudé catheter? bicoudé catheter?

What is the special use of these Coudé catheters?

In what class of cases are these of special value?

What is retention of urine?

In acute retention of urine during the course of an acute inflammatory disease, what kind of catheter should be used to withdraw the urine? Why?

In retention due to prostatic hypertrophy, what kind of a catheter should be used?

For what purposes are solid metal instruments?

Describe differently shaped sounds.

What is meant by catheterization or sounding?

Do bad results ever follow rough handling of the urethra? Describe such.

In what position should the patient be placed for catheterization?

What is meant by the *tour du ventre?*

Describe in detail the passing of a sound, naming its cautions.

Is the finger ever introduced into the rectum when sounding? If so, why?

What is a false passage?

Can these easily occur? Where do they occur most often? Why?

How can you state whether or not the beak of the instrument is in the bladder?

Instruments used for diagnostic purposes within the bladder have what shape, and why?

How can you state whether or not a catheter is in the bladder viscus?

What is meant by a Thompson stone sound, or searcher?

What is the advantage in having this instrument as a catheter at the same time?

What may be felt with such an instrument in the normal bladder?

Has it as much value as formerly? Why not?

In what class of cases should it not be used? Why not?

How do you recognize a stone with this instrument?

URETHROSCOPY.

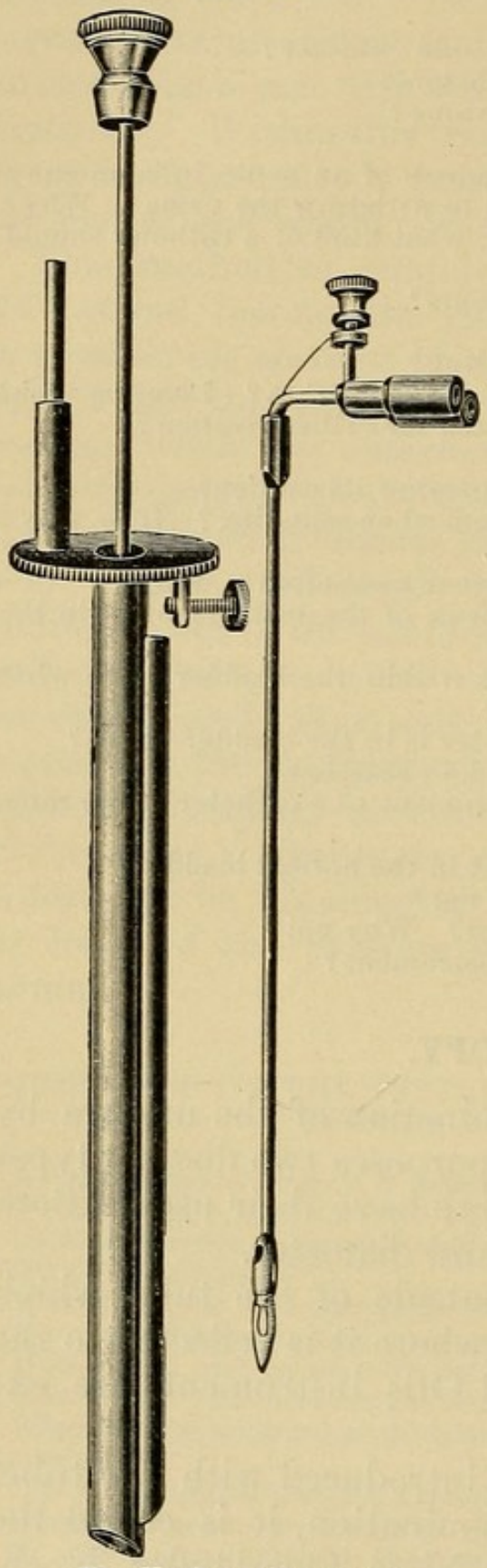
By this term is meant the examination of the urethra by the aid of sight. For all practical purposes two distinct types of instrument are recognized and both have their uses. Both consist of tubes varying in length and diameter.

1. When the source of light is outside of the tube, which is introduced into the urethra, and where it is reflected to the point of examination. Casper and Otis instruments are examples of this variety.

2. Where the source of light is introduced with the tube, and the light is at the point of examination, it is called the direct method. Examples are the Nitze, Oberländer, Koch, and Guiteras instruments.

No matter which instrument is used, certain accessories are

FIG. 2.



The Koch urethroscope.

necessary for intra-urethral work —*e. g.*, cotton carriers, canula to connect with a syringe, small knife, electrodes, etc.

The technique for an examination is as follows: The patient may be either in a sitting position or in a lithotomy position. For all ordinary work he may be on an examining table, on his back, with hips considerably elevated, and the legs spread apart. After using ordinary antiseptic precautions the instrument with mandrin is introduced. If it is desired to insert it into the posterior urethra, the suspensory ligament is made lax by placing the left hand on the pubic region and making it give, so that the instrument held with the right hand passes almost without effort into and through the posterior urethra.

There are but rare instances where any local anæsthetics are required. If so, with a Guyon capillary catheter, 1 to 2 c.c. of a 3 per cent. eucain or cocaine solution are sufficient to anæsthetize the parts. *All local anæsthetics change the appearance of the urethra, hence it is best to avoid their use.* It is best to insert the largest tube that will enter the external urethral orifice.

Normal Features.

There are distinct normal findings. In order to understand what is seen in a urethroscopic examination these must be fully understood. The *central figure* varies with the part of the urethra: so much so that the part can be recognized from it alone. Besides, the radiating lines, gloss, and color all vary in individual cases. Commencing with the internal urethral orifice and gradually withdrawing, the first most important structure to be noticed is the *colliculus seminalis.* Above this, the opening of the *ductus ejaculatorii,* and alongside, the *ductus prostatici.* The *sinus pocularis* can be recognized as a slit on the uppermost part. Withdrawing still further, the commencement of the *caput gallinaginis* is seen. This gives a somewhat crescent-shaped protuberance. Still further along the *pars membranacea* is reached. Here the central figure is of a vertical, slit-like appearance, with the lower and upper parts with many radiations. The *pars bulbosa* shows the openings of the *ducts of Cowper's glands. Pars cavernosa* shows the central figure as a slightly horizontal slit. In this portion *Morgagni's crypts* and the *openings of the glands of Littré* are to be seen. Finally, the *fossa navicularis* is reached, showing a triangular central figure.

PATHOLOGICAL FEATURES.

It will be impossible to mention in detail the pathological findings, yet it will be necessary to enumerate them.

They consist principally of the epithelial lining, which normally shows a smooth and equally glossy appearance. In diseased areas the gloss may be absent or be diminished and occur in patches, or it may be granular in appearance and more or less diffusely the color may not be the normal rose-tint, and the striations and reflex irregular. The glands and crypts are commonly affected, and their openings may show a swollen condition. In subacute and chronic urethral inflammations, Oberländer distinguishes soft from hard infiltrations. The posterior urethra shows many variations, as the caput galli-

naginis is often affected. Besides these changes, tuberculosis, tumors, such as polyps, traumatism, and openings of strictures may readily be recognized.

All these conditions may, of course, be treated intra-urethrally with electrolysis, and all other applications, etc., made directly under the supervision of the eye.

CYSTOSCOPY.

Cystoscopy is the method by which the inner surface of the bladder is examined by inspection.

In cases of women, Simon dilated the urethra with sounds of gradually increasing size, and the inner surface of the bladder was palpated. Kelly uses tubes with mandrins, the tubes not so large in diameter as the sounds of Simon. If patients are put in the knee-chest position, after the removal of the mandrin the bladder fills with air. Then, either with a head-mirror or a small electric light which may be introduced along the side of the inner wall of the tube, the bladder surfaces may be examined; besides, smaller intravesical operative procedures can be undertaken. The Kelly method can also be used in the male, but not with so much satisfaction.

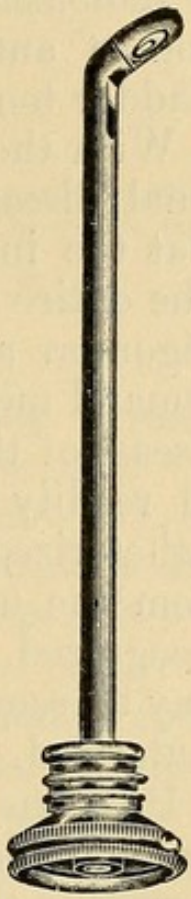
The Nitze cystoscope is the prototype of all the instruments used at the present time. It consists of a metal tube with a bend like a Mercier catheter. In the beak is a small Edison incandescent lamp with the open surface facing upward. At the ocular end of the funnel-shaped tubing the electric insulation attachment is fastened. Just at the concavity of the beak and shaft there is a square opening set with a prism. Now, with the small telescope which is fitted in the tube, everything that is seen by looking through the ocular is at right angles to the axis of the instrument, *as the prism refracts at this angle.*

Nitze also introduced instruments whereby no prism was used, but where the objects seen were directly, and again where the prism was so set that the angle of refraction was greater than 90 degrees.

The Preston cystoscope is so made that it can be used with

or without its optical part. When with it, the principle is exactly like the Nitze cystoscope. When without, the view is uninterrupted; in other words, is direct. As the lamps used give off but little heat, these cystoscopes can be used in a bladder dilated with air. All European instruments are now provided also with cold lamps, yet water is used for dilatation of the bladder, as tumors or membranes float readily in the same, allowing correct judgment as to the character of such pathological findings.

FIG. 3.



Nitze's cystoscope.

Modifications of these instruments have been made so that they may be used for catheterization of the ureters—then called *catheterization cystoscopes.* The Kolischer *operation cystoscope* is one which permits a direct view, and underneath the tubing for the optical part there is a small canal which permits the introduction of curettes, scissors, etc., and allows intravesical operations under the direct view of the eye. The Nitze *operation cystoscope* is a much more complicated instrument.

In order to perform cystoscopy successfully certain requirements are necessary:

1. The urethra must be sufficiently large to admit the instrument, and free of narrow strictures, etc.

2. The bladder must be dilatable to at least 75 to 150 c.c. whenever cystoscopes are used which require dilatation with water; when with air, the bladder need not be dilated.

3. The fluid used for filling the bladder must be clear. If bloody or turbid from pus, an examination cannot be carried out.

To lubricate urethroscopes and cystoscopes it is best to use a substance that is miscible with water: sterilized glycerine is satisfactory.

Occasionally, local anæsthesia is necessary to carry out an examination. It is best, some fifteen minutes before an examination, to insert into the rectum a 0.01 gramme morphine sup-

pository. In addition to this, 5 to 15 c.c. of a 2 to 5 per cent. solution of eucain or cocaine, *as the case demands*, should be distributed along the empty bladder and entire urethra. *Before using cocaine the patient's idiosyncrasy against it must be established.* Besides, 25 to 50 c.c. of a 5 per cent. solution of antipyrin solution can be injected directly into the bladder ten minutes previous to an examination.

With the aid of cystoscopy, the diagnosis of bladder and renal diseases has made enormous strides. It is regrettable that the instrument has not become more general in its use. The entire bladder surface can be thoroughly examined; the trigonum and the parts about the internal urethral orifice demand most attention. Hypertrophy of the prostatic lobes, disease of the trigonum, cystitis, ulcerations, rhagades, etc., can all readily be diagnosticated. Even if the ureters are not catheterized, the urine often can readily be seen as it spurts from the ureteral orifices; if bloody or purulent, it can be recognized. With the operative cystoscopes small tumors may be removed, stones crushed, and ulcerations curetted and cauterized.

Previous to the discovery of cystoscopy and radiography many exploratory operations, especially perineal, were performed in the male. These have now become obsolete. Operations on the kidney are now also made with more certainty, since urine from both kidneys has been collected, since both ureters have been sounded or catheterized, and since skiagraphy and cystoscopy have come into general use; in other words, differential diagnosis of kidney, ureteral, bladder, and posterior urethral diseases can be made with comparative ease with the modern instruments at our command.

QUESTIONS ON URETHROSCOPY AND CYSTOSCOPY.

What is urethroscopy?
What is a urethroscope, and what two types are in common use?
What is the technique for urethroscopy?
Would you use a local anæsthetic?
What are the objections to the use of cocaine?
Describe the normal findings of urethroscopy.
Of what do the pathological conditions principally consist?
In the treatment of urethral disease, has this method any advantages?

What is cystoscopy?

Describe the Kelly methed of examining the bladder. Can it be used in the male?

What is a cystoscope?

Describe the plain Nitze cystoscope.

What is meant by a catheterization cystoscope?

What is meant by an operation cystoscope?

What are the requirements for cystoscopy?

If necessary, how would you anæsthetize the parts?

Why is it necessary to know the idiosyncrasy for cocaine?

With what would you lubricate the instruments?

In the treatment of intravesical disease, how are these instruments used?

In the differential diagnosis of bladder and kidney disease, how are they of use?

Case-Histories and Records.

Every instrumental examination involving the urinary tract should be preceded by a careful history of the case. It is almost needless to state that the most important part of the anamnesis in a case suffering from a genito-urinary disease is that which is directly referable to the organs affected. Whether or not and when any gonorrhœal infections occurred, their number, their course, and their duration, whether complicated in any manner with swollen testicles, chills, or otherwise, must be known. The mode of treatment, whether or not with instruments, should be asked. Then, again, especial attention should be given to the present complaint. When first noticed, whether or not a cause is suspected, and its entire course should be elicited with reference to—

1. Frequency of urination.
2. Whether or not pain is present.
3. Quantity and character of the urine.
4. What kind of stream.
5. Whether or not a discharge from the urethra is present.

Now, in order to facilitate matters, a few questions may be enumerated which give important information in a concise form:

1. How often do you urinate—during the day? during the night?

2. Have you pains? When—before urination? during urination? after urination? or in the interval between urinations? Where is the pain?

3. How much urine do you pass—small quantity? large quantity?

4. What kind of stream—Force? Size? Form? Direction?

5. Is there a discharge—before urination? after urination? Is it non-purulent? Purulent? Bloody?

After this preliminary questioning and examinations of discharge and urine, the physical examination is proceeded with. To enumerate rapidly: Inspection, palpation, then rectal examination. The instrumental examination varies as to the history of the case. If stricture is suspected, diagnostic bougies or sounds, and then the urethroscope; if stone, then stone sound or cystoscope; if an acute urethral discharge is present, it is probably advisable to omit any instrumentation of the urethra on account of the possibility of causing complications. *No exact outline can be given for all cases, as it may vary with each instance.*

QUESTIONS.

Why should a history precede every instrumental examination?

On which part of the history should stress be laid?

In the affection under consideration, why should special attention be paid to number of times of urination, pain, urine, stream, and discharge?

Previous to the physical examination, should the urine be examined? Why?

How would you proceed to examine a patient with a genito-urinary disease?

Is it advisable to examine a patient with an acute discharge? If not, why?

Is there any definite rule to take in the instrumental examination of patients?

CONGENITAL MALFORMATIONS, INJURIES, AND DISEASES OF THE PENIS.

MALFORMATIONS OF THE PENIS.

Cases are recorded of complete absence and rudimentary formation of the penis; also double penes, and in these cases usually double urethras and bladders.

INJURIES OF THE PENIS.

The subcutaneous tearing of the corpora cavernosa rarely occurs at any other time except during an erection, and is

referred to as fracture of the penis. It may occur in any portion of the corpora cavernosa. Usually there is the formation of a hæmatoma, the absorption of which requires considerable time, but contractures of the penis at the time of erection often remain. It may require permanent catheterization and moist antiseptic applications to prevent urinary infiltration. All injuries, whether of crushing character, stabs, or otherwise, indicate the regular surgical treatment.

DISEASES OF THE PENIS.

Balanitis and Posthitis.

Balanitis is a superficial inflammation of the glans penis. **Posthitis** is an inflammation of the inner leaf of the prepuce.

If these two disorders accompany each other, which is the rule, it is then termed **balano-posthitis.** The non-venereal balano-posthitic affections are commonly caused by the retention and decomposition of the smegma in unclean patients. This decomposition produces fatty acids, which erode the epidermis. Prolonged contact with gonorrhœal discharge may produce the same result. Therefore it may be either venereal or non-venereal. As a result, redness and moisture or superficial erosions may appear, which discharge pus quite freely. A predisposition for this trouble is established if the prepuce is very long and its opening very small. When this occurs in men of middle age, there is more or less chronic balano-posthitis. Once in a while the glands in the inguinal region become infected and enlarged, but suppuration in them is a rather rare occurrence. *The first principle of the therapy is cleanliness.* Quite often a few warm-water injections suffice to reduce the inflammation. In severe, non-venereal cases we introduce, between glans and prepuce, a piece of cotton or absorbent gauze which is soaked in an astringent and mildly antiseptic solution of the following formulæ:

℞ Aluminis crudis, 1.0 gramme;
Liq. plumbi acetat. fort., 5.0 grammes;
Aquæ destillatæ, 300.0 "
M. & Sig.—External use as directed.

℞ Zinci sulphocarbolatis, 0.25 gramme;
Acidi borici, 2.50 grammes;
Aquæ destillatæ, 100.00 "
M. & Sig.—External use as directed.

Or cleanse parts with warm water and then with peroxide of hydrogen; dry and dust with dermatol.

This latter treatment will answer for those cases caused by the gonococcus. In all chronic cases circumcision should be resorted to, and as a prophylactic measure against other attacks after an acute case has subsided.

Inert dusting-powder or astringent antiseptic powders, such as the following, can be used frequently daily after first cleansing the parts:

℞ Pulv. zinci oxidi,
Pulv. talci, āā 5.0 grammes.
M. & Sig.—Dust on the parts as necessary.

Or—

℞ Acidi borici, 5.0 grammes;
Acidi salicylici, 1.0 gramme;
Hydrarg. chlor. mit., 2.5 grammes.
M. & Sig.—Apply locally as needed.

Herpes Progenitalis.

Herpetic vesicles are common and most often multiple, arranged in groups on a more or less slightly reddened base, appearing on the mucous membrane and also on the skin of the penis. If arising on the skin, they dry quickly and form a scab, but when on the mucous membrane, the vesicles break open and ulceration sets in. When but one vesicle occurs, it may be round, but usually confluent and irregularly shaped erosions occur. *In diagnosing, the cause should be considered, and it must be remembered that they may lead to a balano-posthitis and occasionally to a bubo.* Uncleanliness, long foreskin, and long-continued friction are probably, with a certain predisposition, the causes. In the treatment it is best to try to prevent the vesicles from breaking. Occasionally, covering

the patch with collodion will do so. If not, or if already broken, cleanliness and antiseptic and astringent dusting-powders are to be recommended. In the chronic cases the ulceration can be thoroughly cauterized with nitrate of silver or carbolic acid. Occasionally, if constantly recurring on the foreskin, circumcision is to be advised, although, as neurotic individuals are susceptible, improvement in general health, by hygienic living, abstaining from sexual excitement, alcohol, and tobacco, may avoid some recurrences.

Venereal Warts.

About the glans, frænulum, and at the external urethral orifice of the male; about the labia in the female; and in other places, as the anus, it is not uncommon to see numerous pin-head- and large-sized warty growths. In occasional cases the entire glans penis or portio vaginalis may be wholly lost to view by the enormous size to which these growths—called variously *condylomata acuminata*, *vegetations*, and *venereal warts*—attain. In the large majority of cases there is some venereal process present, and the secretions from any of these have been regarded as the cause. Authentic cases in virgins have been noted. Irritating discharges appear to be the etiologic factor. Minute excrescences appear, and their growth is rapid. These are sometimes single, but usually multiple, and they may be either flat or pedunculated. They consist of papillæ, enormously elongated, branching like a tree; vascular, and the whole may be covered by many epithelial cells. Apparently a slight secretion is present, which causes maceration, giving off a very disagreeable odor. As yet no cases of transmission by contact or by inoculation are known. After removal they frequently recur. Occasionally they must be differentiated from epithelioma and condylomata lata. Cleanliness is a prophylactic measure. When small, if applications of formalin or perchloride of iron solution are made, the warts will shrivel and the crusts will fall off.

The following application, made on several successive days, is satisfactory:

℞ Salicylic acid, 1.0 gramme;
Glacial acetic acid, 10.0 grammes.
M. & Sig.—For office use. Venereal warts.

This dusting-powder is efficacious:

℞ Resorcin,
Salicylic acid, āā 1.0 gramme.
M. & Sig.—Apply locally with care.

It may be dusted on the warts and will cause them to disappear slowly. Dilute nitric acid applications and dusting the parts with calomel give good results. Simple excision of the papillomatous growth with the base and cauterization of the bleeding surface (best with the electrocautery) is the quickest and most satisfactory method of treatment. The cause, namely the irritating discharge, must be removed, otherwise a new crop will certainly appear.

Phimosis and Paraphimosis.

Phimosis is a condition in which the opening of the prepuce is too small to allow retraction with ease over the glans. The degree of the narrowing of the opening varies considerably. This may be either a congenital one or an originally sufficiently large opening reduced to abnormally small size by inflammatory processes. This inflammation may be due to balano-posthitis, chancroids, or other processes within the prepuce, or the repeated formation of rhagades and subsequent thickenings and rigidity of the preputial edge may lead to phimosis. The consequences of this condition may be the impairing of the urinary flow, and if the opening is pin-head in size, the urine then often fills the preputial sac, also the retention of the smegma, while infectious diseases of the prepuce are brought under unfavorable condition for treatment and cure. In order to relieve this condition we have to resort either to systematic dilatation or to operative interference. The dilatation may be used to advantage in children by inserting gauze wicks or tents into the preputial sac. But there is always some danger of provoking

masturbation by the prolonged irritation. Ordinary artery forceps or forceps made for this purpose can be used daily for a short period of time until the desired results are obtained. The cutting operation may either be an arc-shaped incision from the preputial edge, so as to enlarge the circumference of the opening by stitching the lips of the wound together, or the prepuce is split over its edge down to the coronary groove. This is done in the following way: A grooved staff is introduced in the dorsal part of the sac, and the prepuce split by running a bistoury down in the groove of the staff, or by using a pair of scissors in the same way. Care must be taken to split the inner part of the prepuce fully down to the angle of the wound. After this is done, the external lamella is stitched to the internal, so that a V-shaped cleft is formed, or a partial or total resection of the prepuce may be done after the splitting incision has been made. We then follow with a circular incision at the desired point, and again unite both wound-lips together. The former is simply a dorsal incision, and the latter are called circumcisions.

Inflammatory phimosis may be only transitory in character. If chronic, it may become permanent. The cause must always be treated. The preputial sac should be continually irrigated with mild antiseptic solution, and if due to hard or soft chancre, should be treated accordingly. Besides, moist dressings should be constantly applied.

Paraphimosis.—This is the condition in which the prepuce is brought back behind the glans and is too tight to be replaced. By the constriction of the glans venous engorgement takes place, which makes the replacement more difficult, and if the incarceration persists for some time, gangrene may result. This condition can be relieved either by manipulations of various kinds or by operation. The impacted prepuce may often be replaced by taking the glans penis between the index and middle fingers, while the thumbs are placed on the top of the glans, and in pressing down on the glans try to reduce its volume, while at the same time the other fingers try to push or pull the prepuce forward. If this is unsuccessful, the prepuce must be incised over the incarcera-

tion ring until the impaction is relieved. In case it should be necessary, one can proceed immediately to the resection of the foreskin.

Infections of the Penis.

Phlegmonous processes of the skin and subcutaneous tissues and *lymphangitis* of the penis are met with. The treatment is by rest, sedatives, warm moist applications, and surgical intervention, if necessary. *Chronic cavernitis* is shown by swellings within the albuginea, of fairly hard consistency, and may be painful. Attempts are made at resorption with moist packs, applications of tincture of iodine, and mercurial ointment. *Elephantiasis* involving the penis and prepuce is occasionally met with, usually following some chronic inflammatory process. Circumcision of the thickened prepuce is to be advised.

Tumors of the Penis.

Cystic and *hypertrophic epithelial* tumors are seen occasionally. The *malignant tumors* are of importance. *Sarcoma* may be either primary or secondary. The former arise usually from the erectile tissues of the penis. Treatment is the same as for cancer of the penis—namely, early ablation of the penis and adjoining lymphatic glands.

Epithelioma of the Penis.

It attacks, as a rule, the meatus, where mucous membrane and epidermis border. From this point it spreads and may involve the prepuce. In other cases its original seat is on the inner fold of the prepuce. It first appears as a warty excrescence. This ulcerates very soon and covers itself with a scab. The epithelioma always spreads superficially, in the course of time covering and destroying quite a large area. There are cases on record in which the entire external genitals and even parts of the abdomen and thighs have been involved. Occasionally epithelioma may cause severe arterial hemorrhage by opening the frænular artery. Lymphatics on the dorsum penis and the glands in both inguinal regions

become enlarged and involved fairly quickly, and ulcerate after a certain length of time. The treatment will be an operative one after the disease is diagnosed. While in quite early cases the actual cautery may be used, as a rule excision of the neoplasm must be performed and the glands removed. In very extensive cases in which operative interference does not seem to be advisable, X-ray therapy may probably be used to good advantage.

Carcinoma Urethræ.

The other form of cancer is the carcinoma of the urethra. This can appear anywhere in the course of the urethra. It first manifests itself as an extremely hard, circumscribed infiltration, which very soon becomes the seat of lightning pains. This infiltration grows quite rapidly, but, as a rule, does not ulcerate in the early stages, while the lymphatic glands in the groins soon become involved. If a sound is introduced into the urethra, we find that it cannot be palpated through the cancerous infiltration, thus showing the degree of induration. This cancer spreads rapidly into the corpora cavernosa, so that a radical therapy can consist only in the amputation or excision of the penis, and in cases of necessity the removal of the swollen glands.

Prognosis.—Epithelioma of the penis is, comparatively speaking, a favorable form for radical cure. Carcinoma is, compared to epithelioma, less favorable.

QUESTIONS ON MALFORMATIONS, INJURIES, AND DISEASES OF THE PENIS.

Do malformations of the penis occur? If so, enumerate the more common.
What is meant by fracture of the penis?
What may contracture of the penis be due to?
What is balanitis?
What is posthitis?
What is balano-posthitis?
May these be non-venereal in origin?
What is the treatment for these conditions?
What is herpes progenitalis?
Describe the different appearances?
What are the causes?
What is the treatment?

What are the venereal warts?
Where may they occur?
Are they ever non-venereal in origin?
Do the vegetations ever reach any size?
Can they be inoculated?
Describe the treatment. What is the most satisfactory mode for their removal?
What is phimosis?
By what condition is it produced?
Is it ever congenital?
How would you treat the condition?
What is paraphimosis?
How may it be produced?
What is meant by the incarceration ring?
How would you treat this condition?
How would you treat phlegmonous processes of the skin and the subcutaneous tissue of the penis?
Does elephantiasis of the foreskin ever occur?
How would you treat it?
Name the most common tumors of the penis.
Where does epithelioma of the penis usually first make its appearance?
Describe the course.
What treatment is advised?
Do the inguinal glands ever become involved? Does this condition change the therapy?

CONGENITAL MALFORMATIONS, INJURIES, AND DISEASES OF THE URETHRA.

MALFORMATIONS OF THE URETHRA.

Congenital malformations are not very uncommon. Complete absence, double, and entire obliteration have been noted. Absence of the urethra in the glans, stenosis of the external urethral orifice, strictures (valve-like, cylindrical, or of other form) anywhere in the course of the urethra, are occasionally met. However, the most common conditions are *epispadias* and *hypospadias*. By the former is meant a congenital opening on the *dorsal surface* of the penis, the urine being passed from this abnormal opening. This orifice may occur anywhere on the upper surface of the penis, and is usually accompanied with other malformations. *Hypospadias* is the most common of all these abnormalities. In these cases the urine is passed from an abnormal opening on the lower surface of the penis. For practical description three divisions are made—viz.:

1. Hypospadias of the glans.
2. Penoscrotal hypospadias.
3. Perineoscrotal hypospadias.

All grades of different appearances occur. The treatment of all the malformations is operative.

INJURIES OF THE URETHRA.

These occur commonly during the course of catheterization, and hemorrhages, false passages, sepsis, or urethral fever are noted. Fragments of stone after crushing operations occasionally cause traumatism. A not infrequent occurrence is rupture of the urethra caused by a fall. These vary in the severity of their symptoms : the rupture may be complete or incomplete. Hemorrhage from the external urethral orifice, swelling along the course of the urethra, possibly inability to pass urine, pain, and finally urinary infiltration, with its symptoms, are to be expected. Most of the cases require a free incision and drainage, the steps of the operation varying as to the severity of the injuries.

Foreign bodies are met with in the urethra. They may arise within the urethra itself, as a stone, or be introduced from without, or reach some part of the urethra from the bladder. Usually infection sets in, and symptoms then depend on this fact. In all cases it is necessary to remove the object. This may be possible by the aid of the urethroscope ; otherwise by an operation.

DISEASES OF THE URETHRA.

Benign Tumors.

It is necessary to mention papillomata and polypi. The former are similar to condylomata acuminata, and usually occur in cases of gleet ; they may appear anywhere in the urethra. Treatment is by the aid of the urethroscope, and removal with the galvanocautery. Polypi are occasionally met with, and their treatment is the same.

Malignant Tumors.

These are usually secondary growths—especially carcinomata.

Inflammatory Diseases of the Urethra.

Whenever *urethritis* is spoken of, an inflammation of the urethra is meant; in fact, any portion of it. It is necessary to qualify according to the—

I. Cause:
- Specific.
- Non-specific.

II. Locality:
- Anterior.
- Posterior.

III. Duration:
- Acute.
- Chronic.

IV. Infectious properties:
- Infectious.
- Non-infectious.

Specific Urethritis.

This is caused by the gonococcus of Neisser. Whenever present, it is referred to as a gonorrhœa. Here there is a period of incubation. The disease usually runs a varied length of time, and remains contagious until the gonococcus becomes absent.

Non-specific Urethritis.

By this is meant an inflammation of the urethra caused by other germs or factors than the gonococcus. In this case the cause may be from without and within the urethra. Clinically, these cases may run a course very similar to a typical gonorrhœa. For this reason, therefore, it is necessary to resort to the microscope. There are *syphilitic*, *tuberculous*, *chancroidal*, and *simple* urethritis. The first three can readily be diagnosed by local lesions which are present, and, of course, by taking into consideration also the general conditions of the patient in the cases of the tuberculous and syphilitic. Therefore, in the cases of the so-called simple urethritis, the absence

of the gonococcus is noted, but one or more varieties of bacteria may be found. Yet in certain other cases, where there are constitutional affections, as gouty diathesis, or, again, where there are mechanical or chemical irritations, these may be the causes, and in these cases there can be a complete absence of any germs.

The highly acid vaginal secretion of some women just before and during the menstrual flow has been known to cause urethritis. Hence in married persons careful inquiry should be made to elicit the relation in time between an intercourse and the menstrual period, and so avoid the certainty of reflecting upon the virtue of the wife.

From what has been said it can be inferred that because a patient presenting himself for examination suffers from an intense urethral discharge, such a patient does not necessarily suffer from gonorrhœa. *So an injustice can occasionally be done if every discharge is pronounced as gonorrhœal.* For this reason, if for no other, it is necessary to impress upon every one the importance of a microscopical examination, and even a bacteriological examination in doubtful cases.

In the specific urethritis it is obligatory to find the gonococcus of Neisser. There are other diplococci that resemble this specific germ, and they are referred to as pseudogonococci. When it comes to a differentiation of these it is necessary to go into minute bacteriological examination.

A few facts concerning the gonococcus are: It was discovered by Neisser in 1879; first cultivated by Bumm in 1895; its microscopical appearances are not entirely characteristic; it stains with basic aniline dyes; it is negative to Gram's stain; is found within the protoplasm of the pus-cells, and does not grow on the ordinary culture-media. *The gonococci remaining in the urethra after a gonorrhœa may lie dormant there and remain harmless for years, yet when transplanted on to another urethra, may cause an intense acute gonorrhœa.* Flattened epithelial cells seem to protect against infection better than columnar epithelium. Immunity does not follow infection. No successful attempts are recorded of the inoculation of the gonococcus in lower animals.

The Three Differential Diagnostic Points of the Gonococcus Morphology:

1. It must be distinctly a biscuit-shaped, rather small diplococcus, and is never single.

2. It must decolorize by Gram's method.

3. It must be within the cell-bodies of pus- and epithelial-cells, both of which are very abundant in a given discharge, both with and without these cocci.

Gonorrhœa.

In gonorrhœa there is a period of incubation. In most cases it is from three to seven days. Periods of less than three and more than seven days are comparatively rare, although there are some authentic cases where the period of incubation has also run up as high as twenty-one days. The average period is five days.

Abortive Treatment.—Knowing, then, that such a period exists, it is necessary to consider at this point the so-called abortive treatment. A local application that will meet the three requirements of Neisser—that is: (1) A remedy that will destroy the gonococcus; (2) leave the mucous membrane uninjured; (3) not increase the inflammation—has as yet not been found. *For this reason, and with these three objects in mind, there is no good abortive treatment for gonorrhœa.* This is very important to know. Nevertheless, there are certain things that can be done.

One of the most effective agents is nitrate of silver—viz.:

℞ Nitrate of silver, 1.0 gramme;
Distilled water, 30.0 grammes.
M. & Sig.—For office use.

A few drops are to be instilled into the urethra and along the frænulum as soon after suspicious intercourse as possible.

A more or less violent reaction follows, with destruction of the outer epithelium, a very purulent discharge, and even

slight hemorrhage may occur in a few hours by using this instillation. Whenever such a course is advised, it is necessary to state what may be expected, although there are many cases where the reaction is slight. If it does cause any trouble, give the patient rest, light diet, laxatives, alkalines.

Other solutions are also employed. They are the newer silver salts, such as protargol, largin, argonin, and nargol.

℞ Protargol, 5.0 grammes ;
Glycerin, 10.0 "
Distilled water, q. s. ad 20.0 "
M. & Sig.—For office use.

Protargol or any one of the foregoing newer silver salts in solution can be used as the nitrate of silver solution. Usually the reaction is light.

Prophylactic Treatment.—It is the duty of every physician to warn both sexes of the gravity of venereal infection. Included in this is the most common of venereal diseases—*i. e.*, gonorrhœa. Gonorrhœa is found in both sexes and in all ages ; most commonly in men between the ages of twenty and thirty, and oftentimes seen in infants, and decreasing in frequency with advancing age.

Gonorrhœa may be acquired in other ways than in sexual contact. It is a fact that the gonococcus may retain its vitality when under certain conditions of heat and moisture for some hours, and in this way, by transference by towel or washing, innocent persons may be infected.

If it is the first attack, and the presence of the gonococcus established, it is an acknowledged fact that the gonococcus found its introduction into the urethra at the meatus. It is known that this specific germ does not remain on the surface of the mucous membrane, but while propagating, it apparently passes into and underneath the epithelium—usually not deeper, but cases have shown that the gonococcus has been found even in the sheath of the penis.

It is the proliferation of the gonococcus among the epithelial cells in three to seven days which sets up the character-

istic inflammatory reaction. Blood-vessels become engorged, and lymph and leucocytes are poured out. Some investigators believe that these leucocytes absorb the gonococci, besides loosening the epithelium, and the pus in this way escaping, the disease thus heals itself. The new epithelium thus formed does not contain all the elements capable of propagating the gonococci that the original did. When the gonococci are being eliminated in greatest numbers the discharge is at its maximum, and we find desquamated epithelial cells and pus-corpuscles loaded with the gonococci.

With the elimination of the germs the discharge decreases. From being purulent it changes to watery and colorless, and we find pus and epithelial cells in varying numbers. This often makes its appearance in the urine as threads. The contagiousness is not always lost when the discharge disappears, but often remains as long as any threads or even pus-corpuscles remain in the urine.

Symptoms of Acute Anterior Gonorrhœa:

Commences at meatus.
Inoculation of gonorrhœal pus is the cause.
Incubation period is from three to seven days.
Œdema of meatus.
Swelling of orifice.
Color, pale pink.
Peculiar sensation at meatus: between tickling and itching.
Patient keeps his mind fixed on genitalia, and therefore is obliged to empty bladder.
Ardor urinæ.
Lips sealed first day.
Second day, purulent discharge, increasing daily.
Second week, pus is greenish-yellow.
If inflammation is high, erections are painful. Here the inflammation has extended down the glands and minute ducts between meshes of the corpus spongiosum, and does not allow distention by the blood when influx occurs at the time of erection. Therefore the organ is not uniformly distended and acts like a bow where

agglutination exists in the urethra; therefore the curvature, called *chordee*, results.

Painful erection especially common in third week.

Slight hemorrhage from urethra.

Inflammatory symptoms gradually subside.

Diagnosis.—Examination of the discharge will often distinguish it from syphilitic, tuberculous, chancroidal, pseudo-gonococcus, simple and non-specific urethritis.

Differential diagnosis from recurrent attacks due to stricture, chronic localized areas of inflammation, prostatitis, etc., must also be made.

The Examination of the Discharge.—For routine work it is best to smear a very thin layer of the pus, squeezed from the *deep part of the urethra*, and taken with a platinum needle on a slide; fixing by passing through a flame, and then staining with Loeffler's methylene-blue solution, methylene-violet, or gentian-violet solution. These may be of varying strength, yet it is best to adhere to a solution made according to a definite formula:

Loeffler's methylene-blue solution:

Saturated alcoholic solution methylene-blue,	30.0 c.c.
Solution caustic potash in water, 1:1000,	100.0 "

Ehrlich's aniline gentian-violet solution:

Saturated alcoholic solution of gentian-violet,	16.0 c.c.
Aniline water,	84.0 "

In all doubtful cases the Gram stain is to be recommended. The specimen is prepared in a manner as described above, and then stained for three minutes in a saturated solution of gentian-violet in aniline water. (In a rough manner, about 1 c.c. of aniline oil with 15 c.c. of distilled water are thoroughly shaken in a test-tube, then filtered, and a saturated alcoholic solution of gentian-violet added, drop by drop, until the least opalescence occurs. Then this should be filtered.) Without

washing off, but after simply taking off the excess of staining fluid with blotting-paper, place the specimen into solution of—

℞	Iodine,	1.0 c.c.
	Potassium iodide,	2.0 "
	Water,	100.0 "

for from one to two minutes. The specimen becomes black. Remove excess with filter-paper. Next place in alcohol, and keep there until no more stain can be removed. Then wash with distilled water, and counter-stain with a 0.25 per cent. aqueous solution of Bismarck brown. Wash, dry, and examine direct, after placing a small drop of cedar oil on the specimen, with immersion lens. The gonococcus loses its stain and takes the brown color. *Any diplococci remaining blue are not gonococci.*

The gonococcus has a shape like a coffee-bean, and always appears in pairs whose flattened surfaces are together. In reproduction, each individual divides into two at right angles to the flattened surface. The gonococcus may be between and upon epithelial and pus-cells, and *characteristically in the pus-cell.*

The three diagnostic points of the gonococcus are therefore—

1. Decolorizing with Gram's stain as above.
2. Characteristic diplococcus ("*biscuit*" form).
3. Presence in the epithelial and pus-cells.

Course.—The duration was formerly six to eight weeks, but now less in very carefully treated cases, depending upon the method of treatment used.

Treatment of Acute Anterior Gonorrhœa.—No matter what the day since the commencement of the discharge, we can immediately commence local treatment. It is but just to state that there have been innumerable methods and systems for the treatment of this disease, and therefore we can infer that no one is eminently satisfactory. Many have put the patient in terrible agony, and have left the sufferer worse off than without treatment.

In the treatment of acute anterior gonorrhœa it is necessary to consider these points :

I. GENERAL AIMS.—1. To remove the gonococci. 2. To see that the patient does not suffer. 3. To avoid any complications.

II. HYGIENIC MANAGEMENT.—1. Regularity of life. 2. Rest—lying down, rather than walking, etc.; no exercise; not too much sleep.

III. DIET.—Moderate amount. Bland and non-stimulating. Milk, by preference. If debilitated, meats, and even red wines—claret. *Avoid* greasy food, pastry, spices, pickles, acids; also liquor, coffee, tea. Water, in large quantities, is to be taken. Smoking not objectionable in moderation.

IV. GENERAL.—No sexual excitement, active or passive. Penis should be kept clean; handled as little as possible. Suspensory bandage is a preventive of orchitis, etc. Gonorrhœal bag aids in keeping the parts clean. Great care is necessary not to get pus into the eye nor transmit it to others.

V. PROPHYLAXIS.—Soiled dressings of the penis should be burned; towels and underwear carefully boiled by themselves if possible.

VI. INTERNAL TREATMENT.—The remedies that can be given internally for acute gonorrhœa are divided into several classes. Oftentimes alkalies and diuretics are given to render the urine bland and non-irritating. Oils like sandalwood and balsams are given, so that the substances into which they divide will act favorably upon the mucous membrane as the urine passes from the bladder; they also have a tendency to act on the urine. Sedatives and anodynes likewise are given to lessen burning on urination and chordee. With these, practically all the symptoms arising from acute gonorrhœa can be controlled. There is another division that is of great importance, but it is used to keep the urine as antiseptic as possible—viz., the ordinary urinary antiseptics.

Following these principles, the patient should pass large quantities of urine; it should be feebly alkaline or just neutral, so that it is bland and non-irritating to the mucous membrane. If the patient won't take large quantities of

fluids, it is often necessary to give alkalies or alkaline diuretics, the best probably being citrate of potassium, usually given in 10- or 15-grain doses, always with a large quantity of fluid.

As to balsams and the sandalwood oil. The result sought is to give an alleviating and bland action to the mucous membrane of the urethra by the urine. The sandalwood oil is valuable, and to get its action it should be given in fairly large quantities, say 10 minims four or five times a day, in capsules, emulsions, or—

℞ Olei santali, 10.0 grammes;
Olei menthæ pip., 0.5 gramme.
M. & Sig.—Ten minims on sugar every three hours.

Or in connection with an alkaline salt, so that possibly the reaction in the urethra is still more bland than if given without the addition of an alkali. Oftentimes if sandalwood oil in capsules cannot be had, a very good way is to prescribe it in connection with a little oil of peppermint, as shown in the above prescription.

There are any number of combinations that can be given in connection with sandalwood oil.

℞ Olei santali, 10.0 grammes;
Liq. potassii, 15.0 "
Syrupi acaciæ, 40.0 "
Aq. menth. pip., q. s. ad 120.0 "
M. & Sig.—Teaspoonful every three hours.

It is not necessary to remember the exact amount as stated in the preceding formula, but to grade the amount according to the necessity of each case. If there is great pain during urination, use this form. If it is not so painful, then decrease the amount.

The oil of sandalwood is especially used in the beginning of a gonorrhœa; it is soothing, lessens pain along the urethra, and diminishes discharge.

Balsam of copaiba and cubebs, etc., are given usually in the

later stages of gonorrhœa. Balsam of copaiba was formerly regarded as the specific in a gonorrhœa that had lasted for a considerable time, especially in connection with alkaline diuretics. All these have a disagreeable taste, and the object should be to cover up such taste.

In the later stages of inflammation the following formula will be found rather reliable:

℞ Bals. copaibæ, 30.0 grammes;
Liq. potassæ, 15.0 "
Syrupi tolutani, 30.0 "
Ext. glycyrr. fl., 30.0 "
Aquæ, q. s. ad 120.0 "
M. & Sig.—Teaspoonful three to five times daily.

Cubebs is available in the declining stage—oleoresin of cubebs, 10 minims in each capsule, given four or five times a day. We often see this stimulate digestion.

Aminoform, cystogen, methylene-blue, salol, and urotropin are urinary antiseptics. Methylene-blue causes the urine to turn blue, and it is best to mention this to the patient. It is given in 0.05 to 0.1, the other antiseptics in 0.25 to 0.5 gramme doses, three or four times a day.

The Lafayette Mixture is an excellent urethral and vesical tonic and has the following composition:

℞ Bals. copaibæ, 25.0 grammes;
Liq. potassæ, 15.0 "
Spts. ætheris comp., 20.0 "
Tinct. lavand. comp., 15.0 "
Syrupi simplicis,
Aquæ, q. s. ad 120.0 "
M. & Sig.—Tablespoonful q. i. d.

The following paste may often be of service:

℞ Pulv. cubebæ, 15.0 grammes;
Bals. copaibæ, q. s.
M. Fiat massa.
Sig.—Bolus every three hours.

In cases where the urine burns on passing through the urethra—*ardor urinæ*—and in chordee other measures must be adopted—that is, sedatives or opiates must be used. In practice it is found that codeine controls chordee, 0.015 gramme three to five times a day; or perhaps larger doses, especially at night.

If the patient cannot sleep on account of erections:

℞ Phenacetini, 3.0 grammes;
Sacchar. lactis, 3.0 "
M. et div. in pulv. No. x.
Sig.—Two or three each night if necessary.

℞ Codeinæ phosphatis, 15.0 grammes
Ol. santali, 15.0 "
Tinct. hyoscyamit, 10.0 "
Liq. potassæ, 10.0 "
Syr. acaciæ, q. s. ad 90.0 "
M. & Sig.—One teaspoonful three or four times daily.

Perhaps one need not give any medication during the day, but something like this at night:

℞ Potassii bromidi, 30.0 grammes;
Codeinæ phosphatis, 0.5 gramme;
Tinct. hyoscyami, 25.0 grammes;
Aq. camphoræ, 240.0 "
M. Fiat solutio.
Sig.—One tablespoonful with water two or three times in the evening.

VII. Local Treatment.—*The bacterial and the antiphlogistic methods.* If success is desired, it is necessary to give particular attention to the local treatment. There are different views on the subject of local treatment. For instance, those who follow the so-called Neisser school (*bacterial view*), having for their object the elimination of the gonococcus, commence the local treatment at once.

Ever since the gonococcus has been known to be the cause

of gonorrhœa the silver salts have practically been considered to have a selective action on them. Some of these salts and their percentage equivalent of silver are:

Argonin,	4	per cent.	of silver.
Protargol,	8	"	"
Largin,	10	"	"
Nargol,	10	"	"
Albargin,	15	"	"
Ichthargan,	30	"	"

The other school advocates the so-called *antiphlogistic treatment of Fournier.* Absolutely no local treatment is given in the early stage. So long as the acute symptoms run high, diuretics and diluents are relied on—nothing is prescribed locally to restrict the discharge. Then the local treatment is commenced.

These two treatments have been combined, but the school of Fournier does not take into consideration the presence of the gonococcus, but only the symptoms.

When local treatment is adopted, it is necessary to consider the individual case and vary the treatment according to the intensity of the inflammation.

The medicinal agents used in injection and application have three different actions—viz.:

1. Germicidal.
2. Astringent.
3. Stimulating.

There are different modes of application—viz.:

1. Injections.
2. Irrigations.
3. Instillations.
4. Soluble bougies.
5. Salves.
6. Direct application of electrolysis, etc., with the aid of the urethroscope.

Having established the presence of the gonococcus, and considered it best to give local treatment, a decision must be then made as to the method of application: whether or not *small injections*, given by the physician at first and then, after suitable personal instruction, by the patient, or *irrigations*, given by the physician, are to be advised; selection of the drug must be made with special reference to the action sought. If a follower of the school of Neisser, which teaches that the presence of the gonococcus is the important factor, one of the so-called "newer" silver salts must be used. There can be no hesitation in saying that if the methods of the Neisser school are used, the best results are observed. For this reason it cannot be advocated too strongly. The following is a classification of the different remedies with their action:

I.	II.	III.
Pure Antiseptics not Astringent.	Antiseptics Slightly Astringent.	Pure Astringents.
Argonin.	Nitrate of silver.	Zinc sulphate.
Protargol.	Argentamin.	Zinc sulphocarbolate.
Largin.	Potassium permanganate.	Alum.
Nargol.		Subacetate of lead.
Ichthargan.		
Albargin.		
Citrate of silver.		
Ichthyol.		

Neisser's plan for using these silver salts is laid down in a few rules—viz.:

1. These salts are begun as soon as the presence of the gonococcus is established.

2. A daily microscopical examination must be made in order to ascertain if the gonococcus is present or absent. *After its absence for days, a slightly stimulating, antiseptic, and astringent remedy, such as nitrate of silver, may be used.*

The disadvantages of silver nitrate are:

1. It stains linen and skin.
2. It is irritating, slightly in most, markedly in a few, cases.
3. It precipitates albumin, thus limiting its range.
4. It does not penetrate the tissues.

Citrate of silver and *argentamin* are less irritating and more efficacious in certain cases.

METHOD OF INJECTION.—In order to commence this treatment, prescribe 0.25 to 0.5 per cent. solution of the newer silver salts. These are to be used for a few days, and if the patient is not sensitive, they should be increased in the course of from seven to ten days, to even as high as 2 or 3 per cent. The patient should urinate previous to every injection; then sit down and inject 10 or 15 c.c., according to the quantity that the anterior urethra will hold. Several times a day the injected quantity should be held in at least ten minutes; at other times not less than three minutes each time, and the number of times injected should be from eight to twelve—on the average every two to three hours. After the gonococcus has remained absent under this treatment for three to five days or even longer, the remedies in group II. can be commenced—namely, those which combine antiseptic and astringent effect.

℞ Potassii permang., 0.12 gramme;
Aquæ destillatæ, 120.00 grammes.

℞ Argenti nitratis, 0.10 gramme;
Potassii permang., 0.25 "
Aquæ destillatæ, 150.00 grammes.

Or—

℞ Argentamini, 0.1 gramme;
Aquæ destillatæ, 100.0 grammes.

These are to be used from three to five times a day. It is not necessary to retain them in the urethra more than a few seconds. As to how long a period this second group should

be used is regulated by the microscopical findings or the presence of considerable numbers of epithelial cells.

After this the use of the astringents in the third group is commenced:

℞ Zinci sulphatis, 0.25 gramme;
Liq. plumbi subacet. dil., 120.00 grammes.

℞ Zinci sulphocarbol., 0.35 gramme;
Aquæ destillatæ, 120.00 grammes.

These are used two or three times each day in the same manner as those in group II.

FOURNIER METHOD.—If this is adopted, the local treatment is not commenced until the stage of decline has set in. Then the following injections are used, as already described:

℞ Berberinæ hydrochloratæ, 0.25 gramme;
Aquæ destillatæ, 100.00 grammes.

℞ Zinci sulphocarbolatis, 0.35 gramme;
Aquæ destillatæ, 120.00 grammes.

℞ Zinci sulphatis, 0.25 gramme;
Liq. plumbi subacet. dil., 120.00 grammes.

Ricord's Mixture:

℞ Zinci sulphatis, 0.50 gramme;
Plumbi acetatis, 0.25 "
Aquæ destillatæ, 120.00 grammes.
Sig.—Shake before using.

℞ Zinci sulphatis, 0.25 gramme;
Bismuthi subnitratis, 8.00 grammes;
Pulveris acaciæ, 4.00 "
Aquæ destillatæ, q. s. ad 120.00 "

℞ Zinci sulphatis, 0.25 gramme;
Ext. hydrastis fl., 10.00 grammes;
Aquæ destillatæ, q. s. ad 120.00 "

The hydrastis stains the clothes yellow.

Ultzmann's Mixture:

℞ Aluminis,
Zinci sulphatis,
Acidi carbolici, āā 0.25 gramme;
Aquæ destillatæ, 120.00 grammes.

METHOD OF IRRIGATION.—The irrigation method of treatment has long been advocated. Janet, in 1890, again brought it forward, and since then it has been greatly modified. *As now recommended, it consists of irrigating only the anterior urethra, in a case of anterior urethritis, in the following manner, with the necessary apparatus:*

An irrigator of any pattern which can be raised and lowered, connected with rubber tubing of at least 1.5 centimeter diameter and about two meters long. At the end a stop-cock of some kind is attached, just back of a nozzle of varying shape, which can be adjusted to the external urethral orifice. If a case is presented for treatment, no matter whether the gonococcus is present or absent, the treatment can at once be commenced. It is necessary, however, to consider the medication, the quantity to be used, also the frequency, the height at which the fluid should be placed, and other details. If the treatment is not carefully undertaken, the objects that are claimed for it are not obtained. Advocates believe that the length of time for the cure of a case of gonorrhœa is shortened, and that the complications are lessened. The technique is as follows:

1. Have patient sit in an ordinary arm-chair, or semiprone or flat on the back.

2. Cleanse the external urethral orifice.

3. Protect patient with towels, and place a douche-pan so as to receive the fluid as it comes from the external urethral orifice.

4. If an acute case of gonorrhœa, with no complications, place irrigator about one meter above the part to be irrigated, and use a warm 0.1 to 0.2 per cent. solution of the newer silver salts, taking about 1000 c.c. for each irrigation, which is to be done not too slowly. The fluid should pass into the urethra, and an outward flow from the lower angle of the external urethral orifice be established. Occasionally the orifice is to be held fast, so that the entire anterior urethra is dilated. This should be done twice a day with these silver salts until the discharge decreases and becomes thinner and more mucopurulent in character. Permanganate of potassium, once a day, at first 1 : 3000, and in the course of a few days 1 : 1000, is to be used. Later, weak 1 : 10,000 bichloride of mercury and 1 : 1000 zinc sulphate solutions are to be advised. These every second or third day, depending on how the case progresses. The treatment may extend over a period of three to six weeks.

Irrigations carried out in a different manner are advised: A catheter is introduced into the urethra up to the posterior end of the anterior urethra and connected with a syringe of 100 to 150 c.c. capacity ; the solutions used are the same as in the preceding method. The advocates believe that the force with which the fluid is injected can be graduated better.

Combined Methods.—It is scarcely necessary to state that combinations of *all the local methods* can be made, and it is in these cases that the *best results* are obtained.

Salves and Bougies.—Injections of salves and the introduction of medicated bougies are also used, but if so, are probably more adaptable in the subacute stages. This holds true with the urethroscopic treatment.

Acute Posterior Urethritis.

General Features.—Usually about the third week, sometimes before, or perhaps after that time, what might be called the turning-point in the attack is reached. It usually occurs when the gonorrhœa is at its height, the acme generally being the third week, though sometimes earlier or later. The disease

then commences to improve noticeably and all the inflammatory symptoms to subside, or the process shows some other signs or symptoms that were not present previously—that is, some complication has arisen. Usually it means that the gonorrhœal inflammation has passed backward into the posterior urethra, and if it does so, the inflammation extends upward into the internal urethral orifice, extending then from the external to the internal orifice—that is, the entire length of the urethra. This turning-point must always be anticipated, and it must be regarded as a complication. Whenever this condition occurs there is no question but that it causes grave trouble and really is a serious condition. Sometimes, especially if the symptoms are acute, it is best to stop all local treatment until symptoms abate.

Etiology.—What are the causes of a posterior urethritis? These may be divided into practically two heads—viz.: 1. Internal. 2. External.

1. In the internal cases, as in individuals suffering from other diseases, as from cachexia on account of tuberculosis, syphilis, etc., it is a creeping, slow process, with scarcely any appreciable symptoms.

2. In the external cases the causes are sexual excitement, an increased congestion, the inflammation easily passing backward; injections; all mechanical manipulations, etc.

In those cases where these inward conditions are taken into consideration the posterior urethritis is of a creeping character and there are practically no symptoms at all. Those of the outward form are usually of a peculiar fulminating form of a very grave type. Where this posterior urethritis is of this creeping nature the only way to make the diagnosis is with the Jadassohn method and the two-glass method, which have been described elsewhere.

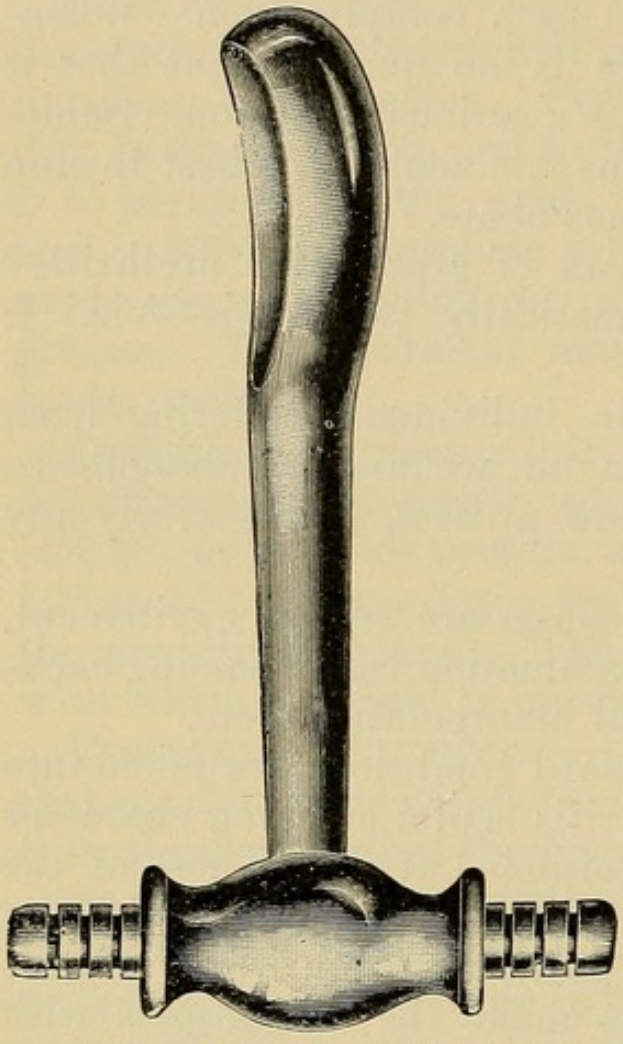
As just said, the posterior urethritis manifests itself in two different ways—namely, the inward and the outward forms, as follows:

First, and less frequently than the second form, it is unnoticeable, with absolutely no symptoms whatever. The patient does not urinate frequently. His urinary symptoms

are no different than those in a simple anterior gonorrhœa. The only way, then, is to make an accurate diagnosis by the two methods mentioned before.

Second, and most common form, and more readily recognized, is usually present about the third week, with chilly feeling, sweats, dull pains over the pubes and sometimes down in the perineum, frequent urination day and night, perhaps tenesmus, marked pain, usually when the urine comes, sometimes so severe that the patient hesitates to urinate. These urinary symptoms are marked both day and night, though perhaps less at night than during the day. Urination may occur every fifteen to thirty minutes, with terrible agony. The sufferer has to go to bed, but gets no sleep. On urination at the height of the inflammation blood appears in variable amount. The psychical conditions at this time are not uncommon.

FIG. 4.



Arzberger's cooling apparatus.

Treatment. — *First Variety.* —If the patient has been treated locally and the diagnosis of a posterior urethritis of the first variety has been made, where the symptoms are practically absent, then the irrigation can be continued, but the fluid should be made to pass into the bladder. In these cases the irrigator is elevated to five or even six feet, using the same solutions, and the patient instructed to keep the perineum lax, or as if going through the act of urination. After allowing 300 to 500 c.c. to pass into the bladder without

causing pain, the patient should then evacuate it voluntarily. This may be repeated several times every twenty-four hours.

If not successful with this method, then the Diday method is to be advised: First, wash out the anterior urethra; after this introduce a small-caliber catheter into the posterior urethra. Inject about 200 c.c., and as the internal sphincter is weakest, the fluid passes into the bladder. Introduce the catheter still further until the eye of the catheter is in the bladder; then draw off the fluid; in the previous step the eye of the catheter is between the internal urethral orifice and the bulbo-membranous junction. Then repeat the procedure, and finally let the patient pass voluntarily the last quantity injected.

Second Variety.—Whenever the symptoms become marked in this so-called second variety, then it is absolutely necessary to care for the hygiene, the rest, the diet, the avoidance of all sexual excitement, or the condition becomes worse. Practically, though, before this point is reached, the prophylactic treatment should have been commenced, as it may prevent erections and pollutions, and in this manner hinder the posterior trouble from setting in.

The following formulæ are valuable for internal administration to allay irritation:

℞ Lupulini,
Camph. monobrom., āā 5.0 grammes.
M. et div. in cap. No. xv.
Sig.—Two or three at night.

℞ Potassii bromidi, 30.0 grammes;
Aquæ camphoræ, 240.0 "
M. Sig.—One tablespoonful at 10 and another at 11 P. M.

℞ Lupulini, 3.0 grammes;
Morphinæ sulphatis, 0.1 gramme.
M. et div. in cap. No. xv.
Sig.—One or two at night.

Sometimes if the patient seizes and vigorously squeezes the inner aspect of each thigh over the area supplied by the crural branch of the genitocrural nerve, a centripetal inhibitory impulse is awakened of strength sufficient to check the erections (Starr).

After the onset of active symptoms, continue giving sandal-wood oil, and if irrigations have been given, these should be inhibited, especially if the symptoms are acute; in fact, stop local treatment of all kinds, except if the gonococcus is present, when the patient may use a non-irritating injection, such as protargol, which does not heighten the inflammation if used in moderate strength.

As soon as the symptoms commence to subside, the local treatment should be resumed. Usually, when a posterior urethritis is present, it is evidence that the gonococcus is still present. If so, gonorrhœal treatment must again be resorted to, irrigating directly into the bladder, as outlined in one of the foregoing methods.

Suppositories are soothing, giving rest to the parts and acting as antiphlogistics.

℞ Ext. belladonnæ, 0.25 gramme;
Ichthyolis, 2.50 grammes;
Butyræ cocæ, q. s.
M. Fiant in suppos. No. x.
Sig.—Insert one morning and night.

℞ Ext. belladonnæ,
Ext. opii, āā 0.25 gramme;
Ichthyolis,
Iodoformi, āā 2.50 grammes;
Butyræ cocæ, q. s.
M. Fiant in suppos. rect. No. x.
Sig.—Insert one night and morning.

℞ Iodoformis, 1.0 gramme;
Butyræ cocæ, q. s.
M. Fiant in suppos. rect. No. x.
Sig.—Insert two or three each day.

In addition, the Arzberger cooling apparatus, which is introduced into the rectum, may be used. Fasten this to an ordinary rubber irrigator, and allow cold water to run in and out four or five times in twenty-four hours for fifteen minutes each time.

Chronic Anterior Urethritis.

Etiology.—Whenever this condition remains after an acute attack, it is most commonly due to neglect or even ill treatment, although there are cases that are prolonged even in spite of careful treatment.

Symptoms.—Any portion of the urethra may become involved. The changes are principally in the color and transparency of the mucous membrane, epithelial metaplasia, lesions in and about the follicles, and more or less cicatrization of all the chronic processes. Frequently granulations occur, and these are the beginning of strictures. Whenever the posterior urethra becomes involved in a chronic process, the prostate gland or seminal vesicles or both are almost positively involved. However, in order to make a clinical classification, Finger classifies all cases as follows:

1. Circumscribed areas involved, and, in addition, the entire urethra still shows slight signs of congestion.

2. Where the process is still recent, but where it is inveterate,—*i. e.*, localized in one spot,—without any accompanying congestion.

In a chronic urethritis there is usually a continuous discharge; often but a "gluing" of the external urethral orifice, usually only in the morning, on arising, on account of the long interval between urinations. There may be a distinct discharge. If sufficient to form a drop, it is referred to as a "*goutte militaire.*" Most often there is no accompanying pain or discomfort, although when the stream starts, there may be a sticking or sharp cutting pain, or but a slight burning sensation during the time of urination. On urinating into two glasses, the first will contain all the secretion, while the second will contain the clear urine; or if the anterior urethra is thoroughly irrigated, the entire quantity of urine

voided should be clear. To establish the diagnosis more positively, introduce a diagnostic sound to the membranous urethra, then massage the urethra from the outside as the sound is withdrawn. In this manner the glands and crypts will be made to empty; furthermore, any infiltrations are readily felt. The discharge thus obtained should be examined microscopically. The urethroscopic examination in these cases should not be omitted. In this type the glandular openings are patent, folds of the mucous membrane absent, lessened gloss, a dark-red hue, or more or less involvement of the epithelial layer, as already described.

Chronic Posterior Urethritis.

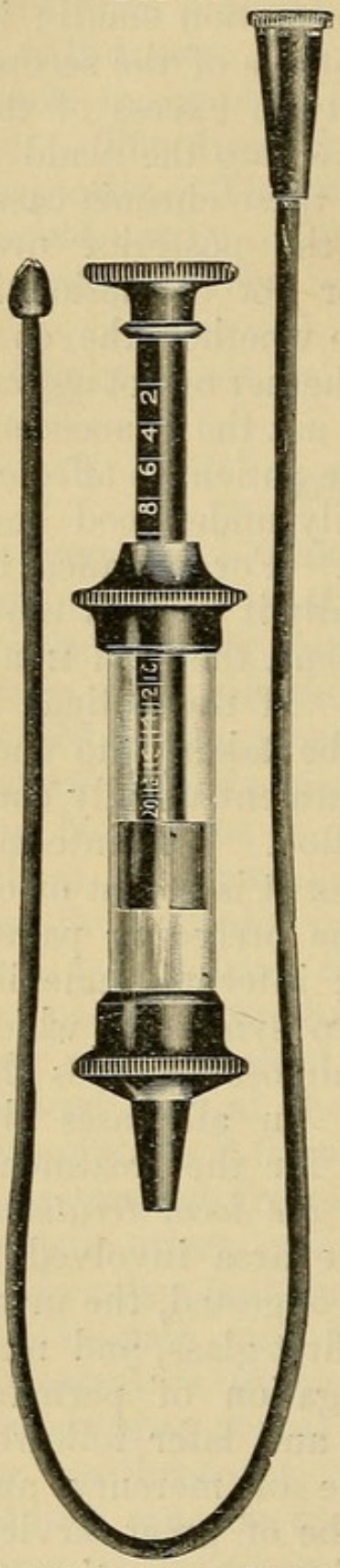
Symptoms.—This affection usually accompanies a chronic inflammatory condition of the anterior urethra, although it occasionally is found to occur independently. Authorities differ as to whether this condition must always be accompanied by a prostatitis. On account of the absence of Littré's glands and of crypts in the membranous urethra, this last is not so markedly involved as the prostatic urethra, where the opening of the prostatic ducts, ejaculatory ducts, and the utriculus masculinus are found. If the anterior urethra is involved, the inflammatory process may extend into the posterior urethra. In all these cases a discharge may or may not be present, and is often intermittent and occasionally noticed only at the time of defecation or on straining. To differentiate it from a strictly anterior urethritis, there is often an increased frequency of urination; besides, the desire to urinate arises, which the patient cannot readily withstand. As in other posterior affections, the sensations of slight burning or pain may be referred to the glans penis. Nothing abnormal is to be felt on rectal examination. Diagnostic sounds may reveal an especially sensitive posterior urethra; the urethroscope, a congested, easily bleeding, irregularly folding mucous membrane, and the bladder opening shows signs of involvement. By irrigating the anterior urethra until free from specks and then allowing patient to urinate

into two glasses, the first would be turbid or contain filaments, and the second would be clear if the interval of urination were short and the amount of secretion small; if the amount of secretion were large, the contents of the second glass would also be turbid, as the quantity in excess of the capacity of the posterior urethra would flow into the bladder.

Treatment.—Naturally the treatment of these chronic cases depends upon whether the anterior or the posterior urethra or both are involved, or whether or not the lesion is accompanied by complications; also as to whether the condition is but recent or of long standing; whether or not aggravated by prolonged treatment; whether or not the gonococcus is present; and, finally, whether or not the patient is affected by any constitutional disease. It is readily understood how these conditions may affect the treatment. For instance, if treatment has been very prolonged, especially if local, it must be discontinued; if the gonococcus is present, the local treatment must be directed against this germ. If the patient is cachectic, the condition causing it must be taken into consideration. However, in all cases the treatment usually consists of both internal and local medication. The internal treatment, with reference to whether or not it is recent or of long duration, should be as outlined in the preceding pages. Where the posterior urethra is involved, internal remedies should never be neglected, especially when symptoms which arise from this region are present. In almost all cases the local treatment is the most important. In all cases the symptoms and the urine are indications for the treatment. *If the anterior urethra only is involved, the local treatment should extend over this part only.* If the area involved is circumscribed, but the entire urethra is congested, the urine usually shows considerable mucus in the first glass, and may be slightly turbid. In these, daily irrigation of permanganate of potassium 1 : 3000 to 1 : 1000, and later followed with a mixture of 1 : 10,000 bichloride of mercury and 1 : 1000 sulphate of zinc solutions may be of great service. When the process is more localized, with no congestion of the urethra, the contents of the first glass show distinct fila-

ments and absence of turbidity. In these cases, when complications are absent, sounds should be passed as large as the urethral orifice will permit. If necessary, the orifice must be enlarged. To reach all the parts of the anterior urethra, the sound must be introduced into the posterior urethra. This also holds true when irrigating—*i. e.*, the irrigating fluid in the chronic cases must reach the posterior urethra. *In all these cases, whenever sounds are passed, the infiltrations should be thoroughly massaged over the sound.* The sounds to be used in these cases are those called Benique's. As already described, they have the normal curvatures of the urethra, and are usually cylindrical, with very blunt tip. *If the gonococcus is present, the treatment remains as already outlined.* In all cases of urethral disease where complications are absent, it can almost positively be stated that the following is a fairly accurate guide and may be adhered to: *If the urine is turbid, if due to pus, and if local treatment is indicated, the more turbid the urine, the weaker the irrigation; and the less turbid, the stronger the irrigation. If filaments are long and light, comparatively weak instillations; the shorter and heavier, the stronger the instillations demanded.*

FIG. 5.

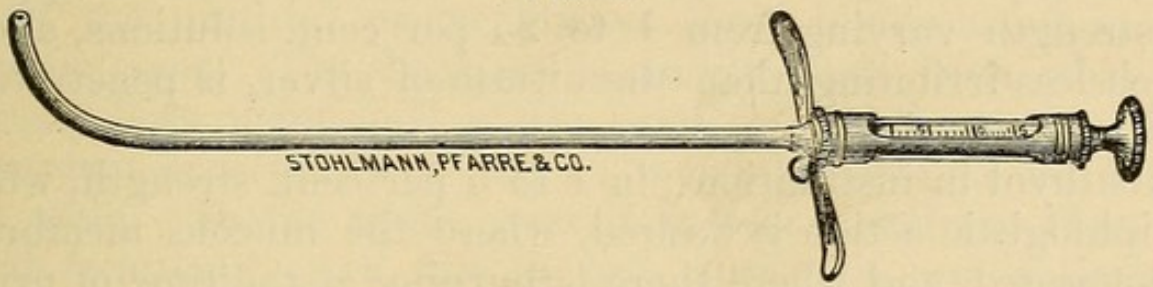


Guyon's syringe and capped catheter for deep urethral instillations.

With the methods outlined it is readily ascertainable whether both the anterior and posterior urethra are involved. The treatment should be governed by the parts involved and

also by the presence or absence of the gonococcus, and in general should be carried out according to the above outline. *Soluble bougies and cupped sounds for the application of salves are rarely used, because they are veritable foreign bodies, and hence are apt to irritate.* The treatment, therefore, consists practically of irrigation, instillations, passing of sounds, and

FIG. 6.



Keyes's deep urethral syringe.

topical applications through the urethroscope. Whenever threads are short and heavy and there is absence of turbidity to the urine, and if they arise in both anterior and posterior urethra, instillations with the Keyes or Ultzmann capillary catheter are made—usually every second day, commencing with a 0.25 per cent. nitrate of silver solution and gradually increasing to 2 or 3 per cent. or ever higher if indicated. Besides, sounds should be passed. In order to avoid enlarging the external urethral orifice by incision, dilatations of various description, and some used for irrigating at the same time, can be used. Metal sounds are the least painful and most easily sterilized instruments, and certainly, whenever possible, should be used in preference to dilators. Local applications of whatever character, direct applications of solutions, electrolysis, or galvanocautery, can be used with the aid of the urethroscope. *They may be used in the posterior urethra as easily as in the anterior.* In all cases of chronic affections the urethroscope can, at least for diagnostic purposes, be used to advantage. In this way the involvement of the urethral glands or granulating surfaces may be diagnosed. If the treatment is carried out through the tubes for any length of time, unnecessary traumatism may occasionally

be caused, whereas if an irrigation treatment had been instituted, good and quick results could have been attained.

Nitrate of silver has a distinct bactericidal action. It is, however, irritating, especially in the posterior urethra. It is a mild caustic in the strengths used; and it has, besides, a slightly astringent quality.

Protargol may be used for instillations whenever the gonococcus is present, and in all cases, if desirable, can be applied in strength varying from 1 to 25 per cent. solutions, and is much less irritating than the nitrate of silver, is penetrating, and is a bactericide.

Ichthyol in instillations, in 1 to 5 per cent. strength, where antiphlogistic action is desired, where the mucous membrane is congested, and where there is burning at the time of urination, has a distinct soothing effect. Here nitrate of silver would cause considerable pain at the time of application.

Copper sulphate solutions, from 5 to 25 per cent. in strength, are used; these are especially valuable as an astringent and in catarrhal conditions of the posterior urethra.

Sulphate of thallin is used in solution in strengths varying from 2 to 10 per cent., especially where an astringent and but slight bactericidal action is desired.

All these are used in quantities of 1 or 2 c.c., and applied by the aid of a capillary catheter, either of flexible material with olive tip (then called a Guyon capillary catheter), or a metal capillary catheter with a very short beak (the Ultzmann capillary catheter). Such are especially indicated in chronic affections, although irrigations are often desirable and necessary adjuvants to the treatment.

Whenever gonorrhœa occurs in young boys it is best to rely mostly on the hygienic and internal treatment, as it is most difficult to treat locally. As soon as the patient understands and can carry out the local treatment, it is to be instituted.

Urethritis in Females.

A brief outline is desirable. Again the gonococcus is the most frequent cause of infection. The period of incubation is

possibly shorter than in men—about two to three days. The production of pus is copious at first, but the amount rapidly lessens in the urethra. The symptoms may almost be unnoticeable, and again the desire to urinate may be very frequent and each act highly painful, and palpation shows the urethra to be sensitive, and the external urethral orifice presents inflammatory signs. This stage readily passes into the subacute and then into the chronic stage. The laminæ and crypts about the urethral orifice always show involvement in the chronic cases. The diagnosis is readily made from what has already been mentioned under urethritis of the male. The treatment is certainly of just as much importance as it is in the male. In the acute cases it is best to refrain from all local treatment, give rest in bed, antiseptic applications to the genitalia, and internal treatment prescribed as indicated. Most cases, however, pass into the chronic condition. In these cases instillation of the silver salts whenever the gonococcus is present, and when absent, iodoform bougies, and later suppositories containing astringents. Urethroscopic examinations and treatment often become necessary. Crypts are to be treated directly with applications. Strictures are rarely met. If present, dilatation as in the male is carried out.

Stricture of the Urethra.

A stricture is a narrowing or a loss in the dilatability of the urethral canal produced by changes in its walls. These changes may be due either to transformation of tissue, and then they are permanent; or transient, and caused by muscular contraction. The latter are called *spasmodic strictures*, and appear mostly in neurotic individuals.

Spasmodic Strictures.

The immediate cause for their appearance is any local irritation caused either by a foreign body or reflexly from the rectum, hyperacidity of the urine, etc. These spasmodic strictures usually occur in the membranous urethra, through the contractions of the unstriped muscular fibres surrounding

the urethra. Such strictures always occur suddenly, no impairment of the passage having previously been noticed. It disappears just as quickly, especially if gentle pressure is brought into action by a heavy sound. In cases of reflex spasms a hot bath, a hot poultice, or in extreme cases a hypodermic injection of 0.01 gramme of morphine will bring about prompt relief.

Organic Strictures.

Strictures due to permanent changes in the urethral walls, or the so-called *organic strictures*, are the result of the organization of inflammatory infiltrations of the urethral mucosa or the submucous layers.

Symptoms.—Organic strictures may occur in different forms. They may be very superficially located, and then either appear as small strands imbedded in the mucosa or may protrude into the urethra as small folds of various dimensions. They run in either an oblique or a transverse direction, and with the aid of the urethroscope appear as whitish, shining stripes, or consist of cicatricial tissue which passes down into the submucous layers, which gives a somewhat similar appearance. By a permanent concentric contraction of this tissue the urethral canal becomes more and more narrowed. Although these cicatrices surround the urethra as a rule only partially, in rare instances even a complete rigid ring may be formed. The strictures are seated chiefly on the lower floor of the urethra. As already mentioned, the strictures are the end-product of inflammatory infiltrations in the mucosa, preferably around the glands and crypts.

In the further course these infiltrations become organized to connective tissue which shrinks. If this takes place on the surface, only eccentric shrinkage is the result, and there will be no impairment of the canal, while deep-seated cicatrization by concentric shrinkage obstructs the canal. Most organic strictures are due to gonorrhœal inflammation; but traumatism of the urethra, if resulting in infiltration and cicatrization, may produce strictures. In rare instances we

find congenital strictures, which, as a rule, present themselves in the membranous urethra as very small elastic bands, or in the prostatic urethra as encircling fibres (Fuller). The number of strictures in individual cases depends entirely upon the number of the previous infiltrations, so that we may encounter one or any number of strictures in the same urethra. *The most common seats of strictures are the bulbo-membranous junction and the fossa navicularis.*

It is best to distinguish between *soft strictures* which are produced by soft inflammatory cellular infiltration, which easily gives way to the intruding sound; *hard strictures*, where there are distinct fibrous changes, and where the dilatability is very slight; and *elastic strictures*, which although readily giving way to the intruding sound of the larger size, return to their former caliber immediately upon withdrawal of the instrument. The symptoms which are produced by strictures are, so far as the patient's observations are concerned, increase of the desire for urinating, burning sensations during micturition, and eventually painful sensations in the affected areas during intercourse. The objective symptoms are, first, the involvement of the urinary stream. It is either twisted or split up into two or three parts, and has lost a more or less considerable part of its force. Often the patient has to wait a long time for the appearance of the full stream, or must obtain the co-operation of the abdominal muscles in order to start the urinary flow and to empty the bladder. In severe cases the urine is squeezed out in drops; consequently it takes a very long time to empty the bladder. By this constantly increased demand on the expulsive power of the bladder its muscular coat hypertrophies, which manifests itself by a thickening of the bladder-walls and the protruding into the viscus of the so-called trabeculæ. These are nothing more than hypertrophied bundles of muscular fibres. The presence of stricture always maintains the existence of a catarrh of the urethral mucosa. Posteriorly to the stricture *a dilatation of more or less extent usually takes place. This gives rise to the appearance of the phenomenon of "dribbling."* Part of the urine always accumulates after

micturition behind the stricture, and after the bladder is emptied, this retained urine dribbles out of the urethra. If the stricture becomes very tight, sterility may be the consequence. The ejaculated semen is retained by the stricture, regurgitates into the bladder, and is afterward emitted with the urine.

Once in a while a stricture suddenly becomes impervious if it becomes inflamed by rough or unclean instrumentation, or if a sudden congestion is provoked by debaucheries of the patient. Then absolute retention of the urine takes place, which, if it is impossible to pass a catheter, may be relieved by puncture of the bladder, which is best performed by using a trocar or a capillary needle and an aspirator, or by urethrotomy. Inflammation of the stricturing tissue itself, or of the adjacent tissue, results in some cases in the formation of abscesses which perforate up to the surface of the penis, so that fistulæ are established, which lead from the urethral canal to the surface. Such fistulæ may appear anywhere in the neighborhood of the urethra. In rare cases perineal fistulæ resulting from large urinary abscesses communicate with each other. If these suppurating centres perforate into the urethra only without reaching the outside surface, the urine becomes accumulated in these cavities and extravasates into the tissues, producing necrosis and reactive suppuration. This condition is known as urinary infiltration, and if free drainage by extensive incisions is not very soon established, death results from sepsis.

Diagnosis.—The proper method of diagnosing stricture is by the exploration of the urethra by means of an olive-tipped sound. The usual method of attempting to pass equally calibred sounds gives unsatisfactory results. If we use an olive-tipped sound, we enter a stricture quite easily and pass it easily, but in withdrawing the olive is caught at its posterior circumference and remains "engaged" until the stricture is passed, so that we get a fair estimate as to the calibre of the stricture as well as to its length. Furthermore, if a number of strictures exist in the same urethra, it is impossible to diagnose all the strictures by means of the uniformly cali-

bred sound. An olive-tipped sound, after it has passed through a stricture, is easily movable and free because of the minimal size of its shaft, and the olive is free until it is again caught in the next stricture. This shaft of the sound is graduated so that it is possible to diagnose accurately the depth in the canal at which the stricture is located. The examination is always commenced by using the largest olive which possibly can be passed through the meatus. If this should be below the normal size, it must be enlarged by an incision which runs toward the frænulum.

Meatotomy.—This operation is called meatotomy. Whenever made, it is best to bring together the mucous membrane of the urethra with the lower angle of the incision on both sides with two or three fine catgut sutures. If this is not done, in order to prevent union, the incised part must be kept apart by passing sounds daily. Oftentimes in these cases where meatotomy is necessary, an exceedingly short frænulum is present. It is desirable to lengthen these. This can readily be accomplished by incising the frænulum at right angles, then bringing the wound together, and suturing at right angles to the incision, thus increasing the length of the frænulum to practically the length of the incision.

Another method of measuring the calibre of strictures is by using the Otis urethrometer. This consists of a shaft having at its lower end a bulb which may be spread out and enlarged, and again contracted by the screw at its handle. The changes in the bulb are shown on the index. Before the instrument is introduced into the urethra the bulb is covered with a rubber cap so as to avoid catching of folds in the mucous membranes.

The examination of the urethra by means of instruments must always be done under aseptic precautions. The instruments must be sterilized by boiling, and the hands of the operator must be cleansed and disinfected in the usual way. The meatus must be washed with an antiseptic solution. Although it is impossible to sterilize the urethral canal reliably, it is advisable to cleanse it as far as possible, either by a previous irrigation or by having the patient urinate.

Treatment of Strictures.—Strictures may be treated either by instrumental dilatation or by cutting operations. The choice of instruments depends upon the clinical features of the stricture. If a stricture is easily entered, steel sounds are used. Strictures which are located in the anterior urethra are dilated by means of straight short sounds (*Dittel's urethral rods*). If the strictures are situated in the posterior urethra, curved sounds with conical tips are used. At the beginning the largest sound which can be passed without difficulty is always used. This sound is allowed to remain for a few minutes, and is followed at the next sitting by the next larger sound. If the patient is very tolerant, after a few treatments two sounds may be used at one sitting. The sounding must be continued with sounds of increasing size until the normal calibre and dilatability of the urethra are restored. If, despite meatotomy, the meatus should not allow of introducing sounds of a size sufficient for the dilatation of the posterior urethra, the previously mentioned dilators, with or without irrigation attachment, may be used to advantage. In case it should be impossible to enter the stricture by means of steel sounds, one of the following methods must be employed:

A bundle of filiform bougies with varying shaped tips is inserted into the urethra; then, after the urethra is injected with olive oil and the patient asked to attempt to urinate, the external urethral orifice is held fast and one bougie after another is manipulated so as to cause it to pass the constriction. One of them very probably will lie opposite the entrance of the stricture and may be passed through it. If successful in passing such a bougie, it is left *in situ* and secured with adhesive plaster about the glans and left in place for one or two days. The patient is then instructed to urinate without withdrawing it. In case this is not possible it must be removed. If tolerated, the contact of the foreign body sets up an inflammation and causes a softening and absorption of the stricture. In this manner a larger bougie can be inserted the following day, and the procedure may, if necessary, be repeated until in the course of some days dilatation can be proceeded with by means of the metal sounds. Or the entrance

of the stricture is found by means of the urethroscope, and if this opening is fixed in the field of view, the bougie is made to enter through the endoscopic tube. These two methods are used preferably in very tight strictures.

Occasionally, by injecting subcutaneously twenty-four hours previous to attempting to pass bougies in these severe cases of stricture, 0.1 c.c. of a 15 per cent. alcoholic solution of thiosinamin hydrochlorate, one may be successful where he would have otherwise failed.

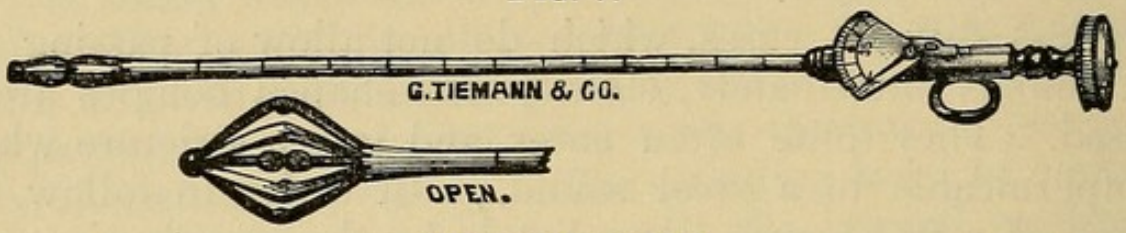
In less difficult cases, which do not allow of passing the steel sounds immediately, elastic, cone-shaped bougies are to be used. They quite often enter and pass a stricture which is impermeable to a steel sound. In order to follow the passing of a fine bougie immediately by the introduction of a steel sound, an instrument called the Le Fort sound and bougie is employed. This consists of a very fine elastic bougie which carries on its central end a screw-worm, so that steel sounds of different sizes may be attached. If this bougie is passed through a stricture, the attached steel sound is easily introduced, following the bougie as a guide. The bougie itself curls up in the bladder. This practically consists of forcible dilatation, and is not to be recommended except in certain cases. Even if a stricture is completely dilated, the sounding must be kept up until the whole urethra is rendered soft and elastic, and the patient is to be advised to have a large sound passed at stated intervals; these intervals at first are short and then longer, in order to prevent shrinkage of the dilated parts: an average rule is to pass a sound by gradual stages once in five, seven, fourteen, thirty, sixty days, then every three, four, six months. Probably every stricture should have a sound passed through it every three to six months.

In some cases strictures are encountered which react on each attempt of sounding by inflammation and urethral fever; or strictures which, on account of their elasticity, cannot be cured by dilatation. All these strictures must be treated by cutting operations. The same holds true for strictures which protrude into the urethral canal as valves, flaps, or bands,

and for strictures which take a tortuous course. The cutting operations which are employed for dividing strictures are called *external* and *internal urethrotomy*.

Internal Urethrotomy.—This is performed with instruments of varying shape, but all are sound-shaped and carry a protected knife. This, after the point of instrument has passed the stricture, is uncovered and then withdrawn, cutting the

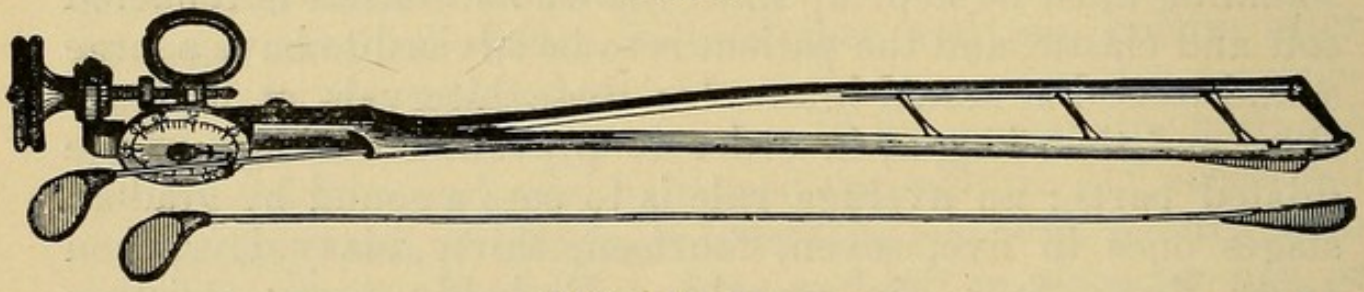
FIG. 7.



Otis' urethrometer.

stricture as it passes toward the meatus. The most popular instrument for this purpose is the Otis dilating urethrotome. This instrument has two branches, which may be spread out by means of the screw at its handle, and thus fixes the instrument tightly against the stricture. The screw is connected with an indicator running over a graduated disc, so that the degree of distention can be gauged exactly. After

FIG. 8.



Otis' urethrotome.

the instrument is passed through the stricture and the desired dilatation is reached, the knife which is hidden in the upper branch is uncovered and slowly withdrawn until the stricturing fibres are divided entirely. Then the instrument is screwed together again and withdrawn. The hemorrhage, as a rule, is very slight, and can, in case of necessity, be checked by hot irrigations. In severe cases a metal catheter is intro-

duced up into the bladder and the penis bandaged over it, so that the bleeding is arrested by compression. It is a good plan always to introduce a small iodoform wick into the urethra after internal urethrotomy. This may remain there until the next micturition. *Internal urethrotomy should be practised only in the pendulous part of the urethra.*

Preparatory to all procedures on the urethra urinary antiseptics should be given, such as—

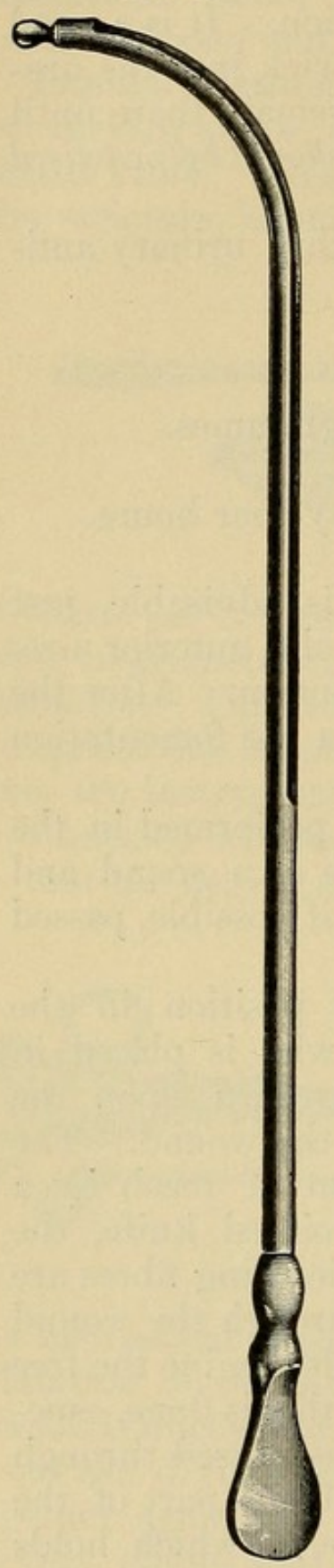
℞ Urotropini,
Salol, āā 5.0 grammes.
Div. in caps. No. xv.
Sig.—One capsule with water every four hours.

In performing internal urethrotomy it is advisable, just previous to any operative step, to irrigate the anterior urethra with a warm saturated boric acid solution. After the cutting the penis should be protected with a hot fomentation repeatedly changed.

External Urethrotomy.—This operation is performed in the following way: A staff curved in the shape of a sound and grooved is introduced into the urethra, and, if possible, passed through the stricture.

This sound is now held in a vertical position in the median line of the body of the patient, who is placed in a lithotomy position. The operator cuts down upon the staff until the bulbous urethra appears in the wound. The latter is then pushed upward and held out of reach by a small retractor. Next, by means of the pointed knife, the urethra itself is split open and all the stricturing fibres are severed. The little finger is introduced through the wound and the urethra into the bladder, in order to determine the free permeability of the prostatic urethra. After this is done, especially if cystitis is present, a drainage-tube is passed through the incision into the bladder. The superfluous part of the skin incision is closed by a few stitches, one of which holds the tube in position. If the bladder is comparatively unaffected, a catheter is inserted through the external urethral

FIG. 9.



Staff or grooved ball-pointed sound.

orifice, through the incised urethra, and then into the bladder. In some cases a resection of the urethra can be performed; again, others may require but a division of the stricturous urethra; and where fistulous tracts and indurated tissues exist, complete excision of the affected parts is indicated. If a catheter has been inserted, it should be left in place, and is then called "permanent." It is to remain in the bladder for varying lengths of time: as long as increased temperature, due to the cystitis, exists it may remain for ten to twenty days or even longer. Of course, irrigations, two or three times a day if necessary, are to be given. If the urine is clear and there is no rise in temperature, it may be removed on the second or third day. In fact, Koenig does not insert either catheter or drainage-tube in these cases. In the cases without cystitis sounding can be proceeded with at once and is to be done daily. Where a catheter is in place, of course it becomes unnecessary. The wound is but partly, entirely, or not at all sutured, depending upon the severity or extent of the operative procedure.

After the patient is brought to bed, the catheter or drainage-tube is connected with a siphon so that the patient is kept dry. In cases in which the stricture is not passable for the staff, the grooved sound is pushed down until its end reaches the stricture. On this deciding point the operator cuts down in order to find, by dissection, the central free end of the urethra after a part of the stricture has been divided. Then the operation is fin-

ished as just described. It must not be forgotten that sometimes the roof of the urethra is also the site of the stricture. Hence this region must be examined, and the stricture divided in the middle line if necessary.

Should it be absolutely impossible to find the posterior end of the urethra by perineal dissection,—and sometimes this becomes a most difficult piece of work,—the bladder must be opened through a suprapubic incision and the urethra sounded by introducing an instrument into it from the bladder. This procedure is called retrograde catheterization. In this manner the central end is located and the remaining portion of the stricture is divided or excised. Should any strictures in the anterior urethra be present, they are split at the same sitting by internal urethrotomy. If in external urethrotomy ordinary strictures are encountered, the simple division of these is sufficient, while extensive cicatrization and formation of callus call for excision of this hardened tissue.

The tube, which is inserted after urethrotomy, will be taken out on the fourth or fifth day after the operation, and the patient now urinates partially through the urethra and partially through the perineal fistula. This fistula closes up after about two to four weeks, during which time sounds are introduced almost daily and kept up at irregular intervals for some months after the operation. If cystitis has been present at the time of the operation, washing of the bladder through the tube or catheter is kept up during the time of convalescence, and salol or urotropin, or both, administered internally, as outlined.

Treatment of strictures by electrolysis, as already stated, should not be performed. However, it is best to explain briefly this method: There are differently shaped instruments: Lang has devised a special shape of sound; the tip is perforated, allowing a filiform bougie to act as a guide for the grooved sound; the tip is metal, and the rest is insulated. Besides this, there are olive-pointed sounds and also cutting-shaped instruments. In all cases this should be the negative pole. The positive pole, a moistened sponge, can be placed at any point, but usually over the pubes, and 2 to 3 milliampères of current

allowed to flow for some five to ten minutes. During this time the instruments must be given the direction desired. Formerly 10 to 15 milliampères were used for two to three minutes. The tissue destroyed by the electrochemic action is not necessarily only stricturous, as the action depends entirely on whether the instrument takes the right course. It is true that after such a procedure a large sound may be immediately passed and the patient feel fairly well, yet in the course of time there will be a distinct and steady contraction following this cauterization, which it practically is.

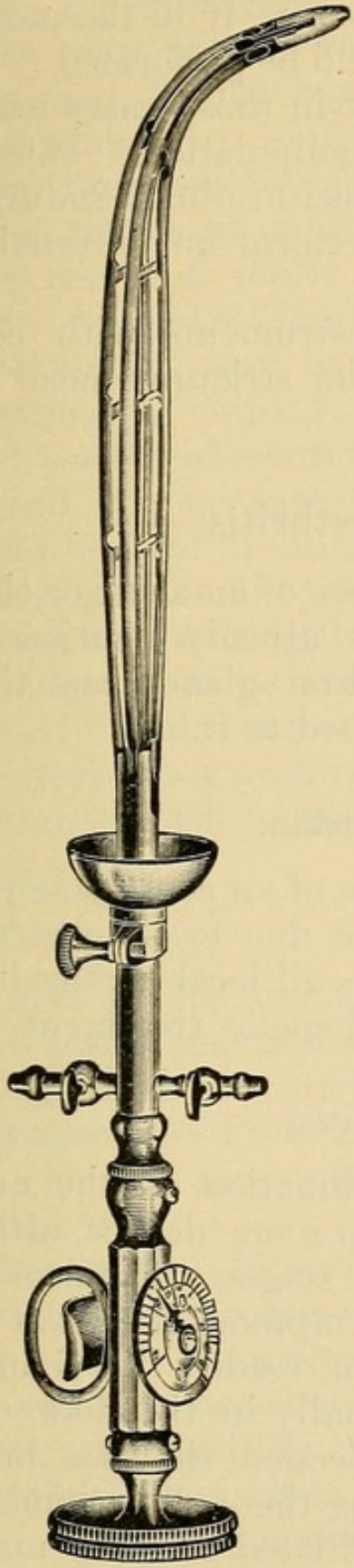
Divulsion is a method which should not be used. It consists of introducing instruments into the stricture and divulsing with main force. The instruments have the shape of the modern dilators, although these have to a certain extent been modeled after the divulsors. The Le Fort method, already mentioned, is practically divulsion.

Rapid dilatation can be performed with the dilators already described. Here, if the urethra is enormously stretched in one sitting, it is called "rapid." But these dilators are not necessarily used in this manner, and Kollman and Oberländer both advise progressive, gradual, and slow dilatation of infiltrated areas, exactly as with the sounds. This is then called "progressive" dilatation.

No matter which type of treatment is instituted, appropriate measures in the way of irrigation and instillations are often necessary throughout the entire course of the treatment.

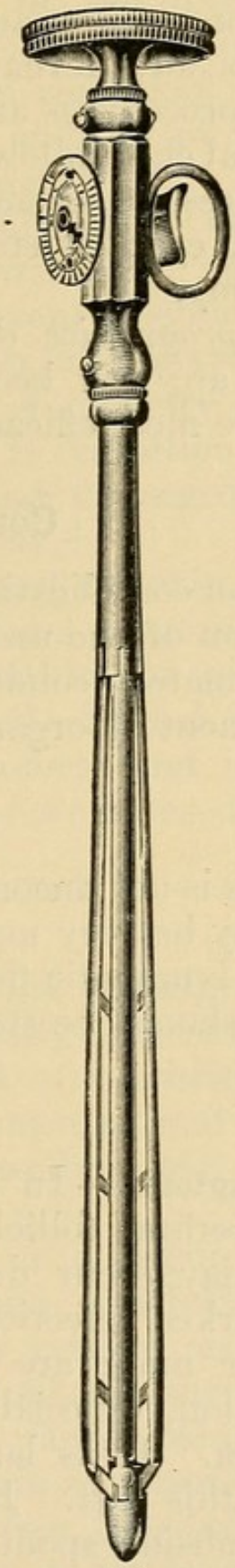
No outline can be made for all cases, yet any stricture may be treated by any of the following methods: dilatation, slowly but progressively, or rapidly; divulsion, electrolysis, urethrotomy, either external or internal. Divulsion and electrolysis should positively *not* be used, hence there remain but few methods that can be utilized in the various types of stricture. However, it is best: (1) To dilate all soft strictures, whether in the anterior or posterior urethra, with sounds or dilators, according to the slow but progressive methods; (2) all fibrous strictures, whether anterior or posterior, should be gradually dilated. Belonging to this class, but always contracting, are the elastic strictures. Where dilatation does not afford relief,

FIG. 10.



Urethral dilator partially expanded.

FIG. 11.



Urethral dilator partially expanded.

it becomes necessary to operate—if the stricture is in the anterior urethra, an internal urethrotomy; if in the posterior urethra, an external urethrotomy should be performed. These same procedures are to be carried out in those cases where a urethral chill follows every urethral manipulation. Wherever strictures are accompanied by severe peri-urethritic induration, fistula, cystitis, etc., it is best to perform an external urethrotomy.

In *progressive dilatation* metal instruments with conical beaks are best because they enter the stricture most easily and are most efficacious.

Complications of Urethritis.

Other complications during the course of an acute or chronic affection of the urethra besides those already mentioned are inflammatory conditions of the urethral glands and the involvement of organs which are attached to it.

Œdema of the Foreskin.

This is not uncommon in the course of an acute gonorrhœa. It may be very marked. It must be due to an obstruction of the lymphatic flow. In these cases all local urethral treatment should be stopped, and antiphlogistic treatment introduced.

Urethral Folliculitis.

Symptoms.—In every acute inflammation of the urethra the urethral follicles are involved to some degree, although this may occur during the chronic stages. In most cases no marked affection exists and no symptoms arise, but when one or more are attacked, they can readily be found by palpation, especially as they are usually in the floor of the urethra. If as large as a pea, inspection shows a bulging along this part. Even after reaching these dimensions they may subside spontaneously, or the dilated follicles may develop into an abscess and the contents break through the skin (occasionally a fistula results) or through the duct into

the urethra. If the inflammation extends to the cellular tissue, a *peri-urethral inflammation* sets in, the abscess becomes more diffuse and may break in either or both directions, and fistula remains. This latter condition is often accompanied by chills, fever, sweats, and, if of a very severe type, all the signs of sepsis persist.

The **treatment** must always be antiphlogistic. Give the parts rest and moist applications—at first cold, and later warm. Avoid all local irritation and prevent erections. All injections are best omitted, although carefully given warm irrigations of mild 1:15,000 bichloride of mercury or saturated boric acid solution may be given. If resolution sets in, a sound may be introduced and the gland massaged. This should be kept up until all traces disappear.

However, should the abscess point toward the skin, a small incision and packing the cavity with iodoform gauze and moist dressings are to be continued. If just within the glans, the affected follicles can occasionally be treated—incised, if necessary, through a urethroscopic tube. Iodoform and ichthyol, 2 grains of each to each urethral bougie, may be used several times a day.

Cowper's Glands.

These glands, emptying into the bulbous urethra and situated just at the perineal region, occasionally become involved during either an acute or a chronic attack of urethritis.

Symptoms.—Pain is the initiative symptom, and as only one gland is most often affected, the swelling will be seen on that side.

Treatment.—If antiphlogistic treatment is begun and if local urethral treatment be stopped at once, resolution often will occur. However, suppuration can readily occur. If the swelling becomes diffuse, passing into the surrounding tissue, the swelling may become quite large, painful, and fluctuation may set in. This is referred to as a *peri-Cowperitis*. Whenever it reaches this point, a free longitudinal incision becomes necessary. Occasionally a fistula is established. A *chronic Cowperitis* may persist; only a small

and painful nodule may remain. In these cases excision can be recommended.

Tuberculosis and malignant disease of this gland have been noted, but are exceedingly rare.

Inflammation of the Seminal Vesicles (Seminal Vesiculitis or Spermato-cystitis).

Symptoms.—Inflammation readily follows in acute or chronic posterior urethritis. It rarely exists by itself, but is nearly always accompanied by a prostatitis, and frequently by an epididymitis. An acute attack is manifested by a slight pain in the perineum, which pain may extend down the thigh or even into the scrotum. There is pain, which may be of shooting character, on defecation. Pollutions are also accompanied by pain. In chronic affections the symptoms are the same as in acute cases, but not so marked. Besides, there may be too frequent erections, and during intercourse pain in the back and *ejaculatio præcox* may be a symptom. In both the acute and the chronic forms the contents of seminal vesicles are mixed with red blood-corpuscles. Besides these, there may occur slight urinary symptoms. Often these cases are associated with neurasthenic symptoms. Once in a while an abscess may form and break into the urethra, rectum, or abdominal cavity. By the rectal examination the vesicles either on one or both sides may most often be palpated as distended, fluctuating, and painful sacs; and the duct passing through the prostate and vesicle itself above and on the base of the bladder are to be felt. Again, especially in the chronic cases, the vesicles can be felt in the area described as irregularly nodulated masses. Here the Posner three-glass method, which gives the so-called *expression urine*, should be used, and the microscopical findings should be as already described.

Tuberculosis of these organs occurs rarely alone, but commonly associated with tuberculosis of the epididymis and prostate gland.

The **treatment** here, as in all other inflammatory affections, is to prevent the process from going on to suppuration. All

sexual excitement should be avoided; the pelvis depleted; free bowel movements obtained; hot sitz-baths and alkaline diluents advised. Suppositories are to be used regularly, such as—

℞ Ext. belladonnæ, 0.25 gramme;
Ichthyolis,
Iodolis, āā 2.50 grammes;
Butyræ cocæ, q. s.
M. et ft. in sup. rect. No. x.
Sig.—Insert two or three each day.

When the acute stage is over, massage of the seminal vesicles, regularly given, and rectal injections of warm saline solutions are to be recommended. The term "*stripping*" has been used to describe massaging the seminal vesicles; it must be continued for weeks and even months, in connection with all antiphlogistic treatment, especially mentioning the Arzberger cooling apparatus, in order to gain any headway. If abscess has formed, it is best to use surgical methods. To reach the seminal vesicles the best incision is either the Fuller or the Zuckerkandl, which will be described under Prostatic Diseases.

DISEASES AND TUMORS OF THE PROSTATE GLAND.

The prostate gland is a glandular body which surrounds the central end of the urethra and forms the so-called prostatic urethra. The prostate consists, chiefly, of muscular tissue in which numerous small glands are embedded. These glands terminate with their ducts around the caput gallinaginis. The body of the prostate is perforated by the two ejaculatory ducts. The prostate has two lateral lobes, which are connected by a median bar. The whole gland is covered by a fibrous capsule. It is kept in its place chiefly by the posterior layer of the triangular ligament. The function of the prostate is to help in the ejaculation of semen after it is collected in the prostatic urethra, while the secretion of the

prostate is the necessary accessory for the activity of the spermatozoa. The prostate may be changed by hypertrophy, by gonorrhœal inflammation, by tuberculosis, neoplasms, and calcareous deposits in its parenchyma.

Acute Prostatitis.

The term acute prostatitis is often used. This usually complicates specific or non-specific urethritis. It is most frequently probably a sequence of chronic posterior urethritis. Excesses are possible causes of this condition. It is in these particular cases that acute signs of a posterior urethritis are either present a short time before or not infrequently in conjunction with this condition by simultaneous infection. For more practical purposes, acute prostatitis can be divided into two divisions—viz.:

1. Acute prostatitis of the entire gland.
2. Acute follicular prostatitis.

Acute General Prostatitis.

Symptoms.—In these particular cases it is possible to find practically per rectum only very slight enlargement or œdema of the prostate. It is usually small, regularly shaped, a little softer in consistency than normal, and but slightly painful. On examination by the three-glass method the patient is allowed to urinate into the third glass, and on examination of the sediment microscopically pus is either present or absent. If present with prostatic elements, there must be a prostatitis present. This is the only way to diagnose acute prostatitis. It can involve the whole structure of the prostate. The symptoms are practically the same as those enumerated in acute posterior urethritis, but in addition there are much pain in the perineum, slight pain in the rectum, and oftentimes pain on defecation.

Treatment.—Rest. No sexual excitement. Diet mild, nothing stimulating, no highly spiced foods; none other than bland foods. Deplete the bowels. Anodynes and treatment

like that for the posterior urethritis. Of late, heroin in the form of suppository has been recommended:

℞ Heroini hydrochloratis, 0.1 gramme;
Butyri cocæ, q. s.
Ft. in suppos. No. x.
Sig.—Insert one every four hours.

A differentiation is scarcely ever made from an acute posterior urethritis.

Acute Follicular Prostatitis.

The second class of cases is more easily diagnosed and more necessary to recognize. It is probably the most common kind of prostatitis that sets in, following posterior urethritis. The follicles are involved more or less deeply, causing the prostatic urethra to become more swollen and congested, depending upon the depth that the inflammation extends, causing irregularity of the prostate when examined per rectum. The inflammation extends down from the urethra to the ducts of the prostate, occludes these openings, and causes the follicles to enlarge—*pseudo-abscesses.* These plugs oftentimes loosen and are passed at the time of urination, and in doing so small quantities of pus escape. If the inflammation continues and becomes chronic, scar tissue forms, and the whole glandular tissue is more or less destroyed.

Symptoms.—These cases of follicular prostatitis show frequent desire for urination which often become imperative. Frequently after urination the desire to urinate still continues, sometimes for minutes, perhaps constantly for hours. Usually at the end of urination pain exists, and small quantities of blood or pus are passed. *The two- and three-glass methods should be used in making the diagnosis.*

As to the rectal findings: In this particular kind of inflammation of the prostate a pea-shaped enlargement over the prostatic surface will usually be found, making this surface very irregular and exceedingly painful. This is in strong distinction to tuberculosis, where the nodules over

the gland surface are entirely different, much smaller, and closer together and usually painless.

It is in these cases that the sexual physiology is often affected. If the ejaculatory duct becomes affected and an obstruction forms, the patient oftentimes complains of great pain at the time of pollution. If the condition becomes chronic and there is complete closure of one of the ejaculatory ducts, the patient is ever afterward a sufferer from *oligospermia*—a lessening of the spermatozoa. Should both of these ejaculatory ducts which pass through the lobes of the prostate become closed, then the patient would be ever afterward sterile. It is one of the causes of sterility in man, *aspermatismus*, or complete absence of the spermatozoa.

Parenchymatous Prostatitis.

Symptoms.—On rectal examination the lobes are found more or less enlarged, rounded, œdematous, consistency softer, pain severe, throbbing in the mass, but no fluctuation. If this condition remains for any length of time,—say a week,—usually an abscess formation occurs. Therefore there is a fusing of some of these inflammatory foci, and instead of this throbbing condition a fluctuating mass appears. The diagnosis of abscess of the prostate is made only where there is fluctuation.

Abscess of the Prostate.

Pathology.—These pus-sacs or foci run together and may become of large size, and thus form one abscess. The prostatic gland is often entirely destroyed, as it is included in practically one abscess. The tissue around the base of the bladder to which the seminal vesicles are attached is then involved, and the whole part which lies between the rectum and the bladder is finally massed together, and the fluctuation can be felt as a localized area or may be very diffuse. If an abscess is left untreated, it may break or empty itself through the urethra, which condition is most common. In fact, this often fills up, may refill itself, or in the course of

time the opening leading into the urethra becomes patent, and this then accounts for urinary dribbling as the urine passes into an old pus-sac. It may extend around the rectum and become a periprostatic abscess, may break into the rectum, or into any number of other directions,—toward the perineum, ischio-rectal space, cavum Retzii, etc.,—but the most common are the three through the urethra, rectum, or perineum, in the order named.

Symptoms.—At the beginning there are chills and fever, chilliness, flushes of heat, etc. With coalescence of these different foci—all the signs of a pyemia; pain in the perineum, of a dull, dragging character, often intense. The pain with tenesmus is intense. During urination there is a burning pain, and at the end there are always pain and tenesmus, perhaps also some blood and pus at the end of urination.

The region between the rectum and the prostate and the lower part of the bladder occasionally becomes affected, and then the so-called periprostatic phlegmons and phlebitis occur. The whole mass does not fluctuate.

Phlebitis can occasionally be felt per rectum as strands.

Diagnosis of phlebitis can be made only by rectal examination, when cord-like strands corresponding to the hemorrhoidal veins are felt.

Diagnosis of Follicular Prostatitis.—Always keep in mind the increased urgency and frequency of urination, of pains, of the pus at the end of urination, of the stopping of pus at the external urethral orifice if the onset is acute. Use the two-glass method.

Diagnosis of Acute Parenchymatous Prostatitis.—When the entire gland is involved, there are constitutional symptoms, chills, and fever; these may occur repeatedly. The frequency of urination is increased, just as in follicular prostatitis, but there is usually much more difficulty when passing urine. Pain is much more severe. The findings of rectal examination are as already outlined.

Treatment of follicular prostatitis is absolutely like that of acute posterior urethritis, which treatment has already been described.

Treatment of Acute Parenchymatous Prostatitis.—In this an attempt to prevent suppuration is made. Sitz-baths, hot applications to the perineum, rectal irrigations with small quantities of water—a cupful of water at a time, allowing the water to remain in the rectum a while. Add 3 to 5 c.c. of ichthyol to each cup of water. Apply dry cups, blisters, and leeches to the perineum. Put the patient to bed. Feed him on plain, bland diet. Give alkaline diuretics and all the anodynes that are needed. If retention of urine occurs, catheterize under aseptic precautions. Always try to insert as small and soft a rubber catheter as possible. It is absolutely necessary to carry out this treatment for a case of acute parenchymatous prostatitis, because the latter is the forerunner of an abscess.

If fluctuation is felt, it is necessary to proceed at once to empty the abscess.

Do not wait for an abscess to break, but advise operative interference.

There are two ways to do this :

1. Puncture through the rectum. The finger is introduced into the rectum with the tip on the fluctuating mass. The trocar is passed along the finger and suddenly pushed into the most prominent part of the fluctuating area. This is not to be advocated, but may be used in certain cases.

2. Zuckerkandl's incision: The patient is in the lithotomy position. In cases of abscess a soft-rubber catheter, in other cases a metal catheter, may be introduced into the urethra in order to outline its course. The operator should insert the index-finger of his left hand with rubber-glove protection into the rectum, and make a semilunar incision extending between the tuberosities of the ischii and crossing the median line midway between anus and scrotum, through the skin, subcutaneous tissue, and fascia, and cutting through the superficial transversus perinei muscle and the sphincter and the bulbo-cavernosus muscles; then, with blunt dissection, separate the anterior rectal wall from the prostate. If the case is a prostatic abscess, an incision is made in the most prominent fluctuating point, parallel to the urethra. Drain-

age and packing with iodoform gauze must be secured. For prostatectomy, the removal of tuberculous or malignant growths of the seminal vesicles, this same incision can be used.

Treatment of Secondary Phlebitis.—Try to subdue the inflammation. Use all kinds of antiphlogistics to reduce the inflammation. Local treatment in the way of irrigations per rectum, with the addition of ichthyol. If the thrombus becomes infected, then operate.

Chronic Prostatitis.

Symptoms.—This disease always follows a posterior urethritis. Oftentimes there is a slight discharge at the external urethral orifice. In these cases there is usually a slight burning on urination, pain on erection, too many pollutions, too many erections, pain at the time of ejaculation or during the sexual act; perhaps pain radiating down the legs. Oftentimes there is scarcely any symptom whatever in these cases. The only signs may be the so-called *nervous phenomenon*. The patient is a sufferer from all kinds of psychical disturbances; there may be sexual debility, neurasthenia, and depression. Another symptom that may be present is some slight heat or bearing-down pain in the perineum; at times, radiating pain down the legs. Furthermore, pains at the time of pollution or during the sexual act occur. All these cause the patient to concentrate his thoughts upon these symptoms and to bring about a condition of neurasthenia. This may be the cause of premature ejaculation (*ejaculatio prematura*). Sterility is often caused by this condition of affairs. Rectal examination of the prostate may be painful, though not always so.

Diagnosis.—This must be made by microscopical examination of the urine and of the "expressed" discharge; also by rectal examination.

Treatment.—The treatment consists of local measures, especially massaging the prostate, irrigation of posterior urethra, occasionally putting in a sound of large calibre, and instillations. At the same time sitz-baths, local douches,

enemata, and suitable diet are indicated. Should this local treatment not be sufficient to clear up the urine, a dilator should be *gently and progressively* used to stretch the posterior urethra, open up the ducts of the prostate in this way, and then irrigation should be begun, in order to remove the plugs of material that are remaining in the gland.

The internal treatment is exactly the same as in chronic anterior affections. During the whole course of the treatment give urinary antiseptics. A few suppositories which may be used per rectum are :

℞ Potassii iodidi, 0.50 gramme ;
Iodi puri, 0.05 "
Ext. belladonnæ, 0.10 "
Butyræ cocæ, q. s.
M. Ft. in sup. rect. No. x.

℞ Potassii iodidi, 10.00 grammes ;
Potassii bromidi, 10.00 "
Ext. belladonnæ, 0.25 gramme ;
Aquæ, 300.00 grammes.
M. & S.—For 20 rectal enemata.

One may also add to each injection from 2 to 10 drops of tincture of iodine, or 2 or 3 grammes of ichthyol at the time of each injection.

If the signs of congestion are severe in the posterior urethra, with severe burning on urination, use an application of iodine, 1 or 5 per cent. in glycerin, with an Ultzmann or Guyon instrument.

Whenever there is chronic affection of the prostate or seminal vesicles, moist heat is very necessary. This should be applied with hot-water rectal douches, with the aid of differently shaped tubes originally introduced by Arzberger. Occasionally, when abscess formation is to be aborted, the prostate cooler should be employed. This is a self-retaining, somewhat pear-shaped, metal instrument. Its flattened surface is to be placed against the gland and cold water allowed

to pass through the separated chambers for ten to fifteen minutes, five to ten times a day.

DIFFERENTIAL DIAGNOSIS BETWEEN ACUTE POSTERIOR URETHRITIS AND ACUTE PROSTATITIS.

Acute Posterior Urethritis.	*Acute Prostatitis.*
1. Frequent urination. Tenesmus.	1. Urination not so often. Tenesmus usually absent.
2. Pain at end of urination.	2. Absent.
3. Blood or pus or both at end of urination.	3. Absent.
4. Slight pain in perineum.	4. Severe, deep pain in perineum. Pain often severe in rectum, especially during defecation.
5. Absent.	5. Retention.
6. Seldom fever; usually no very severe symptoms.	6. Severe general symptoms.
7. Rectal examination: slightly œdematous. Often normal prostate.	7. Enlarged and painful prostate.

Hypertrophy of the Prostate Gland.

Hypertrophy of the prostate is the enlargement of the gland by formation of new tissue. These enlargements may either be uniform, so that the body and both lobes become enlarged, or be confined to only one lobe or to the body, or the hypertrophy is a partial one, in the sense that a circumscribed hypertrophy in one of the parts of the prostate takes place. The enlargement of the connecting bar is known as *Home's lobe*. The hypertrophy, if existing mostly around the prostatic urethra as nodules protruding into the urethral lumen, may make the course of the urethra tortuous, thus interfering with the urinary stream. These nodules are occasionally felt next to the sphincter ani. If the lobes hypertrophy toward the rectum, they can be felt by rectal palpation. The protrusion of the lobes or of the connecting bar into the bladder can be diagnosed only by instrumental examination—that is, by cystoscopy or by the diagnostic sound and also by the stone sound. The hypertrophy of the prostatic body elongates the prostatic urethra to a considerable extent, while the lobes which protrude into the bladder prevent its complete emptying. The median lobe forms a wall between the

trigonum, the *bas fond*, and the internal urethral orifice. This difference in the level is the reason that this part cannot have an unimpeded outflow. The consequence is that in cases of prostatic hypertrophy a residual urine is always encountered —that is, immediately after a patient urinates naturally if a catheter is then introduced, a variable quantity of urine is found to be present in the bladder, which cannot be passed voluntarily. Further symptoms are a frequent desire for urinating, especially during the night; also inability to start urination at once, but the patient must wait and exert pressure, and suffer inconvenience during the passage of feces.

Diagnosis.—The diagnostic points in prostatic hypertrophy are the elongation of the urethra, residual urine, and the proof of enlargement of the gland or some of its parts.

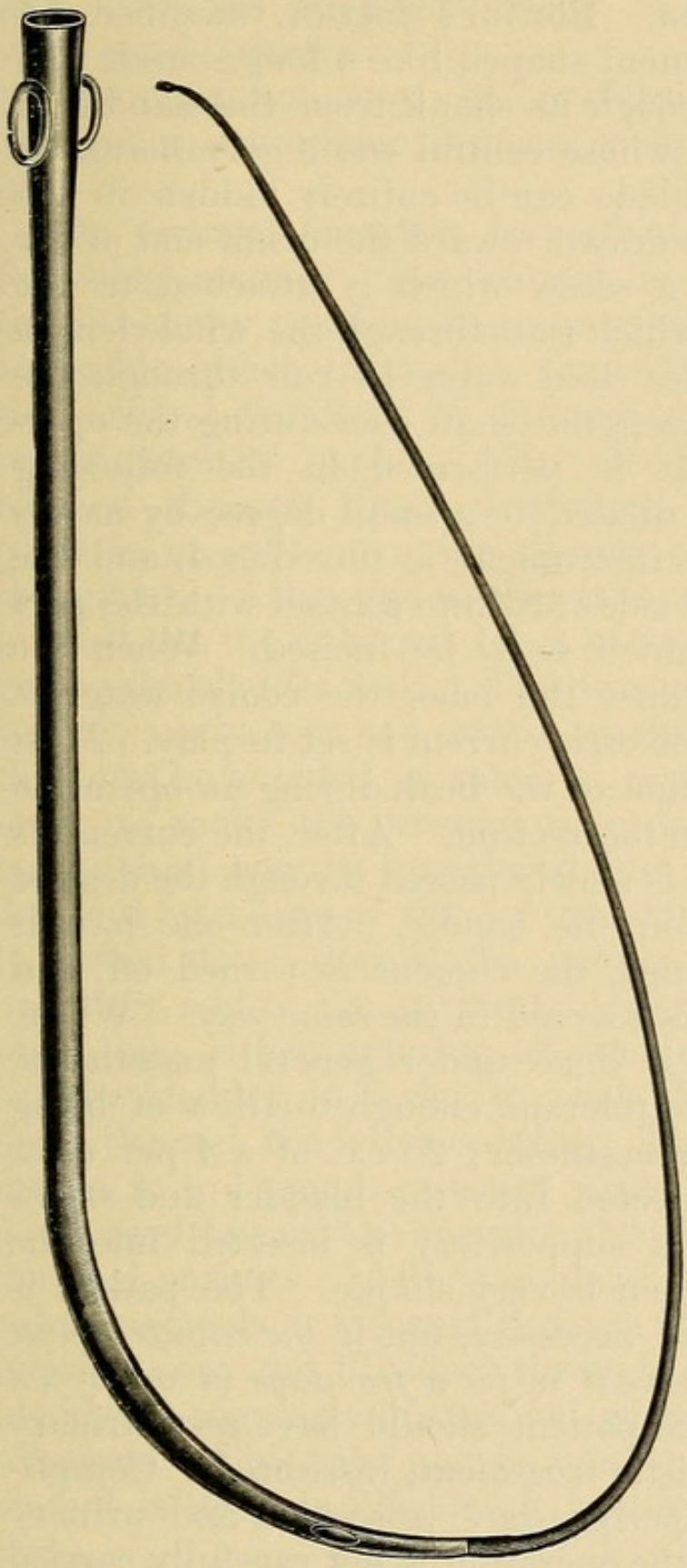
Treatment.—Palliative or a radical means are applicable.

Palliative treatment consists in inserting large sounds and regular catheterization, and the regular flushing out of the bladder, especially if cystitis is present. If these measures are kept up for some time, considerable relief can be furnished. But after a while the symptoms will recur and the treatment must be repeated. If satisfactory voluntary urination is impossible and radical treatment for some reason is excluded, the patient has to lead what is called a *catheter life.* The urine must be drawn in regular intervals, and the patient must be instructed in the use of the catheter and to use all aseptic precautions. It is nothing unusual that the common catheter cannot be introduced in cases of prostatic hypertrophy; then catheters whose consistency and curve enables them to pass over the obstruction must be used. Either elastic catheters with a sharp angle at the beak (*catheter coudé* or *Mercier*) or silver catheters with an elongated beak are to be used.

If catheterization is impossible and radical treatment is not feasible, a permanent suprapubic fistula is to be established.

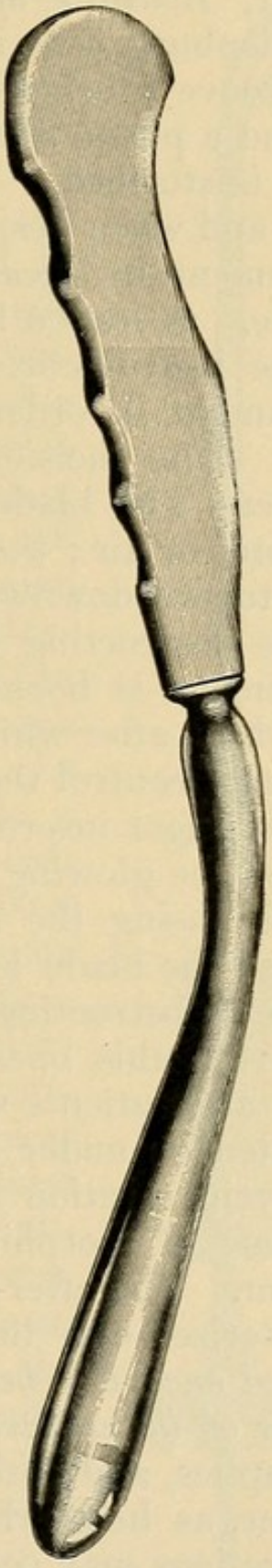
The *radical treatment* of prostatic hypertrophy is either a severing of the obstacle (*prostatotomy*) or the extirpation of the obstructing hypertrophied parts (*prostatectomy*). The so-called modern procedure is a galvanocaustic incision of the

FIG. 12.



LeFort's catheter with filiform guide attached for passing irregular strictures and enlargements of the prostate.

FIG. 13.



Pezzoli's instrument for massage of the prostate.

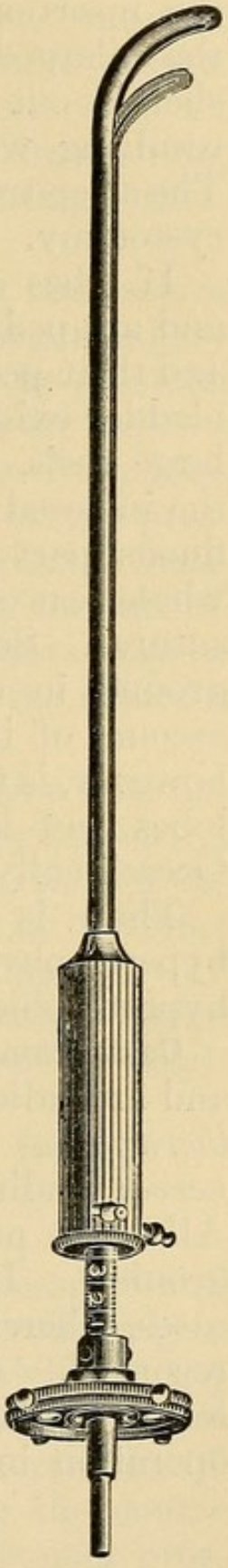
obstructing lobes, an operation which is called after its inventor, *Bottini's operation.* Bottini's incisor, modified by Freudenburg, is an instrument shaped like a long sound. In the groove which runs through its shank from the handle to the end a piston slides, to whose central end a galvanocaustic blade is attached. This blade can be entirely hidden in the beak, and when desired, is drawn toward the distal end of the instrument by means of a screw which is attached to the handle. A leaden hose, which runs through the whole length of the instrument, enables iced water to run through the instrument in order to keep the shaft cool during the operation. The incision itself is performed in the following manner: The bladder is dilated to a small degree by means of water or air; then the instrument is introduced, and the beak turned downward or sideward into contact with the part of the obstructing lobe which is to be incised. When the instrument is hooked against the lobe, the cooled water is turned on, after which an electric current is set in play. Most operators control the position of the beak during an operation by one finger inserted into the rectum. After the current is turned, the glowing blade is slowly passed through the desired part by using the screw on the handle. After one lobe is severed the blade is returned, the current is turned off, and the next obstructing lobe is severed in the same way. While, as a rule, this operation is done under general anæsthesia, there are patients who are tolerant enough to allow of being operated on under local anæsthesia; 25 c.c. of a 4 per cent. antipyrin solution are injected into the bladder and 0.015 gramme of morphine in a suppository is inserted into the rectum. The after-treatment is very simple. The patient is catheterized only in case of necessity, but *if the catheter must be used once, it is best to leave it in for a few days in order not to tear off the eschars.* The patient should have rest, urinary antiseptics, and antiphlogistic treatment, instituted. Complications, as hemorrhages, periprostatic abscesses, and urinary infiltrations may occur if the operation is not carefully carried out. One caution of the Bottini operation is to make the cuts

slowly. If the blade is drawn along too rapidly, then the after-hemorrhage is apt to be very much greater.

Prostatectomy may be performed either through a *suprapubic incision or by the perineal route.*

The **perineal operation** is performed in the following manner: The patient is placed in the lithotomy position, and the prostate made accessible either through a semicircular incision around the anus or through an incision in the perineal raphé. After the prostate is reached through blunt dissection, the main point is to split open the fibrous capsule of the gland. After this is done it is rather easy to shell out the enlarged lobes without endangering the bladder-wall. The prostatic urethra will always be torn to a certain extent, although this is to be avoided as much as possible. In order to make the prostate more accessible, a large sound may be introduced into the bladder, and by means of this instrument the gland is pushed down toward the perineum. Some operators add to the perineal incision a suprapubic one, either entering or remaining without the bladder, in order to push the prostate down through the latter opening. The simplest means is to have an assistant press the gland downward toward the operator through the abdominal parietes. After the gland is removed, a drainage-tube is inserted through the perineal incision into the bladder, through which the bladder is regularly flushed out with antiseptic solutions. This tube may be removed after the wound is entirely filled with healthy granulations.

FIG. 14.



Bottini's prostatotome.

Suprapubic prostatectomy is done in this way: After the suprapubic opening into the bladder

is made and the base of the bladder rendered accessible by the insertion of retractors, the mucous membrane covering the enlarged lobes is incised, and the obstructing parts are shelled out after the fibrous capsule has been split. The resulting wounds are best closed by deep catgut sutures. The after-treatment is the same as after any other suprapubic cystotomy.

If lobes are encountered which protrude into the bladder and are pedunculated, they are amputated with their pedicles and their pedicle-stumps ligated. If lobes protruding into the bladder exist, whose connection with the bladder floor is on a large basis, mucous membrane and capsule may be split and the inclosed prostatic lobes may be shelled out. The superfluous part of the resulting flaps may be resected and the whole seat of the tumor is after that closed with deep catgut sutures. Suprapubic prostatectomy is losing more and more ground in comparison with the perineal prostatectomy, on account of its greater mortality. Suprapubic prostatectomy, however, is the proper method for the removal of pedunculated lobes and large lobes which have grown into the viscus. Occasionally the operations are combined in selected cases.

There is another method of treatment for these cases of hypertrophy, with the object of decreasing the size of the hypertrophied lobes—namely—

Castration and resection of the vasæ deferentiæ are performed, and are called the "sexual operations." Besides this, *organotherapy* has also been used. *Ligation of the arteries and the nerves* leading to the prostate has likewise been carried out. All these procedures have been done on certain theoretical grounds. It can be stated positively that but few authentic cases, wherein permanently good results have been seen, are recorded. All these methods are practically becoming obsolete. Of late, the perineal prostatectomy seems to be the operation in most favor.

Neoplasms of the Prostate.

Varieties.—They are either malignant growths, as sarcoma or carcinoma, or benign tumors, as fibromata or fibromyomata.

Symptoms.—The latter is that which is often described under the name of hypertrophy. These fibromata represent tumors which may fill almost the entire bladder cavity. They can be palpated by bimanual palpation, and cause all forms of urinary disturbances, as temporary obstruction, residual urine, and permanent desire for urinating; their only cure consists in extirpation.

Malignant tumors of the prostate characterize themselves by a rather rapid progression of the prostatic enlargement, by the extreme hardness of the nodules embedded in the prostate, and lightning pains throughout the pelvis. Very soon a general cachexia and regionary swelling of the lymphatic glands set in. In consequence, the enlargement of the prostate will cause the known symptoms of this condition. Occasionally a very severe hemorrhage might occur on account of an artery being eroded by the cancer. These tumors may be primary in the prostate, or secondary from one of the adjacent organs.

Treatment.—A radical therapy (*extirpation*) is as a rule not feasible, so that it is necessary to resort to symptomatic measures—administration of narcotics for the pain, and instrumentally relieving the urinary obstruction, in extreme cases, by establishing a permanent suprapubic fistula. If the urine, on account of ulcerations of the neoplasms, becomes decomposed, cauterization and antiseptic washings of the bladder should be practised.

Tuberculosis of the Prostate.

Symptoms.—Tuberculosis of the prostate produces, first of all, the symptoms of inflammation, enlargement, softening in spots, and soreness. These conditions do not yield to any treatment, thus giving rise to the suspicion of a specific process. As a rule, this tuberculosis is combined with tuberculosis of the cords and with tubercular epididymitis. In the course of time even the bladder becomes involved. Frequent prostatic hemorrhages are not unusual.

Treatment.—The therapy will aim at an improvement of

the general health by nourishing diet, outdoor exercise, and the administration of tonics. Injections of iodoform emulsion into the parenchyma may be tried. In appropriate cases prostatectomy may be resorted to. The usual combination of this condition with tuberculosis of the other genitalia makes the prognostic outlook rather unfavorable. If primary in the gland and if remaining localized, operative interference, as excision, ought to be followed by good results.

Prostatic Concretions.

Pathology and Symptoms.—In some cases retained and dried-up secretions of the prostatic glands give rise to the deposition of earthy phosphates, thus forming the nuclei of calculi. These calculi, as a rule, are only of small size, but in rare cases, by permanent deposition of phosphates, they may attain considerable size, so as to produce a manifest enlargement of the prostate, and eventually urinary obstruction. It sometimes happens that inflammation and suppuration take place around the concretions, so that they perforate by ulcerating into the rectum or into the urethra.

Treatment.—If the stones are numerous and of considerable size, they may be palpated, and if they cause inconvenience, they ought to be removed by perineal prostatotomy. Occasionally they may be felt as a sound is passed over them, or they may be seen through a urethroscope. They have been removed in this manner when small in size.

Prostatic Neurosis.

Symptoms.—This is a functional disorder due either to a general neurasthenia or to neurotic disturbances which are confined to the prostate. On the other hand, prostatic neurosis may cause general neurasthenia, which subsides after the local trouble is removed. The prostate may be the seat of typical neuralgias, whose attacks come on without special irritation, or the prostate is the seat of dull, permanent pain. It is extremely sensitive to the touch, although the examination fails to reveal

any anatomical changes. This neurosis quite often causes increased desire for urinating. Once in a while it causes tenesmus or temporary retention through spasms of the prostatic sphincter. If the patient is asleep or his mind is diverted by amusement or occupation, all the symptoms will subside. The urethra, as a rule, is hypersensitive, and although no inflammation exists, the rectal examination is very painful. While the sexual desire is quite often increased, the sexual power is diminished or entirely gone. The patients, as a rule, are generally depressed and apt to become hypochondriacal.

Treatment.—This will first aim at the improvement of the general health by hydropathic measures and through the administration of tonics. Often we achieve quite a marked success by the application of the psychrophore. This is a urethral sound, inside of which a leaden hose is arranged in such a way that cold water can pass through it after the sound is inserted. The sittings are continued for five or ten minutes and repeated at regular intervals of two or three days. The Faradic current may also be used to good advantage: one pole is inserted into the rectum; the other is placed on the abdomen. Only very weak currents must be used, and the application should not last longer than two or three minutes. Sexual intercourse, or any attempt at it, is absolutely to be avoided. Massage of the prostate generally only makes matters worse.

QUESTIONS ON CONGENITAL MALFORMATIONS, INJURIES, AND DISEASES OF THE URETHRA AND ADNEXA.

Mention the more common malformations.
What are the most common malformations?
What is meant by hypospadias?
For practical purposes what divisions are made of this malformation?
What is the treatment?
Are injuries to the urethra common?
How may they occur? Where are they most usual?
What symptoms may they cause?
How would you treat this condition?
Do tumors of the urethra ever occur?
What are the more common varieties?
How would you treat them?
What is meant by urethritis?

In what manner may the term be qualified?
What is meant by gonorrhœa?
What is meant by non-specific urethritis?
Do they run a similar clinical course?
May urethritis be caused by any other distinct germ or by any distinct condition?
What do you know about the gonococcus?
In the case of gonorrhœa is there a distinct period of incubation?
What would the requirements be for a remedy to be used as an abortive agent?
What is used for this purpose?
What may result from their use?
What is understood by the prophylactic treatment?
In what ways may gonorrhœa be acquired?
What causes the inflammatory reaction in the case of gonorrhœa?
Describe the course of infection.
When the discharge is at the maximum are the gonococci in great number?
What are the symptoms of acute anterior gonorrhœa?
From what should acute anterior gonorrhœa be differentiated?
Describe the manner of examining the discharge.
Describe the Gram stain.
Describe the appearance of the gonococcus.
In the treatment of acute anterior gonorrhœa, what are the factors to be considered?
What does the hygienic management of such a case require?
Describe the internal treatment of such a case.
In what manner does sandalwood oil act favorably?
When would you prescribe balsam of copaiba, oil of cubebs, and the urinary antiseptics? Enumerate combinations of these.
When is it advisable to use an opiate or a sedative in these cases?
When is it advisable to commence the local treatment?
Mention the newer silver salts.
In prescribing agents for injections, must the action of each remedy be considered? Why? Mention the classes and enumerate those remedies belonging to each.
Enumerate the different modes of application.
What is Neisser's plan for using the silver salts?
How would you commence treatment with any one of them? Describe in detail.
When and how would you use the antiseptic and slightly astringent group? When the astringents?
What is meant by the irrigation method? Describe the manner of giving an irrigation. Can irrigations also be given with the aid of a catheter? How?
What is meant by posterior urethritis?
Is it to be regarded as a complication of anterior urethritis? Why?
What are the causes for this complication?
Describe the forms in which it manifests itself.
How would you treat the condition?
What is the method of Janet, of Diday?
What is understood by the prophylactic treatment for posterior urethritis? Describe in detail.
If an acute posterior urethritis sets in during the treatment of an anterior urethritis, is all local treatment to be stopped? Why?
What is the internal treatment and with what objects is it continued?

What is a chronic anterior urethritis usually due to?
What parts of the urethra become involved?
What is the classification of Finger?
What are the symptoms?
Of what value is the diagnostic sound in these cases? The urethroscope?
What is understood by a chronic posterior urethritis? Does a prostatitis always accompany this condition?
Is the membranous urethra involved more than the prostatic urethra in these cases?
How do you differentiate from a chronic anterior urethritis?
In these cases, what does the examination by the method of Jadassohn show?
On what does the treatment of these cases depend? Give in detail.
What is the internal treatment?
What should the local treatment be?
Should the meatus be enlarged so that sounds may be passed? If infiltrations are present, how are they to be treated? What type of sounds should be used? In treating these cases is there a guide by which the local treatment is to a certain extent regulated? Give in detail.
Is the posterior urethra treated in the same manner as the anterior urethra?
Give a general outline of treatment if one or both parts of the urethra are involved.
Has the urethroscope any advantage in the mode of treatment in these cases? if so, what are they?
Enumerate the salts and their strength used for instillations, and give their action.
What do you know about gonorrhœal urethritis in the female? What is the treatment?
What is a stricture?
Name the different kinds of strictures?
What is a spasmodic stricture? How may they be accounted for?
What is meant by an organic stricture?
In what different forms may they occur?
What are inflammatory strictures? Describe their pathology.
Is there a limit to the number of strictures which may appear in any single case?
What is meant by a soft stricture? a hard stricture? an elastic stricture?
What are the symptoms of stricture?
In extreme cases do the symptoms differ?
What are the pathological changes back of the stricture—that is, in the urethra and higher urinary organs?
May a stricture affect the passage of semen? in what manner?
Does a stricture ever cause retention of urine? In what manner may this condition be treated?
Do fistulæ ever occur due to stricture? How are they accounted for?
What is urinary infiltration?
What is the proper mode of exploring the urethra in order to diagnose a stricture?
What is meant by a sound being "engaged"?
Explain why an olive-tipped sound is best for diagnostic purposes.
When would you advise meatotomy?
How is it possible to increase the length of the frænulum by a simple operation? Describe it.
What is the Otis urethrometer? How is it to be used?

What does the treatment of strictures consist of? On what does the choice of instruments depend? What is the mode of procedure when using sounds? When does it become necessary to use dilators?

In what class of cases are filiform bougies used, and how are they to be used? Is such a bougie ever left in place for twenty-four hours? With what object in view?

Can the entrance of a stricture ever be found with the aid of a urethroscope?

In what class of cases are bougies to be used?

What is a La Fort sound? Describe it and its use.

With what regularity are sounds passed?

If passing of sounds causes urethral fever each time, what is to be done?

What are the cutting operations? What are they called?

With what kind of instrument is an internal urethrotomy done?

Describe the most typical instrument. Describe in detail the different steps of such an operation.

Can any complications arise? How are they treated?

What is meant by an external urethrotomy? How is it performed? describe in detail.

In what cases should perineal drainage be instituted? When should a permanent catheter be used? How long are these to remain in place?

In what cases does it become imperative to perform a suprapubic cystotomy?

Are internal and external urethrotomies made in the same case? What are the indications for the former? for the latter?

What is meant by the electrolytic mode of treatment of strictures?

Why is this method condemned?

Why should the method of divulsion not be used?

What is meant by rapid dilatation? How is it carried out?

What is meant by progressive dilatation?

Give a résumé of all the modes of treatment of the different varieties of stricture?

Enumerate other complications of urethritis.

Of what is œdema of the foreskin often indicative?

How would you treat the condition?

Are the urethral follicles ever involved?

What is meant by peri-urethral inflammation? Are such inflammations ever the cause of fistula? What is their treatment? In what manner must they be surgically treated?

Are Cowper's glands ever affected? In what manner? How would you diagnose this condition? What is the treatment? How would you treat a peri-Cowperitis and a chronic Cowperitis?

What is meant by a spermato-cystitis? Is this condition often accompanied by other complications of urethritis? What are the symptoms? How is the diagnosis made? What is the treatment?

What is meant by "stripping" the seminal vesicles?

What is the prostate gland?

What is meant by the prostatic urethra?

What is the function of the prostate gland?

What forms of prostatitis are there? What are the the symptoms? How would you diagnose and what is the treatment of acute prostatitis of the entire gland? Of acute follicular prostatitis? Of parenchymatous prostatitis? Of abscess of the prostate gland?

When would you advise operation upon a prostatic abscess? Why?

Describe Zuckerkandl's incision for reaching the prostate gland.

What are the symptoms, how would you diagnose, and what is the treatment for chronic prostatitis?

How would you make the differential diagnosis between acute posterior urethritis and acute prostatitis?

What is meant by prostatic hypertrophy? In what different ways may this occur? How is the diagnosis made? Is it readily made in every case? What are the diagnostic points of prostatic enlargement? What are the symptoms? What are the results if the condition is left alone? What does the treatment consist of?

What is meant by "catheter life"?

When obliged to catheterize a patient with prostatic hypertrophy, what is the correct mode of procedure?

Is it ever advisable to make a suprapubic fistula?

When is it advisable to make a prostatotomy? A prostatectomy?

Describe the Bottini instrument and the Bottini operation.

Describe the indications for the different prostatectomy operations. Describe the operations. Are they ever combined and why?

What is meant by the "sexual operations"? What are they?

What is meant by the organotherapy of these cases?

Mention the more common neoplasms of the prostate gland. As a rule, what symptoms do they cause and how are they diagnosed?

How do malignant growths of the prostate gland characterize themselves?

If they cannot be operated on, in what manner should they be treated?

What is meant by tuberculosis of the prostate gland? What are the symptoms?

How would you treat this condition?

Is it best to operate? If so, when?

What are prostatic stones?

How can you account for them?

What complications may arise from them? How are they treated?

What is meant by a prostatic neurosis?

How is it possible to make such a diagnosis?

How would you treat these cases?

ANOMALIES, INJURIES, AND DISEASES OF THE SCROTUM, OF THE TESTICLES AND THEIR COVERINGS, AND OF THE CORDS.

CONGENITAL ANOMALIES.

Retention of the Testicle.

Etiology, Varieties.—During the embryological development many anomalies involving both the internal and the external genitalia may arise. There may be an absence of one or of both testicles. Whenever a testicle, instead of descending into the scrotum before birth,—although it may do so in the following years,—remains in the abdominal cavity back of the peritoneum or in some part of the inguinal canal before

it reaches the scrotum; being fixed permanently or temporarily there, it is referred to as a "*retentio testis*"; if in the inguinal canal, as "*retentio testis inguinalis*"; if in the abdominal cavity, "*retentio testis abdominalis.*" If but one testicle remains in the abdomen, it is referred to as "*monorchismus*"; if both, "*cryptorchismus.*" In the latter case the other genitalia are normally developed and the bearer may be virile. In those cases where the external genitalia are undeveloped and where there is absence of semen, in addition to cryptorchismus it is referred to as "*anorchismus.*"

Diagnosis.—This condition is diagnosed by the absence of the organ from its normal situation.

Symptoms.—If it is retained in the inguinal canal, we find above the pubic tubercle a smooth, soft, small, egg-shaped tumor, which reacts on pressure with characteristic sensations to the patient of tenderness, faintness, weakness, or nausea. Occasionally congenital hydrocele and even hernias are present, with or without the presence of the testicle. In cases of monorchismus the testicle is usually atrophied, and therefore if complicated with the foregoing signs is difficult to palpate. In cryptorchismus the testicles can rarely be felt, and in these cases are in the abdominal cavity. If the testicle remains for a long time in the inguinal canal, its development may be impaired in varying degrees. It is a well-established fact that retained testicles incline to malignant degeneration.

Treatment.—Manipulations are begun in early life which tend to pull down the organ into the scrotum. In some cases descensus of the retained testicle into the scrotum takes place when puberty is reached. If this should not happen and should manipulations not succeed, the testicle is to be brought down by operative interference. The operation is to cut down to the tumor in the inguinal canal and free the spermatic cord, high up, by blunt dissection. In cases of necessity the Bassini operation is performed at the same time. The testicle is brought down into the scrotum and its tunica, and the sheath of the spermatic cord fastened by a few stitches. The operation is called *orchidopexy*. If it should be impossible to bring the testicle down, and if it should

cause great inconvenience, or if malignant degeneration should take place, castration must be resorted to. However, castration must be done only as a last resort, and never during the period of puberty if it can be avoided.

Other Testicular Abnormalities.

There are other conditions, as *abnormal mobility*, *inversio testis*, both on the horizontal and vertical axes, and abnormal locations, which cause disturbances.

The **symptoms** of invertio testis or torsion depend upon acute inflammatory processes of these parts: sudden pain, followed by swelling of testicles and epididymis, dizziness, faintness, nausea, and vomiting. Even hemorrhages and discoloration of the parts may occur in extreme cases. It is necessary to differentiate these cases from incarcerated hernia.

Ectopia testis is the abnormal location of a testicle. Its normal situs it neither attains before nor after birth in such cases. *Ectopia cruralis*, *perinealis*, *scroto-femoralis*, are terms explaining their locations. In all cases of abnormal descensus inflammatory processes easily occur and malignant tumors also arise.

ACQUIRED DISEASES.

Injuries and Diseases of the Scrotum.

Contusions of the scrotum are not uncommon, and subcutaneous hemorrhages readily occur. Usually there is rapid absorption, but once in a while the hemorrhage remains circumscribed—*hæmatoma scroti*. In these cases the hemorrhage is between the tunicæ dartos and communis. Aspiration or incision under aseptic precautions should be advised. Usually all incised wounds heal rapidly.

Inflammatory processes of the scrotum are not usual—eczema, erysipelas, phlegmons, gangrene, are all met with, and must be treated as when they occur elsewhere on the body.

Neoplasms of the Scrotum.—Here elephantiasis, rather uncommon in this country, must be differentiated from an ordinary œdema of the scrotum, which is frequently seen in

connection with kidney and heart diseases. This elephantiasis scroti consists of a thickening of the scrotal cutis and subcutaneous tissue, and cell infiltration about and in the vessel-walls themselves. The lymph-vessels are usually enormously dilated, and the glands are enlarged.

True tumors of the scrotum are also met with: atheromata are common; dermoids occasional; lipoma and sarcoma but rare. Carcinoma scroti is met with in individuals handling coal-tar products. Usually chronic inflammatory processes of the skin exist previous to any carcinomatous changes, but prior to this warty excrescences with a hard base, excoriated and ragged surface, secreting a serous fluid, and apparently metastatic growths in the scrotum, appear. If recognized sufficiently early, the prognosis is fair. A radical operation, including the removal of the inguinal glands, gives good results.

DISEASES OF THE COVERINGS OF THE TESTICLES AND CORDS.

Injuries to the Coverings.

Hemorrhages into the loose connective tissue between the coverings of either cord or testicles are met with. The hæmatoma about the cords may reach fairly large dimensions, while those about the testicles are comparatively small and circumscribed. However, these may be found together, and the tumor-mass may reach large dimensions. Arising fairly suddenly after injury, spontaneous pain as well as tenderness along the cord and testicle may occur, and if the hemorrhage reaches the internal ring, may be mistaken for incarcerated hernia. These hemorrhages are *without* the serous space, although hemorrhages occurring *within* the tunica vaginalis propria are also seen. In these cases the blood remains fluid longer than in the previous cases. The prognosis is not so good, as the absorption cannot occur so readily. Consequently, in the intravaginal hæmatoma it is best, under aseptic precautions, to evacuate with a trocar in order to prevent hydrocele

and chronic inflammatory conditions. In both classes of cases the patient should be put to bed, the parts elevated, and an ice-bag placed on the swelling.

Inflammatory Diseases of the Coverings.

Acute inflammatory conditions of the coverings of the testicles (*hydrocele vaginalis acuta*) or of the cords (*hydrocele acuta funiculi spermatici*) are noticed after injuries to these parts and in acute infectious diseases; occur suddenly, with all the signs of inflammation and œdema of the skin; occasionally, this may pass into suppuration. The treatment consists of rest in bed; elevation of the parts; at first ice-packs; later, warm moist antiseptic applications, frequently changed. If no relief, aspiration; if suppuration, incision and drainage.

Chronic Inflammatory Diseases of the Coverings.—The chronic inflammation of the tunica vaginalis propria testis occurs on one or both sides, visceral and parietal, and is an exceedingly common condition. It occurs most frequently between the ages of fifteen and thirty years.

Hydrocele.

Definition.—This is the accumulation of serous fluid within the sac of the tunica vaginalis.

Etiology.—Hydrocele arises frequently without any apparent cause, and authorities without number insist that there is no evidence of any inflammatory disease either in the serous exudate or in the adjoining coverings. However, statistics show that traumatism takes part in a large number of cases, and that gonorrhœa exerts a great influence in this direction and must be regarded as an important cause. Other local conditions, as tumors, are often associated with it, and, besides, it is frequently found to be present at time of birth.

Varieties.—It is obligatory to distinguish between *hydrocele testis*—that is, if the exudate is confined to the testicular part of the tunica, while the tunica higher up is obliterated; then *hydrocele funicularis*, if the testicular tunica has obliterated, while the funicular part has remained open—and

hydrocele communis, if the exudate extends along the testicular and funicular space of the tunica; and, finally, *hydrocele communicans*, or *congenital hydrocele*, if the entire processus vaginalis has remained open, so that its space communicates with the free peritoneal cavity. *Hydrocele bilocularis* consists of two sacs: one intra-abdominal and the other extra-abdominal, communicating with each other. *Hydrocele multilocularis* consists of numerous cystic inclosures of exudates situated anywhere along the cord or testis.

Symptoms.—*Hydrocele communis* shows such characteristic symptoms that it can scarcely be mistaken for anything else; it usually develops slowly, without any pain or symptom, but is first noticeable on account of size and weight, which commences to drag on the adherent parts and thereby causes pain. The surface of the tumor is smooth, more or less tense, movable within the scrotum, and the overlying skin is tense and oftentimes shows dilated veins; the whole mass fluctuates. In the large majority of cases the testes and epididymis protrude into the fluid and can be palpated if the amount of fluid is not too large. There is a transparency to these cases that is almost positive. A tube should be held tightly against the tense skin, a light to the opposite side of the swelling, and then, by looking through the tube toward the source of light (*best in a darkened room*), the translucency can be noted. *If involving the tunica about the testis, the hydrocele is egg- or pear-shaped; if involving the tunica about the cord, most often small and spherical. In the case of hydrocele communicans* all the fluid in the sac can easily be made to pass into the abdominal cavity, or itself readily passes into this latter-named cavity; and, again, this fluid can be demonstrated to be free by placing the patient in different positions. If this cannot be shown, it must be a *hydrocele bilocularis*. In both cases the sac about the testis fills up when the patient stands up or coughs. Hydrocele may affect the condition of a patient. If large, it may prevent manual labor; cause disturbance in urination; and give rise to diseases of the scrotum, such as eczema.

Treatment.—In children, hydroceles have disappeared spon-

taneously, but this is rare. In congenital hydrocele the careful application of a truss has, by causing the obliteration of the processus vaginalis, given good results. The most simple procedure, both in children and in adults, is aspiration of the fluid with the aid of a trocar. After all aseptic precautions the tumor is grasped from behind, the skin of the anterior surface is held tense, and noting that the testicle is to the posterior part of the swelling, the trocar is, with a sudden move, thrust into the cavity in such a manner that the point does not pass through a vein of the skin or does not reach the testicle or the epididymis. The fluid is withdrawn. If the hydrocele persistently recurs, the procedure should be repeated, and one of the following fluids injected :

2 to 10 c.c. tincture of iodine.

$\frac{1}{2}$ to 1 gramme carbolic acid, with sufficient glycerine to keep it fluid.

5 to 10 c.c. absolute alcohol.

As the canula is withdrawn *the parts should be massaged, so that the irritating fluids may reach all parts of the tunica.* Iodine is very apt to be absorbed from the tunica, and has thus caused fatal poisoning. Carbolic acid closes the mouths of the lymphatics more readily and is not absorbed. Nevertheless, massage had best be done with the canula *in situ* and then the excess of fluid evacuated. Usually severe pains set in about these parts; swelling and temperature occur. In five to seven days usually all has passed over.

There are operative procedures which give more positive results. Opening, with a longitudinal incision, and irrigating the cavity between the layers of the tunica with a 5 per cent. carbolic acid solution ; suturing tunica vaginalis to integument, and packing cavity with gauze and dressing aseptically is Volkmann's operation. Von Bergmann advised a still more radical operation, in that the tunica vaginalis up to attachment of epididymis is extirpated and testicle dropped back into the scrotum and all hemorrhage carefully stopped and the skin then brought together.

Any form of hydrocele may become infected. Naturally, if it is a congenital hydrocele, fatal results may follow. The

others have a variable course. All must be treated surgically as soon as possible.

Hæmatocele.

Definition and Pathology.—This is regarded as a chronic inflammatory process due to traumatism or spontaneous hemorrhage, characterized histologically by the formation of connective tissue in the tunica vaginalis, and by hemorrhages into the wall and upon the surface. Consequently, the contents of such a condition, since the wall of the cavity may often be 1 to 2 cm. thick, vary, and may be hemorrhagic, serous, or serofibrinous.

Etiology and Symptoms.—Most often a hemorrhage follows immediately after a traumatism, and the tumor in the scrotum is at once noticeable, or the swelling first arises in the course of weeks or months. In the course of time pressure and pain develop. Fluctuation is not so readily elicited as in hydrocele; its consistency is usually harder, varies in different places, and is not transparent.

Prognosis and Treatment.—On account of the thickening of the tunica, in every case the sooner the condition is surgically treated, the better are the results. Longitudinal incision and removal of the thickened walls will be enough, as a rule. In other cases castration may become necessary.

Varicocele.

Definition.—This is regarded as an abnormal dilatation and lengthening of the veins of the pampiniform plexus and of the veins of the spermatic cord.

Etiology.—It is an exceedingly common condition, and occurs most frequently about the age of puberty. At this time statistics show that 25 cases in 1000 is about the ratio; again, the left side in about 80 per cent. of the cases; right side in 9 per cent.; and on both sides in about 11 per cent. of the cases. The left side is more often affected than the right, because the left spermatic vein empties into the left renal vein at a right instead of an oblique angle, has rarely a

valve, and hence has all the disadvantages possible in withstanding the pressure within the renal vein, which is higher than in any other veins of the body. In individuals who are obliged to stand a great deal the hydrostatic pressure apparently appears to be the direct cause. Again, there seems to be a predisposition in certain individuals with large scrotums and exceedingly thin-walled veins. In many cases it makes its appearance gradually, and in others suddenly, after traumatism or exertion. Different parts of the veins are apparently more affected than others. The veins in and immediately about the testicles are most often involved, although the enlargement may reach high up into the inguinal canal.

Symptoms.—The history most often shows that there is practically no pain in their development, although pains may arise after excessive exercise, especially during the heated season. These particular pains disappear with rest in the horizontal position. Occasionally these pains are of a dragging character, or even shooting, and pass upward into the inguinal canal, or even toward the lumbar region. They may be of a stinging or sharp character, noticeable during sexual excitement. When standing, oftentimes the peculiar, irregularly dilated and arranged strands appear through the thin skin of the scrotum, and in the light forms this condition disappears altogether when the patient assumes a horizontal position. In some cases hardened plates in the course of the veins are noticeable.

Differential Diagnosis.—Inguinal hernia and hydrocele communicans must occasionally be distinguished from it. The condition rarely improves by itself; it remains at a standstill by care not to overexert or absence of sexual excitement, and by the wearing of a tight and comfortably fitting suspensory bandage.

Treatment.—Whenever the venous circulation disturbs the normal condition of the scrotal skin, as these veins also enlarge, allowing readily of dermatoses, or when the pains become severe or the testicles atrophy, or if hypochondriasis sets in, one or all the indications are present for advising operative interference. Bandages of different styles, injec-

tions of alcohol into the venous convolutions, and subcutaneous suturing, which was formerly practised a great deal and still is advised, are best left undone.

If an operative step is necessary, an open operation is most advisable. A longitudinal incision, 3 to 6 cm. long, is made over the most prominent part of the swelling, dissection into the tunica, and ligation and resection of the varicosed veins, leaving intact the vas deferens, artery, and sufficient veins for a return circulation, and then apposition of the stumps and union of the skin in the usual manner are the steps. If the scrotum is very long, in order to shorten it the incision is often united transversely. Partial amputation of the scrotum has also been advised in these cases.

Injuries of the Testes and Epididymis.

Contusions to these parts are not uncommon. The scrotum usually, however, also shows signs. The testicles, epididymis, or both become enlarged, sometimes enormously so, and exceedingly painful. With patient in bed, elevation of the part, and ice-cold applications there is usually a diminution of the swelling. Anodynes are oftentimes required.

Dislocations of the testicles—"*luxatio testes*"—have been noted; when under the abdominal wall, they are called "*luxatio abdominalis.*" In recent cases the testicle can be replaced and the foregoing treatment instituted.

Inflammation of the Epididymis (Epididymitis).

Causes.—Inflammatory processes of the epididymis are much more common than those of the testes. Both may be involved at the same time, and are frequently accompanied by hydrocele. Traumatism may cause a distinct involvement of the epididymis, and, besides, metastatic inflammatory processes reaching the epididymis by way of the circulation occur. However, the most common epididymitis is the one due to some urethral pathological condition, wherein the infection travels along the vasa deferentia, reaching the epididymis in this way—*epididymitis urethralis.*

Acute and chronic inflammatory processes of the urethra—either specific or non-specific urethritis; strictures; prostatic hypertrophy; seminal vesiculitis; prostatitis; traumatism caused by instrumental examinations, and the passage of stones or fragments of stone through the urethra after litholapaxy; and catheterization and instrumental treatment of the urethra, etc., where germs are already present—as in aseptic handling bacteria *cannot* be introduced.

Symptoms.—Acute swellings of the epididymis occur, as a rule, after such causes. In as high as 5 to 10 per cent. of all patients suffering from urethritis this condition arises during some time of its course, but especially during the second or third week after the beginning of a urethritis, when the posterior urethra becomes involved, and appears suddenly with severe pain in the inguinal region, and later in the epididymis. Usually but one side is involved, probably the left oftener than the right; both may, however, be inflamed at the same time. This pain may reach the lumbar region or it may pass down the thigh on the side affected, but concentrates itself in the epididymis. The swelling and tenderness generally increase, so that in the course of from three to five days the height is usually reached. At this time the tumor may be the size of a large pea. In most of the cases the epididymis can be felt to be much enlarged, although the testes proper may at the same time not be affected. Fever, nausea, and even vomiting and restlessness may be present. At times symptoms of an acute posterior urethral involvement accompany these. The acute pains pass away in about from ten to fifteen days, and the swelling of the epididymis can be outlined with great ease.

An inflammation of the cord, "*funiculitis*," often occurs at the same time, and the mass which extends into the inguinal canal can readily be palpated, although often associated with great tenderness.

Treatment.—The rational management necessitates the alleviation of the cause. During the course of instrumental treatment it is often advisable to stop such procedures, although in cases of retention of urine, of hypertrophy of the prostate, or even in acute cystitis, catheterization must be persisted in.

In all cases of severity, however, the patient should be placed in bed, the testicles elevated, not allowing them to drag on the cord. This can be done by placing supports between the legs or by the aid of well-fitting T-bandages. In the incipient stages ice-cold applications, frequently changed, are of help, but after the swelling has existed for a few days hot boric acid fomentations, frequently repeated, will give quickest relief and cause the swelling to diminish most rapidly. Abortive remedies, such as blistering the scrotum and giving wine of antimony internally, have been abandoned. The application of adhesive plaster in the early stages scarcely warrants a trial, although this is highly recommended and still advised. The method consists of applying an adhesive-plaster strip above the swollen testicle, then longitudinal strips, and finally transverse strips, in order to cause compression. In most cases considerable pain follows, and the bandages must be removed. This process must be repeated frequently in order to gain any result.

If in the course of a urethritis the pain is not too severe, the treatment of the urethritis, during which the testicle may have become swollen, may be continued. This consists of irrigations according to the method of either Diday or Janet. In all cases the urine should be rendered as bland as possible, erections avoided, and frequent urination allayed.

The following formulas will be found of value:

℞ Potassii bromidi, 25.00 grammes;
Potassii citratis, 15.00 "
Codein. phosphatis, 0.25 gramme;
Tinct. hyoscyami, 30.00 grammes;
Elix. simplicis, 30.00 "
Aquæ camphor., q. s. ad 250.00 "
M. & Sig.—One tablespoonful every four hours.

Oftentimes there is a prostatitis or spermato-cystitis, and these, as well as any other complication, must receive attention:

℞ Ext. hyoscyami, 0.30 gramme;
Morphin. sulph., 0.15 "
Ichthyolis, 3.00 grammes;
Olei theobrom., q. s.
M. Ft. in sup. rect. No. x.
Sig.—Insert one suppository every eight hours.

In the acute stages sitz-baths, depletion of the pelvis, and, if hydrocele persists, applications of tincture of iodine or aspiration; internally the following prescription may be used:

℞ Potassii iodidi, 15.00 grammes;
Potassii citratis, 10.00 "
Syrup. aurant. flor., 30.00 "
Aquæ aurant. q. s. ad 120.00 "
M. & Sig.—One teaspoonful with water every three hours.

In the more chronic forms counter-irritation and resolvents may be applied.

℞ Potassii iodidi, 3.0 grammes;
Iodi puri, 0.3 gramme;
Ext. belladonnæ, 0.3 "
Ung. simplicis, 30.0 grammes.
M. Ft. ung.
Sig.—Apply twice a day.

In all these conditions a tightly fitting suspensory, giving support to the part, should be worn. That of the Zeissl-Langelbert pattern is serviceable. Massage and moist applications, especially at night, should be carried out for months after the acute attack. In most cases obliteration of the vas occurs, hence no secretion from the involved testicle reaches the seminal vesicles, and an oligospermia is the outcome. If obliteration occurs on both sides, complete absence of spermatozoa (azoöspermia) is seen, necessarily causing sterility. In chronic recurrent cases of epididymitis removal of the entire involved part is to be advised.

Inflammation of the Testes (Orchitis).

Etiology.—This is practically due to the same causes as epididymitis. The metastatic forms are more frequent. In parotitis it is not uncommon for orchitis to exist as a complication, besides being seen occasionally during typhoid fever or any other acute bacterial disease. Individuals of gouty diathesis are also affected.

Symptoms.—In palpating the testis it is to be differentiated from the epididymis; if this is not readily done, then a periorchitis is present. The pain is just as severe usually, and the other symptoms resemble those of epididymitis to such an extent that it becomes unnecessary to repeat them here. The outcome is, however, somewhat different. Once in a while gangrene may result; suppurative processes also are probably somewhat more common, and, besides, atrophy of the testicles is not at all unusual.

Treatment.—This is practically the same, except that in those of rheumatic diathesis large doses of salicylate of sodium may give relief. If gangrene or septic processes set in, surgical treatment must eventually be instituted. These same conditions may also be noticed in cases of epididymitis.

Fungus testis is the protrusion of testicular substance from an opening through the integument, caused occasionally by the rupturing of the tunica propria which had become adherent to the skin. The remaining part of the testicle can sometimes be saved, but in most cases it is necessary to remove the testicle by surgical procedure.

Tuberculosis of the Testis and Epididymis.

Etiology.—Tuberculosis of the testis or epididymis, most often in the latter, may arise in individuals otherwise perfectly healthy and free from any other tuberculous processes elsewhere in the body. In a large number of cases it is distinctly metastatic, as from pulmonary processes. It may arise also as a descending pathological process when the primary focus is in the kidney or prostate. It may be the starting-point for the ascending affection involving the urogenital structures. There

can be no question whatsoever that a predisposition for the primary beginning in the testicle is a traumatism or some inflammatory process which causes a *locus minoris resistentiæ.* It occurs most often in youth and early manhood, and practically always attacks the epididymis first.

Symptoms.—It characterizes itself by fairly rapid formation of numerous hard nodules in both the head and tail of the epididymis; most frequently with but little pain, so that the patient does not have his attention immediately attracted to his condition. Within from five to ten weeks the nodules may become the size of a walnut, and adherent to the integument, and then readily open spontaneously, from which a cheesy, seropurulent discharge flows, sometimes for an indefinite time. It may occur without any rise in temperature, although a slight anæmia may result. In 65 per cent. of cases the other testicle becomes involved. Whenever the process has existed for any length of time, the testis proper becomes affected—certainly the vas deferens, etc., if it is an ascending process.

Prognosis.—This depends partly on whether or not other parts are involved. If they are, it is unfavorable. In the primary cases it depends on the treatment.

Treatment.—Castration is the radical treatment, and it certainly gives the best results. Nevertheless it must not be advised in a reckless manner, as in the cases of double-sided tuberculous epididymitis it would mean the removal of two organs having important functions. Hence the more conservative procedures are to be advised; if only the epididymis is involved, a resection of the diseased part is to be undertaken. If a sinus remains after a rupture of a tuberculous abscess, and especially if there is present an involvement of other parts, curettement and local treatment are desirable, with—

℞	Guaiacoli,	5.00 grammes;
	Ext. belladonnæ,	0.25 gramme;
	Ung. simplicis,	25.00 grammes.

General dietetic and hygienic treatment are imperative, together with removal to a suitable climate when possible.

Syphilis of the Testis and Epididymis.

Etiology.—In acquired syphilis the testis may be affected either during the secondary or more often in the tertiary period. Syphilitic deposits may also be seen in hereditary syphilis. Traumatism appears to predispose, as direct connection with it has often been demonstrated.

Symptoms.—Syphilis, in contradistinction to tuberculosis, affects the testis most frequently. A diffuse swelling, usually in one or both testicles, rarely causing an unevenness, is to be felt, and begins to show itself with almost complete absence of pain; but if there is pain, it is due more to the traction and tension on the cord on account of the increased size and weight. No constitutional symptoms are necessarily present. The swelling disappears by degrees, owing to an interstitial process, and the testicle may gradually atrophy; or the swelling may increase in size and rupture spontaneously, and a serum-like fluid escape, leaving a funnel-shaped ulcer with undermined edges. This gradually fills up with testicular substance and becomes covered with granulations—referred to as *fungus benignus syphiliticus.*

It is almost needless to state that the syphilitic process may involve the epididymis.

Diagnosis.—It is to be remembered that the epididymis is distinctly and easily palpated from the testis. Besides, the cord is unaffected. The testis may attain the size of an orange, and as the parenchyma may be unequally involved, the surface may be uneven. It is to be differentiated from a chronic epididymitis, tuberculous processes, and tumors.

Prognosis and Treatment.—If it is recognized early and proper treatment instituted, there must practically be complete absorption. If first seen after gummatous breaking down and the establishment of a sinus, it is often best to curette and pack with iodoform gauze, or to apply mercurial ointment and institute energetic antisyphilitic treatment.

Cysts of the Testis and Epididymis.

Varieties.—One of the most common tumors found in this location are the cysts (the *hydatids of Morgagni*), situated at the upper pole of the testis and just below the head of the epididymis. The most important cyst, however, is the collection of the secretion of the testis, called *spermatocele.* It probably consists of a dilatation of a part of the vasa efferentia, and hence is a retention of the testicular fluid.

Symptoms.—In most cases the cysts may readily be palpated from both testes and epididymis, and are usually spherical or oval in shape. They have a peculiar doughy consistency. Aspiration of the contents is indicated, and if microscopical examination reveals the presence of spermatozoa, the diagnosis is confirmed.

Treatment.—Extirpation of the sac, no matter what the kind of cyst may be.

Neoplasms of the Testis and Epididymis.

Varieties and Symptoms.—These are not uncommon, and there is scarcely an organ in the body that can claim a greater variety.

Those derived from the epithelia, or *carcinomatous* tumors, are not rare. Both *medullary* and *scirrhus* types are met with. The former is more common, and takes quite a rapid growth. As soon as the tunica becomes involved, an uneven and fairly hard, nodulated condition is first noticed. Pains arise only when there is a rapid increase in size and when the inguinal glands become involved. The epididymis does not become involved quickly, and neither are inflammatory processes noticeable. *Adenomata* have also been observed. Castration is necessary in these cases.

Dermoids and *teratomata* have also been recorded. These embryonal tumors are, however, comparatively benign. Excision, or in certain cases castration, becomes necessary.

The tumors derived from the connective tissue are the *fibroma*, *myoma*, *enchondroma*, *lipoma*, and *myxoma*, and, most important of all, *sarcoma.* They are primary on one

or both sides, either in the testis or epididymis, and are most common in childhood. They grow rapidly, usually without pain. They rupture spontaneously, and the *fungus malignus* is thus produced. As it grows the consistency becomes softer, and *cystosarcoma* may give rise to various findings.

Carcinoma is usually found in the later years of life. Whenever the cord and the inguinal glands become involved, the diagnosis may readily be made.

Prognosis is unfavorable.

Treatment must be radical extirpation.

DIFFERENTIAL DIAGNOSIS OF TUMORS OF THE TESTIS.

	Syphilitic Testis.	*Tuberculous Testis.*	*Malignant Neoplasms.*
History	Syphilitic.	Tuberculous.	(Traumatic.)
Commencement	Testis most often.	Epididymis most often.	Testis.
Growth	Slow.	As a rule, quite slow; may be acute exacerbations.	Usually rapid, though may lie dormant for long time.
Pain and tenderness	Almost always absent.	But slight.	At beginning absent; later sharp and shooting.
Size and contour	Size of a pear. May atrophy; then usually hard. Epididymis free.	Epididymis irregularly enlarged, nodulated. Sinus may exist.	Frequently of large size, nodulated tunica, fungus growth.
Number	At first one; later the other.	Consecutive involvement.	Usually single.
Complications	Hydrocele often present. Inguinal glands not involved. Seminal vesicles and cord and prostate gland not involved. General adenopathy may be present.	Hydrocele is occasionally present. Inguinal glands may be acutely involved. Seminal vesicles and cord and prostate gland usually involved.	Unusual to have hydrocele. Inguinal glands always become enlarged. Seminal vesicles and prostate not involved. Often cord is involved.
Medicinal treatment	Reacts to antisyphilitic treatment.	Sometimes good results from general tonics.	No effect.

Castration.

The **indications** for castration are easily included in the following: malignant tumors, benign tumors if the size causes inconvenience, tuberculosis, certain forms of syphilis, injuries with or without gangrene, and septic processes of the testes.

Technic.—(1) It is usually sufficient to make an incision

over the most prominent part of the tumor, through the skin, tunica dartos, and coverings of the testis. Remove the testicle and ligate the cord and vessels as high as possible. After all hemorrhage has been checked unite the skin. If the skin is attached to any process, it is best to remove it. If tuberculosis of cord or malignant tumors are present, incision should be made to reach the parts passing through the inguinal canal. The entire cord should be removed either through the incision or with the aid of the Zuckerkandl incision of the perineum.

(2) Another very simple method of castration is to make an incision centred over the superficial abdominal ring, and extending downward parallel with the cord. Deep dissection must aim to reach the cord, which is then isolated by blunt separation. Traction upward on the cord will now shell the testis out of the scrotum. The vas deferens must be separated from the remainder of the cord and divulsed out of the abdominal cavity by traction downward. The cord is then doubly ligated and cut across between the ligatures. The stump is pushed into the inguinal canal, and the pillars stitched together to avoid rupture.

Neurosis of the Testicle.

Varieties.—Neurosis of the testicle may be either an extreme irritability or an actual neuralgia.

Symptoms.—The irritability manifests itself in the occurrence of dull pains during physical exercise or sexual excitement. It results, sometimes, in a spasm of the cremaster muscle, so that the testicle is drawn high up toward the abdominal ring and presses around it tightly, adding to the discomfort of the patient. During and after intercourse the testicle becomes the seat of dull pain, which lasts for some time. The actual neuralgia appears in attacks which take place at more or less regular intervals. Previous to the attacks, and during their occurrence, the bladder, as a rule, is highly irritated.

The **causes** of these conditions are either sexual excesses

and undue stimulation, or they are the consequences of excessive masturbation. Sometimes neuralgia appears in the course of an old malarial infection. General neurasthenia or organic diseases of the spinal cord may produce localized symptoms in the testicles.

The **treatment** will, at first, remove any evident cause. Sexual intercourse, and particularly masturbation, must be avoided. If posterior urethritis or prostatitis is present, these conditions must be properly attended to. Malaria calls for the specific treatment of this disease. General neurasthenia must be treated by the administration of tonics and hydropathic measures. A faradic current is quite often used to good advantage.

QUESTIONS ON THE INJURIES AND DISEASES OF THE SCROTUM, TESTICLES, CORDS, AND THEIR COVERINGS.

Enumerate the congenital anomalies of the testicles.
What is retentio testis?
What is monorchismus? cryptorchidism?
Are individuals of the latter type sterile?
Describe the condition of retention of the testicles.
What are often the results in these cases? What is the treatment?
What is meant by orchidopexy?
What is meant by inversio testis?
What is meant by ectopia testis?
What is meant by hæmatoma scroti?
Do neoplasms of the scrotum ever occur? Enumerate them.
What is their treatment?
What is meant by a hæmatoma of the coverings of cord or testicle? What different types are there? What is their treatment?
What is meant by acute hydrocele? by chronic hydrocele?
What are their causes? Describe their different varieties, as funicularis, communis, communicans, bilocularis, and multilocularis.
What are the symptoms of these different varieties?
What is the prognosis?
What is their treatment? Give the latter in detail for all the different varieties.
What is varicocele?
What do you know about varicocele?
How is the diagnosis made?
From what must the condition be differentiated?
To what condition may varicocele lead?
What is the treatment?
Describe the operation for varicocele.
Are injuries to the external genitalia common?
What is meant by dislocation of the testicle?
What is epididymitis?

In what different ways may this arise? Is this a common complication of urethritis? How do you account for this?
What are the symptoms?
What is meant by funiculitis?
From what must this condition be differentiated?
What is the treatment? Describe in detail the different modes.
If complicated with a urethritis, should the local treatment of the urethritis be discontinued?
If chronic and recurrent, what course may be necessary to take?
What is meant by orchitis? What are the causes? Is it often complicated with epididymitis?
In the course of what general disease does it occur as a complication?
What is the treatment?
What is meant by fungus testis?
How is this condition treated?
Does tuberculosis of the testicle or epididymis ever occur?
In what manner may it arise?
How is the diagnosis made?
What is the prognosis?
What is the treatment?
What is meant by castration? Describe the operation?
Does syphilis of the testicle or epididymis ever occur?
Which is most commonly affected?
How is the diagnosis made?
What is the prognosis?
What is the treatment?
Enumerate the different tumors of the testis and epididymis.
Are the varieties of neoplasm of these organs very numerous?
Describe the more common varieties.
How is the differential diagnosis of the different neoplasms made?
What is their prognosis?
Describe in detail the differential diagnosis of syphilis, tuberculosis, and malignant neoplasms of these organs.
What is meant by neurosis of the testicles?
Describe such a condition.
On what can a diagnosis positively be established?
What is the treatment?

MALFORMATIONS, INJURIES, AND DISEASES OF THE BLADDER.

Ectopia Vesicæ.

Pathology and Symptoms.—This is a congenital malformation, in which the anterior abdominal and vesical walls are absent, and where the posterior wall and fundus protrude through the abdominal opening. It is called also exstrophy of the bladder. At the same time union of the symphysis pubis and external genitalia exists. The condition presents a characteristic appearance: The mucous membrane is ex-

posed and appears irritated, and on close examination the urethral openings may be seen.

Treatment.—Various operations have been devised for the relief of this condition. All are attempts either at direct union of the edges, plastic, or to deviate the course of the urine. Maydl's operation is probably the most successful. It consists of transplanting the ureters with the bladder mucosa about the ureteral openings into the rectum. All such operations are grave and often fail.

Entire absence of the bladder has been noted. **Double bladder**, or **vesica duplex**, has also been reported. **Multiple bladders**, so called, are probably sacculated conditions of the bladder.

Hernia of the Bladder.

Varieties.—This is a not uncommon condition, and is *occasionally noticed during hernia operations.* The anterior or one of the lateral walls which are uncovered by the peritoneum protrude into the inguinal canal. If this prolapse becomes larger, then a certain amount of peritoneum is pushed into the canal and the bladder follows; this, then, is regarded as a true hernia of the bladder; in other words, hernia of the bladder may be either *extraperitoneal* or *intraperitoneal*, or a combination of these two. These types have also all been referred to as cystocele.

Causes.—Among these, strictures and prostatic hypertrophy must be considered, especially as these cause abnormal distention of the bladder with residual urine. With weakened muscular walls, repeated holding of the urine, or overdistending the bladder may give rise to these conditions.

Symptoms.—These naturally refer to abnormalities in the act of urination. The patients must often place themselves in peculiar positions in order to urinate: most frequently always exactly in the same position, and must even exert pressure on the hernia in order to aid urination. *If associated with an omental or intestinal hernia, if of any size, differentiation can often be made by the aid of palpation and percussion, and, most important of all, with the catheter, because evacuation*

of the bladder will decrease the size of the hernial protrusion. If it is possible to make a diagnosis of this condition, or if met with, or even if the bladder is accidentally injured during an operation, the radical operation is to be advised. A suprapubic incision is made, resection of the affected area, careful suturing of entire bladder-wall. Small gauze drain in prevesicular space and a permanent catheter placed in the urethra.

Cystocele Vaginalis.

Symptoms.—This is a prolapse of the bladder, or a part of it, toward the vagina. It occasionally occurs after labor, and also in cases of prolapse of the uterus. In some cases it may be so severe that the urethra is higher than the bladder.

Treatment.—The cause demands removal, and often plastic restoration of the anterior vaginal wall will be found necessary.

Injuries to the Bladder.

Etiology.—These may occur during instrumentation, as during a litholapaxy, cystoscopy, or even catheterization, etc. Rupture of the bladder occurs, however, more readily when the bladder is full than when empty, because a blow may then act directly on the bladder, extending over the symphysis pubis. Injuries to the pelvis, especially fracture of the pelvis, are frequently associated with rupture of the bladder. They occur most frequently in men—nine out of ten cases. For practical purposes these injuries are divided into two classes: (1) *Intraperitoneal rupture* is more common,—two out of three cases,—and occurs most frequently on the posterior wall or apex. (2) *Extraperitoneal rupture* is found most often in the anterior wall.

Symptoms and Diagnosis.—As regards the immediate diagnosis of rupture of the bladder, this is not always an easy matter. Besides, to differentiate absolutely between extraperitoneal and intraperitoneal, or a combination of both, is also difficult. As these cases are frequently observed in the intoxicated, and also as shock often accompanies rupture, the

subjective symptoms are delayed until either or both of these conditions pass, and tenesmus usually follows. This is accompanied by an inability to pass urine, although small quantities of blood or of bloody urine may be passed. At the same time severe pains about the entire bladder region and the perineum are almost constant. Excessive tenderness about these parts is also usually present. Occasionally, when the rupture is extraperitoneal, a tumor above the pubes may be felt.

If a positive diagnosis of rupture of the bladder can be made without the use of the catheter, this method is to be preferred. If, however, this becomes necessary, the catheter should be passed under the strictest aseptic precautions. When the eye of the instrument is in the bladder, no urine is withdrawn, as the bladder is collapsed. If the catheter is manipulated, bloody urine containing débris may be drawn off. This is accounted for by the fact that the eye of the catheter passed through the opening and entered either the abdominal cavity or the prevesicular space. If the rupture be extraperitoneal, symptoms of urinary infiltration immediately arise. In about from twenty-four to forty-eight hours, if the rupture is intraperitoneal, symptoms of peritonitis begin to appear.

Rarely does a bladder rupture during an intravesicular operative procedure, although this has been known to occur. In these cases the distended bladder, which was readily seen and felt above the pubes, suddenly decreases in size, disappears, and can no longer be felt. Besides, a catheter introduced into the bladder no longer withdraws fluid.

Prognosis.—It is needless to state that the earlier the diagnosis and the sooner treatment is instituted, the more favorable is the prognosis.

The **treatment**, naturally, must be surgical, with the purpose of preventing peritonitis and urinary infiltration. With the patient in the Trendelenburg position, an incision from 4 to 6 cm. long is made in the median line, above the pubes. Care should be taken to avoid the peritoneum. *When the rupture is found, the bladder should be explored thoroughly with the finger, to note the absence of any other tear.* In some cases the

bladder can be closed in two layers, drainage instituted in the prevesical space, and a permanent catheter introduced and allowed to remain in the urethra. If the rupture is not found in the anterior or the lateral walls, laparotomy should be performed. The part of the bladder covered by the peritoneum is examined, and when the tear is found, it should be united in layers. Of course, the abdominal cavity is carefully cleansed and drainage is allowed to remain. Many deviations in technique are necessary, as each case differs from all others.

Fistula of the Bladder.

False passages connecting the bladder with the abdominal wall, rectum, and vagina are not uncommon. These occur occasionally during the course of chronic inflammatory diseases, and are also made artificially. Whenever it becomes necessary to close the fistula, operative procedures varying with the different cases should be employed.

Cystitis.

Cystitis is an inflammation of the bladder-wall which may be confined to the mucous membrane or involve the submucous layers, and eventually spread into the muscular coat. If the inflammation passes into the connective tissues which surround the viscus, we speak of **pericystitis.**

Causes.—While in very rare instances a slight inflammation of the bladder may be produced by chemical influence, there is no doubt that in an overwhelming majority of cases of cystitis the origin is bacterial. There is scarcely one of the pathological germs which cannot produce cystitis. The condition is most frequently caused by the gonococcus, bacillus coli communis, bacillus typhosus, urobacillus liquefaciens septicus, the various pyogenic staphylococci and streptococci, and the bacillus tuberculosis. Retention of urine; internal medication with oils, cantharides, etc.; tumors; calculi; traumatism; or colds are the predisposing influences for the inflammatory action of the microbes which may be present in the urethra, ureter, or neighboring parts.

The **symptoms of acute cystitis** are sensations of heaviness and fulness, eventually of pain in the bladder. The desire for urination is greatly increased, but the act of micturition brings no relief, and but small quantities are passed at each act. This continues both day and night. An occasional chill followed by quite high temperature for some time are not unusual.

The urine is turbid, and usually contains a large number of pus-cells, and in very acute cases even red blood-corpuscles. The urine becomes alkaline only in cases complicated with pyelitis, or if, by the influence of certain bacteria, ammoniacal decomposition of the urine sets in.

Gonorrhœal cystitis is characterized by a peculiar distribution of the infected areas. The inflammation confines itself to the trigonum, which appears to be spotted with red patches.

Colicystitis involves the mucous membrane more or less universally, so that the epithelial lining is thrown off in quite extensive areas, causing the inner wall of the bladder to resemble red velvet.

The *bacillus tuberculosis*, as a rule, confines its action to the trigonum, and gives rise to the formation of small grayish nodules in the mucous membrane which eventually ulcerate, thus forming tuberculous ulcers. Tuberculous cystitis is, as a rule, a very painful affection. The bladder especially is extremely sensitive to dilatation and to any kind of instrumentation; tenesmus, and often slight hemorrhages, may exist. The urine is usually acid. Whenever there is a general cystitis, as caused by the pyogenic staphylococci and streptococci, a slight œdema of the mucosa may be seen. Later desquamation of the epithelial cells and the formation of pus are manifest. This process may be diffuse over the entire inner surface of the bladder, and ecchymoses may be distributed irregularly throughout the entire affected area. The enlarged vessels are very noticeable, especially within the trigonum. As regards the quantity of pus and albumin, the quantity of the latter can be accounted for in the manner already described.

Chronic Cystitis.—Here the subjective symptoms are less-

ened, while the pathological changes become more and more extensive and grave. The urine becomes turbid, and if, in consequence of some noxæ, the process flares up,—which usually occurs repeatedly,—the amount of pus in the urine increases.

In cases of *gonorrhœal cystitis*, if the process becomes chronic, the original red color of the inflamed areas turns gradually to a dark brown. Quite often the infiltration intrudes into the submucous layers, so that elevated plaques are to be seen, whose centres occasionally suppurate; in this way gonorrhœal ulcers are produced.

If a *colicystitis* becomes chronic, the inflamed mucosa assumes more and more the character of a granulating surface. If such cases of cystitis are neglected, ulcers, which may be found all over the inner wall of the bladder, are not uncommonly formed. If the inflammation involves the submucous layers to a great extent, the so-called *parenchymatous cystitis* develops, and the bladder-wall becomes thickened, sensitive, and rigid. In its higher development this condition leads to the establishment of *cystitis dolorosa*, in which the bladder becomes contracted, so that even the smallest amount of fluid cannot be retained. Every drop of fluid is expressed through contraction of the bladder, and these contractions are extremely painful. The bladder is continually the seat of excruciating pains, and the whole region is extremely sensitive to the touch.

Whenever a posterior urethritis exists, the bladder mucosa immediately adjoining the internal urethral orifice becomes almost certainly affected by extension of the process from the posterior urethra. In these cases it is the trigonum which is chiefly involved; this condition has been called *cystitis colli—inflammation of the neck of the bladder.* Anatomically, no neck exists, hence the term is incorrect, and Finger introduced the term *urethrocystitis*, which is to be used in the class of cases referred to. It occurs during the course of an acute or chronic urethritis, and excesses of all kinds are known to be the most important factors in these cases.

In cases of cystitis the urine will be found to be turbid

with pus; hence the Thompson two-glass method shows the urine to be turbid in both glasses. In all cases it is necessary to establish whether or not the pathological findings of the urine are due entirely to the bladder affections or whether admixed with substances from the ureters, pelves, or kidneys.

Treatment.—The treatment in acute cases of cystitis will restrict itself to general measures and symptomatic applications: practically, rest, diet, depletion of pelvis, baths, and medicinal treatment are necessary. The patient is put on a bland diet, and alcoholic beverages are strictly prohibited; laxatives, rest in bed, and hip-baths are ordered. As a rule, hot poultices over the pubes and perineum reduce the pain and lessen the frequency of urination.

The *medicinal treatment* separates itself into two divisions:

I. Internal Medication.—Most important are the anodynes, which are absolutely necessary on account of the symptoms. The indications are pain, frequency of urination, and tenesmus. Whenever a case of cystitis presents itself, in order to make any progress these symptoms must be relieved, as the pain, the frequent urination, and the tenesmus tend only to increase the trouble. As much anodyne should be given as is necessary to overcome the symptoms. Sometimes as much as 0.25 gramme of morphine or 0.5 gramme of codein may be required daily, both in divided doses. In prescribing an anodyne, a small dose should first be given to ascertain whether the patient has an idiosyncrasy for the drug. If this is not enough to overcome the pain, etc., and no idiosyncrasy presents itself, then increase as necessity demands.

Opiates and anodynes are given either internally or by the rectum. If the latter, some formula like the following is very useful:

℞ Ext. opii, 0.25 gramme;
Ext. belladonnæ, 0.10 "
Ichthyolis, 2.50 grammes;
Butyri cocæ, q. s.
M. Ft. in suppos. rect. No. x.
Sig.—One every three or four hours.

Opium is frequently sufficient, but morphine should be given at once if opium has no immediate effect.

℞ Decoct. seminis lini, 500.0 grammes;
Tinct. opii, 1.0–2.0 "
Aquæ laurocerasi, 15.0 "
Sig.—One tablespoonful every one to two hours.

℞ Fol. uvæ ursi,
Fol. buchu, āā 30.0 grammes.
Add a pint of boiling water to a tablespoonful of the foregoing tea, let it stand for a while, and then strain; a cupful every hour should be ordered.

℞ Liq. potassii, 10.0 grammes;
Tinct. hyoscyami, 20.0 "
Syr. acaciæ, q. s. ad 90.0 "
Sig.—A teaspoonful every two to three hours, well diluted with water.

In some cases there may be severe hemorrhages. If such a condition exists, it must be taken into consideration. The following may then be of service:

℞ Liq. ferri sesquichlor., 1.0 grammes;
Aquæ destillatæ, 150.0 "
Syr. corticis aurantii, 25.0 "
Sig.—One tablespoonful every hour. Take with water.

Fluid extract of ergot and hydrastis may readily be added to the preceding.

Erections and other symptoms must be treated accordingly.

℞ Ext. cannabis indicæ,
Ext. hyoscyami, āā 0.3 gramme;
Sacch. lactis, 3.0 grammes.
Div. in pulv. No. x.
Sig.—One every three hours.

℞ Acidi camphorici,
Sacch. alb., āā 2.0 grammes.
Div. in caps. No. x.
Sig.—One every four hours.

The urine is usually acid and of high specific gravity; but when the urine is alkaline, alkaline diuretics should rarely be given. Where phosphaturia exists, urotropin, salol, aminoform, and cystogen are given in order to cause the urine to become acid. Sodium salicylate, in 1-gramme doses, given four or five times daily, has a tendency to render it acid.

II. Local Treatment.—This is omitted during acute attacks, and should be instituted only when complicated with retention of urine. Then catheterization under aseptic conditions and irrigation with mild solutions, as warm saturated solution of boric acid, are necessary.

In the subacute stages the injection of from 5 to 15 c.c. of a 10 per cent. iodoform emulsion affords relief from the pain and has a healing effect upon the inflamed mucosa.

Formulæ like the following are reliable :

℞ Orthoformi, 5.0 grammes;
Iodoformi, 10.0 "
Ol. olivæ, 100.0 "
Sig.—Shake and use 5 to 15 c.c.

℞ Orthoformi, 5.0 grammes;
Iodoformi, 10.0 "
Gummi tragacanthæ, 1.0 gramme;
Glycerini, q. s. ad 100.0 grammes.
Sig.—Shake and use from 5 to 15 c.c.

In irrigating the bladder, the kind of catheter to be used and the technique of flushing depend upon the cause. If it is a case of hypertrophy of the prostate, a large (22 Ch.) catheter may be used; if following a posterior urethritis, usually a small catheter, etc.

If strictures, stones, or tumors are present, these must be

treated as are the causes before any reasonable hope of curing the inflammation can be had.

In **chronic cases** local therapy is the most important. The bladder is irrigated with a 3 per cent. boric acid solution. This is followed later by a 1 : 5000 permanganate of potassium solution, or eventually by flushing out with a 1 : 10,000 silver nitrate solution. Both may be gradually increased to 1 : 1000. In very stubborn cases, or in cases of granulating cystitis, instillation must be resorted to, and a few drops of a 2 to 5 per cent. silver nitrate solution applied with the Guyon instillator.

Ulcers of the bladder are curetted and cauterized by the aid of the operative cystoscope.

Parenchymatous cystitis and **cystitis dolorosa** call for permanent drainage and rest of the bladder by establishing a perineal or suprapubic fistula, and by inserting a drainage-tube into it, so that the bladder may be regularly flushed out with antiseptic solutions, and also put at physiological rest by allowing no urine to collect in it.

DIFFERENTIAL DIAGNOSIS BETWEEN ACUTE ANTERIOR AND POSTERIOR URETHRITIS AND URETHROCYSTITIS.

Disease.	*Acute Anterior Urethritis.*	*Acute Posterior Urethritis.*	*Acute or Chronic Urethrocystitis.*
Two-glass method.	1. Turbid. 2. Clear.	1. Turbid. 2. Turbid or clear.	1. Turbid. 2. Turbid.
Jadassohn irrigation method.	Clear.	Turbid or clear or specks.	Turbid.
Reaction.	Acid.	Acid.	Acid, often alkaline.
Albumin.	Negative.	Negative. Occasionally a slight trace.	Usually positive.
Microscopic.	Second-glass sediment negative.	Pus-cells. Few epithelial cells.	Pus-cells. Epithelia of bladder and posterior urethra of various shapes.
Bacterial.	Gonococci.	Gonococci.	Rarely gonococci, but often streptococci.

1 = first glass of the Thompson two-glass test.
2 = second glass of the Thompson two-glass test.

Hypertrophy of the Bladder.

This is caused by a chronic cystitis, and is readily diagnosticated. Examination with a sound gives this impression

to the sense of touch. The bimanual examination reveals the tumor-like mass. In these cases of concentric hypertrophy the capacity of the bladder is usually *decreased*, and but a small quantity of retention is found. It is impossible to inject large quantities of fluid on account of causing severe pain.

Neoplasms of the Bladder.

Tumors of the bladder are either *primary*—by which is meant that they develop from the bladder—or *secondary*, either derived by direct extension from neighboring organs, as from the prostate gland, or are *metastatic*. The latter two varieties are most often malignant in character.

Tumors in the bladder may be either *benign* or *malignant*. The former are *fibromata*, or, in rare instances, *myomata* or *angiomata*. Once in a while *cysts* may be observed, which may be either simple cysts or dermoids.

Benign Tumors.

The most common of these are *papillomata—fibroma papillare*. These are villous excrescences which float around in the bladder fluid, resembling in their appearance certain kinds of sea-weed. Although not malignant, they show a marked tendency to recurrence. They may cover the larger or even the entire surface of the bladder, and are found especially in the fundus, and then within the trigonum ; or they appear as one large growth, overshadowing, mushroom-like, on a single pedicle. In rare instances these papillomatous growths do not show any signs of malignancy in their free part, while the base is cancerous.

Malignant Tumors.

Varieties.—Those observed in the bladder are cancroids, sarcomata, and myxomata. These malignant tumors have a tendency to ulcerate on their surface, thus producing cystitis and hæmaturia. Once in a while malignant tumors appear in the bladder as secondary growths in consequence of the bladder-wall being involved in malignant tumors of adjacent organs,

especially as an extension from the uterus. The most common form of carcinoma of the bladder, and that having the worst prognosis, is the scirrhus. This readily affects neighboring organs, and pyelitis and nephritis, with accompanying cachexia, rapidly set in. All in all, there are more males than females attacked with tumors of the bladder. They occur at all ages, but rather uncommonly before the thirtieth year.

The **subjective symptoms** of tumor of the bladder are a constant sensation of heaviness in this region, which sensation is considerably increased during the night, on account of the congestion produced through the bed-warmth. Tumors about the ureteral opening may cause compression of the ureters and hydronephrosis. Papillomata situated near the bladder neck are likely to produce pains in the perineum, with a permanent desire for urinating. Malignant growths quite often cause lightning pains which radiate into the penis.

Objective symptoms are frequent hemorrhage, without any previous mechanical interference; that is often the first and characteristic symptom of tumor. The recurrence and continuance of the hemorrhage are the peculiar characteristics of bleeding from tumors. This manner of occurrence is almost pathognomonic of tumors. In case of malignant tumors, where cystitis sets in, it is most often of ammoniacal type, and in the course of ulceration capillaries are eroded; hence the blood is mixed with the ammoniacal urine. Malignant growths generally produce cachexia. In very favorable cases large tumors of the bladder may even be palpated by bimanual examination.

The **diagnosis** is made certain if we find tumor particles in the urine or discover the mass by digital examination through a perineal opening or by cystoscopy. The latter method may be used practically in all cases, and the diagnosis be thus made. Examination with sounds is *not* to be recommended.

The **treatment** of all tumors may be an operative one only. *Benign tumors* may be removed by the caustic snare of the operation cystoscope, while in the case of *malignant tumors* a radical extirpation must be performed after access is gained by suprapubic cystotomy. Whenever the condition is so far

advanced as not to allow of this, palliative treatment must be instituted—permanent suprapubic or perineal fistula, so that the bladder can be thoroughly irrigated and drained. Necessarily, opiates must be given if the pains are excruciating. Besides, hemorrhages and cystitis must also be treated by internal medication and local means, combining astringents and antiseptics.

Foreign Bodies of the Bladder.

The larger number of foreign bodies reach the bladder by way of the urethra, and in various manners. Probably the most common are those which are introduced at the time of masturbation, again by instrumentation and by therapeutical agents. To avoid these accidents every instrument should be closely examined previous to its introduction. Of course, strictures and other obstructions aid or are often the cause of the mishap. Foreign bodies may also reach the bladder by way of pathological migration. Pessaries causing pressure-necrosis have been found in the bladder of women. Even foreign bodies from the intestinal tract, after agglutination of intestines with bladder, have been observed.

Diagnosis.—The symptoms may be similar to those of stone—frequent urination, with pains, hemorrhages, and turbid urine. A sound may aid the diagnosis, and the cystoscope will verify it. The X-rays will often show foreign bodies.

If the objects are small, they may be removed through a straight tube introduced into the bladder, if necessary, placing the patient in the knee-chest position and, with the aid of an operation cystoscope. Lithotriptors have also been used for this purpose. If it is impossible to remove them in this manner, or if it is deemed best not to do so, an operative procedure, such as a suprapubic operation, becomes necessary. In women most foreign bodies in the bladder may be removed by dilating the urethra to a diameter of $\frac{5}{8}$ or $\frac{3}{4}$ inch, and then digitally or instrumentally manipulating it until the objects present at the neck for extraction.

Stone in the Bladder.

Cause and Pathology.—Stones in the bladder may be formed around a small calculus which may have descended into the bladder from the kidneys and remained inside of the bladder, either having been caught in the trabeculæ or having been too large to be voided in urination. In other cases the nucleus for the stone consists of a coagulum or a particle of a tumor or some other foreign body. The tendency to the formation of stones, provided a small foreign body is in the bladder, is enhanced by stagnation of the urine and by a general diathesis creating a predisposition to excessive precipitation of urinary solids. These precipitated solids, according to the theory proposed by Ebstein, are agglutinated by a cementing material furnished by pus, mucus, or some organic substance. Harris and others have attempted to show that bacteria are present in all calculi, and they have demonstrated this fact; they believe that the bacteria are the beginning of the process of stone formation.

As a rule, stones are formed of the phosphates and urates, and occasionally of the carbonates, in the urine. In other cases they are formed of chemical constituents which are separated from the blood by the kidneys, but only under certain abnormal conditions. Such stones may be formed by oxalate of lime or by cystine. Climatic and atmospheric conditions, drinking-water, and wines have been regarded as important factors in the formation of stones. Heredity is regarded as taking part, since entire families have been shown to suffer from cystine stones.

It is not an infrequent occurrence that a stone consists of different layers, which have various chemical composition, and have been precipitated under different conditions of the urine. On section, such stones have the appearance of concentric layers. While uric acid stones and phosphatic stones show smooth surfaces, oxalate of lime stones have a rough surface, which gives them the name of mulberry stones. Stones are more commonly found in children and in those of advanced age than at middle age, and in men more frequently than in

women. This is probably explained by the fact that the urethra in woman is so dilatable as to pass out many stones as soon as they appear. While phosphatic calculi are formed only in the bladder, urates and oxalates are first formed in the kidney.

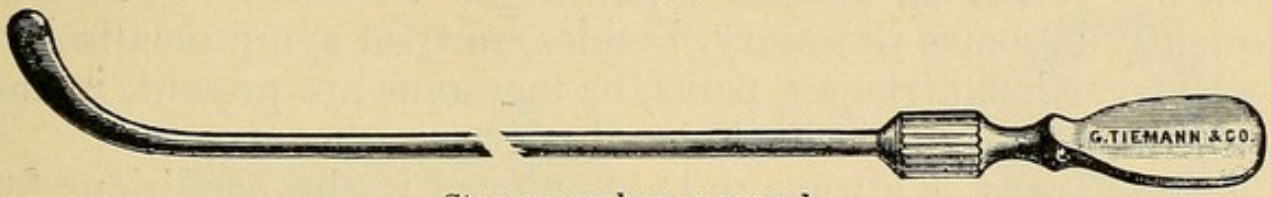
The shape of bladder stones is, as a rule, that of an egg or a small globe. The size varies from that of a pea to one which completely fills the bladder. The number of stones that may be present is also very variable. If a large number of stones accumulate in one bladder, they may become faceted by rubbing against one another. The increase in the size of stone differs according to individual conditions and with the kind of stone formation. Phosphates increase in size most rapidly; oxalates and urates much more slowly. Usually there is a progressive enlargement. They may be either free in the cavity or fixed—*i. e.*, may be situated in a diverticulum.

Symptoms.—The presence of stones in the bladder produces the following symptoms: The patient may have a sensation as of a foreign body in his bladder, which may become a distinct pain. He notices pains in violent movements, especially when being shaken in taking a ride on a bad road, or whenever jarred in any manner. Rest in bed in these uncomplicated cases gives partial immediate relief, in contradistinction to pains caused by other diseases; therefore, when complicated with cystitis or ulcer, the pains do not necessarily disappear at once with rest. Hemorrhage may occur during such violent motions. Whenever stone is complicated with hypertrophy of the prostate, tumors, or cystitis, hemorrhage may occur during periods of rest, and not uncommonly after excessive sexual excitement or following errors in diet. It is quite a frequent occurrence that the urinary stream is suddenly interrupted, and begins again after the patient has displaced a calculus from the internal urethral orifice by certain movements. In time, stones with rough surfaces produce traumatic lesions of the bladder mucosa, so that constant pain results, which almost always radiates into the penis or scrotum, and is present in most of the cases. If the stone becomes fixed in the internal urethral orifice, it may

cause acute retention of urine. Practically in all cases there is increased frequency of urination, especially noticeable when the patient is up and about and lessened when resting. Occasionally, small fragments of stone are passed with the urine. In almost every case blood is present, at least in microscopic quantities.

Diagnosis.—*Sounding.*—In order to diagnose a stone, the bladder is searched by a steel sound with a very short beak. This short beak allows of very free movements inside of the viscus, so that every part of the bladder may be explored satisfactorily. It is best to have the patient on his back and

FIG. 15.



Stone searcher or sound.

the bladder filled with about 100 c.c. of distilled water. In order to demonstrate quite distinctly the metallic click which is produced by contact of the stone with a sound, it is best to use sounds which are fitted at their handle with a so-called *resonator*, a short, hollow, metallic tube with very thin walls. By passing the beak of the sound in different directions over the now detected stone, a fair estimate may be made of its size and surface. This examination may be completed by following it with cystoscopy, which is especially instructive in cases of multiple stones or in cases in which the stone is firmly embedded in a diverticulum.

Palpation, especially by the vagina in women, may reveal a stone. In the male, especially when there is a hypertrophied prostate, stones cannot usually be felt. If a stone of enormous size is present, it can be palpated through the lax abdominal walls, especially if a finger is inserted in the rectum and exerts pressure upward.

Skiagraphy should be employed, as it often gives the correct number and size of stones.

Treatment.—There are three methods of removing stones

from the bladder. Very small stones may be pumped out by using an evacuation catheter and a Bigelow pump. Large stones either may be crushed inside of the bladder and the débris pumped out afterward (litholapaxy), or may be removed after the bladder is opened by perineal or suprapubic incision (lithotomy).

The *internal treatment* with the object of dissolving or causing dissolution of the stone—*i. e.*, litholysis—is without result.

The *prophylactic treatment*, however, is not to be forgotten. In cases of uratic stones, alkaline mineral waters, mixed diet, with as little carbohydrate food as possible, and in cases of oxalate stones an animal diet, should be ordered. It frequently becomes necessary, besides, to treat symptomatically, whenever hemorrhages, pains, or tenesmus are present, in the manner already described elsewhere.

Litholapaxy is always to be employed if the conditions for its execution exist. These conditions are: the urethra must be permeable for the lithotriptor and the large evacuating catheters. The stone must be small enough to allow of sufficiently large space between the stone and the bladder-walls, so that the blades of the lithotriptor can easily be manipulated. The stone must be freely movable inside of the bladder, and should not be extremely hard.

Perineal lithotomy is to be used only in cases of small stones and where the number of concretions is known positively, because it is impossible to explore the entire bladder with certainty through a perineal incision.

Suprapubic lithotomy must be resorted to in all other cases.

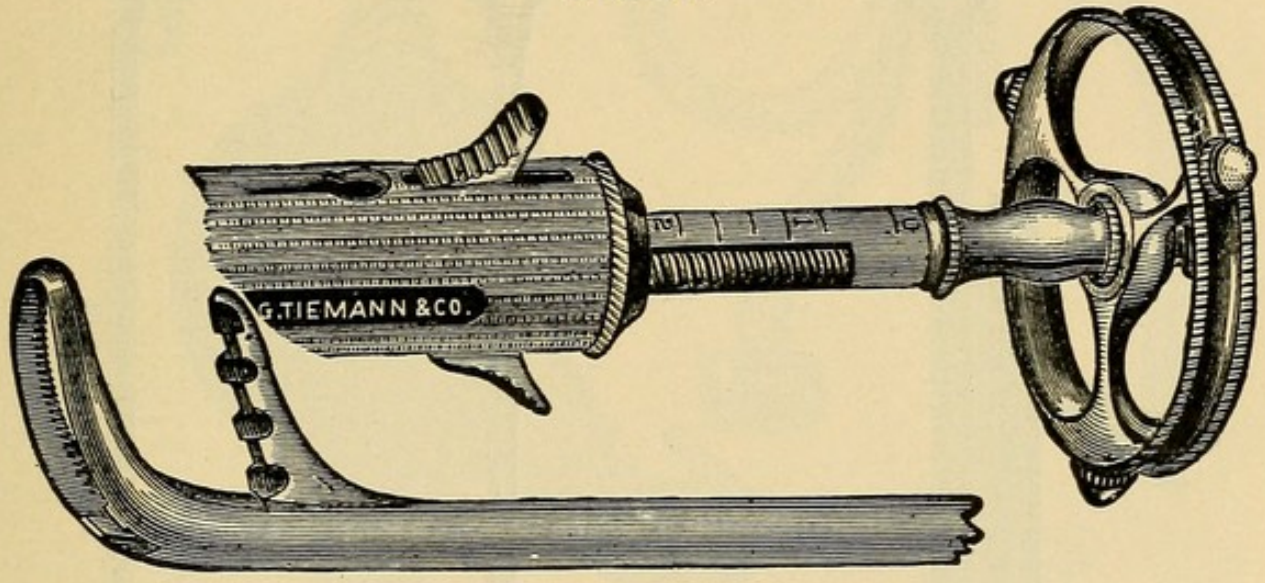
Litholapaxy.

The instruments necessary for performing lithotripsy are: first, the lithotriptor, or crusher, and, secondly, the evacuator—that is, the instrument for pumping out the crushed fragments from the bladder. The *lithotriptor* consists of two blades whose ends are bent at almost a right angle. These blades fit into each other, so that when closed the instrument

resembles a simple sound. The larger blade is perforated and is called the female blade, while the smaller blade carries at its beak a roughened surface, so that when the stone is caught between these blades by forcibly bringing them together it may be crushed. The two blades can be made fast at different distances by a rack and pinion at the handle. The crushing itself is performed by forcing the two blades together through the screw which is hidden in the shaft.

The *evacuator* consists of a glass bulb on the top of which a rubber balloon is attached. This rubber carries two cocks —one close to the glass bulb and the other on the top of the

FIG. 16.



Lithotrite.

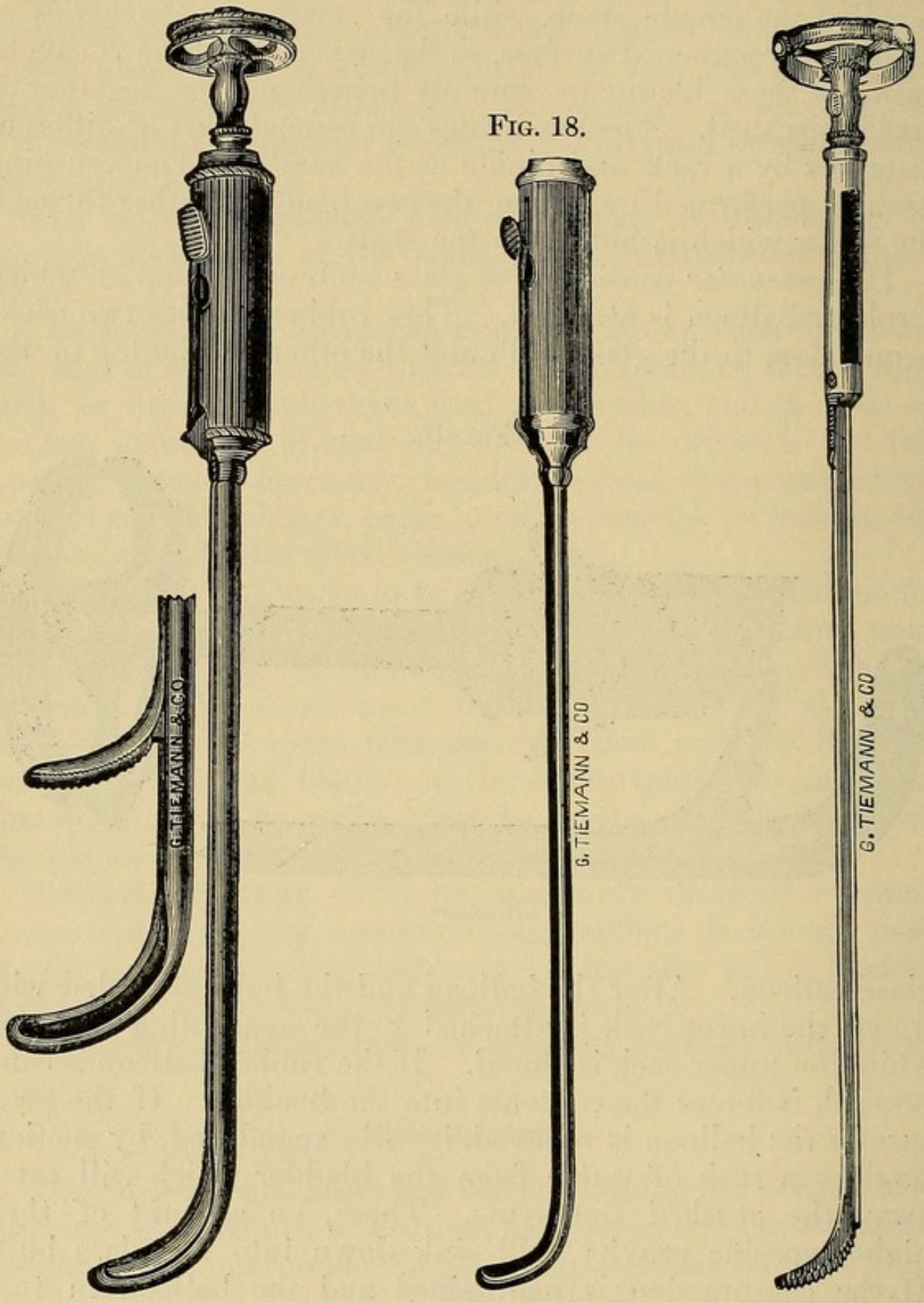
glass balloon. After the balloon and the bulb are filled with water, the lower cock is attached to the evacuating catheter, while the upper cock is closed. If the rubber balloon is compressed, it forces the contents into the bladder. If the pressure in the balloon is relieved, it will expand and, by suction, produce a rush of water from the bladder which will carry away the crushed fragments. These, on account of their higher specific gravity, will sink down into the glass bulb. If the compression is maintained and the balloon in turn relieved, all the fragments from the bladder will be removed.

In order to perform litholapaxy, the patient is prepared in

Fig. 17.

Fig. 18.

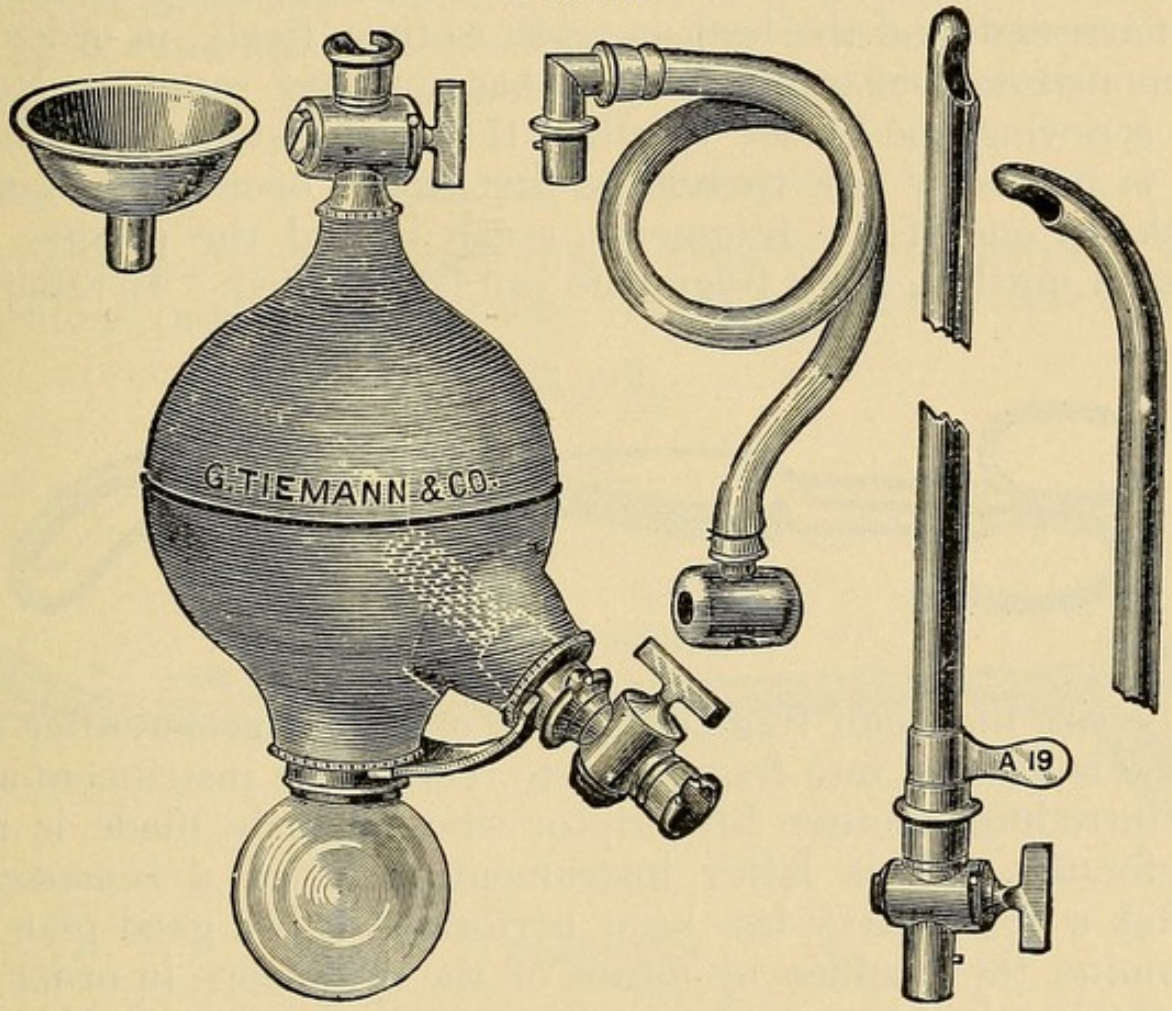
Fig. 19.



Lithotrites or stone-crushers. From left to right in serial order are the blades opened, the instrument assembled with blades closed, the female blade and the male blade separate.

the following way: An existing cystitis is treated by irrigations; previous to the operation a urinary antiseptic is administered. In order to make the urethra as flexible and patulent as possible, a large soft catheter is inserted in the urethra and retained for twenty-four hours previous to the operation. As a rule, litholapaxy is performed under general anæsthesia. In tolerant patients a local anæsthesia (4 per cent. anti-

FIG. 20.

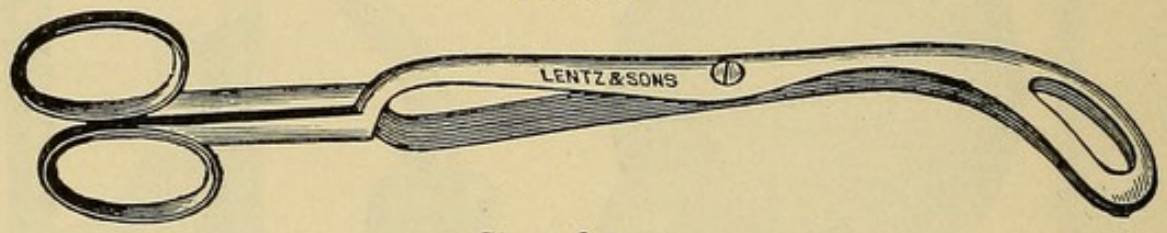


Evacuator for the removal of fragments from the bladder.

pyrin) will suffice. From 25 to 50 c.c. of a 3 to 5 per cent. antipyrin solution are put into the bladder and allowed to remain from ten to twelve minutes; this is then replaced with 100 c.c. of a saturated boric acid solution. Meanwhile a 0.01 gm. morphine suppository is introduced into the rectum, and sufficient eucaine solution to anæsthetize the urethra is applied. Patients who have had litholapaxy performed re-

peatedly upon them become so tolerant that these operations may be performed without any general or local anæsthesia. The patient is placed in a recumbent position, his pelvis somewhat elevated in order to secure free manipulation of the instrument. Into the bladder as much sterile water is injected as possible, without hyperdistention of the bladder; then the closed lithotriptor is introduced, and after the stone is found the blades are separated. By different movements an attempt is made to secure the stone. After this is done, the blades are arrested, and the beak is made to turn freely, in order to demonstrate that a mucous fold has not been caught. Now, by screwing the blades together the seized stone is crushed. It is necessary now to release the blades, open them again, pick up one of the fragments, crush it, and the process repeated until no large fragments can be detected. In order to

FIG. 21.



Stone forceps.

pulverize the small fragments some operators prefer, after the stone is divided into fragments, to remove the instrument and to introduce another lithotriptor whose female blade is not perforated. This latter instrument is called a *ramasseur*. After a litholapaxy has been performed it is a good plan to examine the bladder by means of the cystoscope in order to ascertain whether any fragments remain in the bladder, or whether fragments embedded in the bladder-wall are to be seen. If this is the case, they are removed by the forceps of the operation cystoscope. *It is very important to remove all the fragments in one sitting, in order to avoid secondary complications, as traumatism from sharp splinters and secondary cystitis.* There are cases on record in which such a sharp splinter, by perforating the bladder-wall, caused a fatal pericystic phlegmon.

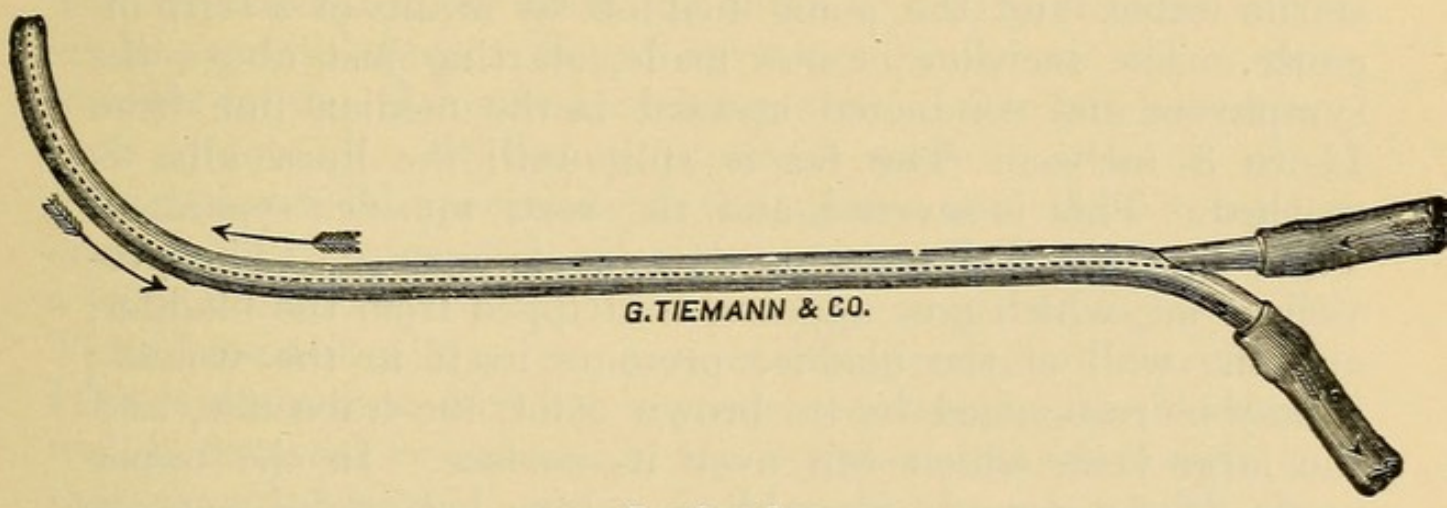
If the bladder-wall is not injured during the operation, there will be no subsequent hemorrhage. If the bladder is the seat of dilated veins, there might be a hemorrhage after the operation. In these cases the bladder is flushed with 1 : 10,000 to 1 : 1000 silver nitrate solution until the bleeding ceases. A permanent catheter is inserted until the bloody hue of the urine entirely disappears.

Regarding the perineal operations, only the median lithotomy is to be commended. The lateral section, so popular in former times, is nowadays abandoned because of its many inconveniences and dangers. This is also true of the bilateral operation.

Median Lithotomy.

In its preliminary steps this is identical with perineal urethrotomy, and the description of the latter will therefore suffice.

FIG. 22.



Psychrophor.

For removing the stones, curved forceps of various shapes are used. As the opening into the bladder is comparatively small, all stones, especially if large and if they have rough surfaces, should not be removed before crushing them previously with lithotriptic forceps or forceps made for this purpose. The after-treatment of perineal operations is occasionally complicated by inflammation around the neck of the bladder, and eventually secondary suppurations may take place. Furthermore, bruising or even laceration of the pros-

tate and ducts has been observed. As regards the after-treatment, especially if small particles are believed to have remained in the bladder, a large drainage-tube may be allowed to remain for a few days. In this manner the bladder may be irrigated frequently. In rare cases the perineal opening becomes transformed into a permanent fistula, which may be cured by cauterization, or in stubborn cases by freshening and suturing the lips of the fistula, and then inserting a catheter through the urethra, which should be made permanent until the fistula closes.

Suprapubic Cystotomy.

The patient is placed in a recumbent position, and the pelvis is somewhat elevated. Under complete anæsthesia, a catheter is introduced into the bladder, and this organ is washed out until the fluid returns quite clear. Then the bladder is distended by the injection of about 150 c.c. of sterile water, and the penis tied off by means of a strip of gauze. The incision is now made, starting just above the symphysis, and conducted upward in the median line from $1\frac{1}{2}$ to 3 inches. The fat is split until the linea alba is reached. This is severed, and the recti muscles separated. Thus the so-called space of Retzius is opened. The prevesical fat, which now appears, is stripped from the bladder, and the wall of the bladder presents itself in the wound; it may be recognized by its brown color, the trabeculæ, and the large veins which run over its surface. In the upper angle of the wound, resembling a blue half-globe, appears the peritoneal fold. In case of necessity the peritoneum is pushed upward and retained by a small blunt retractor. After this the bladder-wall is seized, just underneath the peritoneal fold, with a tenaculum. Now the bladder is opened by passing a sharp bistoury underneath the tenaculum into the bladder cavity, and *cutting down toward the symphysis.* The fluid contained in the bladder overflows the operating field and is sponged off, and lateral retractors are inserted into the bladder, thus separating the incised wound and rendering the interior of the viscus accessible. Stones

may be removed by certain kinds of spoons or forceps. In uncomplicated cases there is no objection to closing the bladder with two layers of catgut sutures. The prevesical space should not, even in such cases, be closed entirely, but left open far enough to allow of loose packing until the primary reunion of the bladder wound has been established. If closure of the bladder is not desired, the bladder wound is only partly sutured, so that in its centre a drainage-tube which reaches into the *bas fond* may be inserted and a purse-string suture drawn around it, in order to prevent leakage of urine.

The external incision is now closed at its angles by a few stitches, and the prevesicular space and edges slightly packed with gauze; then the drainage-tube is connected to a small glass tube which is bent at a right angle. To the other end of the glass tube a rubber hose is attached, which dips into a bottle which is filled with an antiseptic solution. This drainage is continued until the entire wound is covered with healthy granulations. Some operators prefer to fasten the bladder to the abdominal incision with a few stitches after each cystotomy. If the cystotomy is made in order to perform endovesical operations, as for tumors, etc., three retractors are inserted into the bladder—two small lateral ones and a large Simon's speculum into the upper angle of the wound. The after-treatment is the same as that previously described. If it is desired to establish a permanent fistula, the bladder-wall is fastened by sutures to the anterior abdominal wall, so that the bladder-wall grows in immediate contact with the abdominal walls. The length of time required in order to obtain good results varies as to the presence or not of complications. In some cases it may be necessary to permit the suprapubic tube to remain for from one to three weeks or even longer, depending upon the condition of the bladder and the state of the urine.

Continuous Vesical Drainage.

Continuous drainage of the bladder is easily and perfectly secured by using the apparatus of R. H. M. Dawbarn, of

New York, which is practically a Sprengel pump, except that the intermittent action is by water instead of by mercury. A large catheter (30 to 40 French) is inserted into the base of the bladder, and at the wound is surrounded by a short piece of large rubber tubing, so that the atmospheric pressure can pass between them into the viscus. The catheter is now attached to a piece of rubber tube which meets in a Y-tube the outflow from the reservoir at a point below the level of the bladder floor as the patient lies in bed. A common douche-bag is an excellent reservoir. The exit of the Y-tube has a tube attached to it leading into the receptacle of antiseptics below the bed, and trapped by tying a knot loosely in it. When the trap fills, it empties itself and thus siphons away the urine in the bladder, which should occur once in about five minutes. Urine for examination and measuring can be obtained by putting a wash-bottle into the circuit between the Y-tube and the bladder, with the long tube of the bottle toward the bladder.

A Chemical Analysis of the Stones.—This can be made quickly. An outline is as follows :

COMBUSTIBLE.	The stone after it is powdered burns, after placing on a platinum dish, without giving off a flame or odor.	*Murexid test:* With ammonia, purplish red; with potassium hydrate, purplish violet.	Uric acid and uric acid salts.
		Murexid test: With ammonia, yellow; with potassium hydrate, orange yellow.	Xanthin.
	The powder, on being placed on a platinum dish, burns, giving a bluish flame, and emitting an odor of sulphur.		Cystin.
	On the addition of hydrochloric acid to the powdered stone there is an effervescence.		Carbonate of lime.
NON-COMBUSTIBLE.	No effervescence by the addition of hydrochloric acid to the stone.	The ash of the stone effervesces with hydrochloric acid.	Oxalate of lime.
		The ash of the stone does not effervesce with the addition of hydrochloric acid.	Phosphates.

Neuroses of the Bladder.

Neuroses of the bladder are regarded as nervous conditions *per se* which affect the bladder, in either disturbances of sen-

sibility or motility, and manifest themselves as spasms or paralyses. No central or cord affections involving the bladder are to be considered strictly under this particular heading.

Previous to making a diagnosis, every known method of examination, especially cystoscopy, should be used. Since cystoscopy has been employed it has been demonstrated that small ulcers of the bladder were the cause of symptoms resembling neuroses, hence they were not a neurosis, and thereby showed the necessity of thus examining.

Spasm of the Bladder.

Spasmus vesicæ, cystospasmus, is a spasm of the bladder, regarded as caused by a hypersensitive condition of the bladder nerve-endings, which condition causes repeated muscular contractions. Small quantities of urine cause contraction and tenesmus, so that either or both the detrusor and sphincter muscles are called into action. It is impossible to distinguish one from the other. In these cases the mucous membrane of the bladder is perfectly normal, and the urine without any pathological elements. The pain is most severe when the bladder empties itself. A feeling of spasm coexists, and may radiate to the penis or testes. In connection with this subject all other affections which might act reflexly must be excluded—*i. e., anal and rectal diseases, and especially, in women, those involving the internal genitalia.* If no pathological cause in the bladder can be found, the condition is what is correctly known as *irritable bladder*, or occasionally termed *cystalgia*. The attacks may last a few minutes or even longer, and repeat themselves frequently, or hours may intervene.

In the **treatment** it is necessary to correct anything that causes a reflex action. In these cases excesses of all kinds should be prohibited. During the attack baths, narcotics, and especially a hypodermic injection of morphine often becomes a necessity. Local treatment, such as sounds and instillations, has apparently given good results in selected cases.

Atony of the Bladder.

Atony is a muscular debility which is due to exhaustion of the muscular coat of the bladder. This is often caused by the changes of advanced life or is the result of continual overstretching of the detrusor muscles. This overstretching may be caused by some obstruction in the urinary passage or by regular overdistention of the bladder due to artificial strain in consequence of not responding in time to urinary calls. It is an eccentric hypertrophy of the muscular coating. If the atony, combined with a tight stricture, exists for any length of time, the phenomenon appears which is called *paradoxical incontinence.* Although the bladder is unable to empty itself by contraction, it constantly overflows, because after the limit of its capacity is reached, every additional quantity of urine flowing down from the kidneys causes an equal quantity to dribble out.

The **exact diagnosis** of atony is made by introducing a catheter. The stream in which the urine flows has no force, and drops from the end of the catheter only by the force of gravity.

The **treatment** of atony has for its first object relief of the overstretched bladder muscles by catheterization regularly three or four times a day, or oftener if necessary. Furthermore, an attempt is made to stimulate the muscles by the use of electricity and by applying cold externally to the hypogastrium. If an obstruction produces the condition of atony it is of paramount importance to remove it.

Paralysis of the Bladder.

This is the complete inability of its muscular coats to contract, which condition is due to morbid affections of the nervous centres, trunks, or terminals. It may either be permanent, in case the causal nervous disease is permanent, or it may be only temporary, if it is caused by some acute febrile nervous affection, and then subsides with its disappearance. The urine, as a rule, becomes decomposed by

stagnation, while the trophic disturbances enhance the establishment of crystals.

The **treatment**, if it is impossible to remove the central cause, can be only a symptomatic one. The urine is drawn at regular intervals by the catheter, and antiseptic washings of the bladder are employed. If the bladder has been distended for a long time, it is best not to empty it at once by catheterization, or if the urine is drawn off entirely, the bladder must be instantly partially filled with mild antiseptics, *in order to avoid hemorrhage ex vacuo.* If paralysis involves the sphincter muscle, true incontinence occurs.

Enuresis.

Whenever there is involuntary urination in an otherwise apparently normal bladder, it is regarded as a neurosis. It occurs most commonly in children, especially in boys and during the sleeping hours. This nightly "wetting the bed" is called *enuresis nocturna.* It is believed by certain authorities to be due to an underdevelopment of the prostate and external sphincter muscle of the bladder; also reflexly to phimosis, excessively long foreskin, etc. In certain cases it occurs during the day,—while laughing, running, or while indulging in other physical exercise,—and is then called *enuresis diurna.*

Treatment consists in attempting to rectify the cause, if it can be found. If there is phimosis or long foreskin, circumcision has given apparent relief. Again, massage of the posterior urethra given by the rectum has been followed by good results. If individuals are undeveloped, tonics, baths, and electrical treatment may be of service.

A very serviceable course of treatment for purely nervous enuresis nocturna is the following: Have the child evacuate the bladder just before getting into bed, and refuse it all fluids for several hours (four to five) prior to bedtime. Raise the foot of the bed several feet, best to the top of a table, so that the urine as delivered from the ureters into the bladder will collect at the fundus first and not at the neck. In the

Vanderbilt Clinic in New York, a great number of cases have been found to yield to the following simple formula:

℞ Fluid extract ergot,
Bromide soda,
Tinct. belladonna, āā 10.0 grammes;
Cinnamon-water, q. s. ad 100.0 "
M. Mixture for enuresis.
Sig.—One drachm three times daily after meals. The strength of this solution must be reduced for children less than five years old.

QUESTIONS ON MALFORMATIONS, INJURIES, AND DISEASES OF THE BLADDER.

What is meant by ectopia vesicæ?
What is the treatment? What is meant by Maydl's operation?
What is meant by hernia of the bladder?
What varieties are there? What is their cause? What are the symptoms? How would you treat the condition?
What is a cystocele?
How may injuries of the bladder occur?
What classes are there for practical purposes?
How is it possible to make the immediate diagnosis of these two classes? If possible, why should a catheter not be used?
How is the diagnosis made twenty-four hours after the injury?
What is the prognosis?
What is the treatment? Describe the operative interference?
What is a fistula of the bladder?
What is meant by cystitis?
What is meant by pericystitis?
What is the origin of cystitis?
What are the more common predisposing causes?
What are the symptoms of acute cystitis?
How do the different etiological types characterize themselves?
What is especially characteristic of the symptoms of tuberculous cystitis?
If pus and albumin are present in the urine, how is the quantity of the latter accounted for?
What are the symptoms of a chronic cystitis?
Are ulcers of the bladder common?
What is meant by cystitis dolorosa?
What is meant by parenchymatous cystitis?
Whenever the posterior urethra is involved and when the inflammation has passed to the bladder by extension, what part is mostly involved?
What is meant by a urethrocystitis?
Of what value is the Thompson two-glass method in cases of cystitis?
What is the treatment of acute cystitis? Give the internal treatment in detail. What is the local therapy—in acute cases? in chronic cases? in cases where there are no complications?

How is the differential diagnosis made between acute anterior and acute posterior urethritis and a urethrocystitis?

What is meant by hypertrophy of the bladder? In concentric hypertrophy, is there a large quantity of urine retained?

What varieties of tumor of the bladder are met with?

Are they often primary in origin?

What are the common benign tumors? What characteristics do they show?

What are the malignant tumors? Which is the most common?

What are the subjective symptoms?

What are the objective symptoms of tumor of the bladder?

Of what value is cystoscopy in these cases?

What is their treatment?

Can they be treated intravesically? If so, how, and what kind of treatment is thus adopted?

How are the malignant tumors treated?

If complications are present, how are they treated?

Are foreign bodies ever found in the bladder? How do they reach the bladder? How are they diagnosed?

How can they be removed if not too large? If of large size, how are they removed?

What is meant by stone in the bladder?

How are they found? Describe their appearance.

What are the more common chemical constituents of these stones?

Give, succinctly, the chemical analyses of the different stones.

What symptoms do they present?

If complicated with ulcer or cystitis, do the symptoms differ? How and why?

How is the diagnosis established?

What is the prognosis?

What is their treatment?

What is meant by litholysis?

What is litholapaxy? Describe in detail this operation.

Are there any complications which do not permit of its being carried out?

What complications can follow litholapaxy?

What is the after-treatment?

What do you know about the perineal operations?

Describe the perineal operations.

In what cases is this operation advisable? When would you remove a stone by a suprapubic incision?

Describe the suprapubic operation when with and without complications.

What are the advantages and disadvantages of this method?

What is the after-treatment?

What is meant by neuroses of the bladder?

How is such a diagnosis made?

What is the treatment?

What is meant by a spasm of the bladder? Describe in detail.

What is the treatment for this condition?

What is meant by atony of the bladder? What are the causes?

How is the diagnosis made?

What is the treatment?

What is meant by paralysis of the bladder?

What are the causes?

What is the treatment?

What may arise if the bladder is emptied too quickly?

Does incontinence ever occur in these cases? When?
What is enuresis?
What may the causes be?
What is enuresis nocturna? Diurna?
What is the treatment?

SEXUAL DISORDERS OF THE MALE.

For the purpose of convenience all disorders classed under this heading may be divided into three groups: (1) Pathological losses of semen; (2) impotence; (3) sterility. It is almost unnecessary to state that these may intermingle with one another.

Pathological Losses of Semen.

It is best to state that every pollution is not due to disease, but that there are physiological pollutions—*i. e.*, losses of semen at times of erections during sleep, occurring from time to time after the age of puberty. These *pollutiones nocturnales* (nocturnal pollutions) are usually accompanied by erotic dreams.

Pollutions become pathological only on account of their frequency and the ill effects they exert upon the individual. As regards their frequency, no sharp distinction between physiological and pathological pollutions can be made. The mode of living, the temperament of the individual, and his constitution all take part in deciding the question. As regards their number within a definite period of time and the frequency with which they may occur and still be physiological, no definite statement can be made. One pollution in ten or fifteen days in a healthy individual who abstains from intercourse may be regarded as a normal condition. Pollutions may occur oftener, and so long as there is no mental depression or feeling either of mental or of physical exhaustion, or of both, it must be regarded within the physiological limits. As soon as an individual is thus affected or if, in addition, pollutions occur on account of mechanical stimulation, as when riding horseback or on touching the genitals during the day (*pollutiones diurnales*), and especially if erections are absent, the condition is pathological.

Spermatorrhœa—a more or less continuous, spontaneous flow of semen—is a rare condition, and is entirely distinct from any relation to pollutions. A loss of semen which is quite common at the time of defecation is referred to as *defecation spermatorrhœa;* at the time of urination, *micturition spermatorrhœa.* At these times a distinct spasm resembling contraction in the perineum is usually felt. If there is an admixture of sperma in the urine without any noticeable symptom, it is termed *spermaturia. There may be pollutions, spermatorrhœa, and spermaturia present in one and the same case. There is, however, not necessarily any direct connection one with the other.*

Pollutions may be regarded as motor neuroses—spasms of the seminal vesicles; while spermatorrhœa is a paresis of the ejaculatory ducts.

Etiologic Factors.—There are different elements causing these conditions: *constitutional diseases*, during convalescence from an acute febrile disease, tuberculosis; *organic diseases of the central nervous system*, especially diseases of the cord. Pathological conditions of the genito-urinary tract are, however, the most important causes. Following or during the course of a posterior urethral infection, whether of a gonorrhœal or non-gonorrhœal character, is by far the most common local cause. It must not be forgotten that any condition, especially if involving the posterior urethra with its adnexa, may be the cause.

The defecation and micturition spermatorrhœas are very common. Besides this, occasionally after instrumental examination there is loss of semen, and it has been termed *artificial spermatorrhœa.* In connection with all these different forms and when a localized posterior disorder exists, a neurasthenic condition often accompanies them, and is referred to as *sexual neurasthenia.* Again a neuropathic tendency is an important factor in the cause of these affections. In these cases there is usually congenital or acquired anæmia, general weakness, and an "irritable weakness" of the nervous system. In order to produce this, psychical conditions, such as fright, excesses in venery, onanism, and coitus interruptus, take a

leading part. The last condition, also referred to as coitus reservatus, is the interruption of the act of intercourse—the withdrawal of the penis just previous to the orgasm.

The **diagnosis** should always be made with the aid of the microscope, to differentiate from other discharges, such as urethrorrhœa and prostatorrhœa.

The **prognosis** must naturally vary as to the cause. In all cases it may be stated that the longer the duration, the worse the outlook. The prognosis varies also as to whether or not the different types are all present.

Treatment.—This naturally falls into the prophylactic and curative. The former must, of course, include the teaching of the prophylaxis of venereal diseases, the avoidance of sexual excesses, onanism, or any practice that may lead to this condition. It is almost needless to state that whenever distinct organic conditions are present, they must be attended to, no matter whether constitutional or not. If local, such as a posterior urethritis, this must receive close attention.

Local Treatment.—This has already received attention under the different headings. Whenever these conditions, general or local, have been thoroughly attended to, a correct application of hydrotherapeutics is to be advocated. At the same time the sexual neurasthenia which accompanies these conditions must never be neglected. It is in these cases that suggestive therapeutics may be of great value. Following the local treatment for the pathological conditions, a treatment with the Winternitz psychrophore, an instrument resembling a catheter, but without an eye, divided into two parts, through which cold water may be passed, is to be inserted into the urethra and used for at least fifteen minutes from three to five times a day. Electrical treatment with the galvanic or faradic current is useful. Here a urethral electrode is introduced, and in the case of the galvanic current, it should be the inactive pole, and the other electrode placed on any other part of the body, as the pubes or perineum. Faradic electricity is similarly passed for a few minutes at least once a day. These various treatments, as a rule, have not been very successful. *Internal treatment* is in most cases

necessary : always treat the direct cause ; if iron or arsenic is necessary, it should not be omitted. The more common cases require the following medication :

℞ Acidi camphorici, 10.0 grammes.
Div. in caps. No. xx.
Sig.—Two or three capsules at night.

℞ Camphoræ monobromatæ,
Lupulini, āā 5.0 grammes.
Div. in caps. No. xv.
Sig.—Two or three capsules each night.

℞ Ext. belladonnæ, 0.15 gramme ;
Antipyrini, 5.00 grammes.
Div. in caps. No. xv.
Sig.—One or two capsules late in the evening.

Impotency.

By this term is meant the inability of the male to have intercourse in the normal manner—*potentia cœundi.* Correctly speaking, it refers to abnormalities of erection, and the condition of *potentia generandi* is not necessarily to be included, as this has reference only to the power of fertilization. Sometimes congenital malformations or diseases causing deformities, as hydrocele, rupture, etc., again, where destruction of the penis has occurred, are necessarily the causes of *organic* impotency. Drugs, such as morphine, camphor, lupulin, and, in cases of intoxication with alcohol or lead, also marasmus, may produce a "*nervous*" impotency. *Psychical* impotency is the condition noticed in newly married people. In these cases fright or mental impressions tend to prevent the occurrence of erections. *Relative* impotency is a term applied whenever it is impossible to have intercourse with a normally built woman when under sexual excitement no erection occurs. *Neurasthenic* impotency is referable to the cases suffering from neurasthenia. In these cases there may be pollutions,

and both conditions must naturally be considered together. In this particular class of cases, once in a while the individuals are perfectly capable of having erections and intercourse, and again these are lost; this is termed *temporary* impotency. In those individuals in whom there are complete loss of sexual excitability and absence of erections the condition is regarded as a *paralytic* impotency.

The **prognosis** depends naturally on the variety of the affection; therefore the correct diagnosis must first be made. If dependent on structural conditions, the prognosis is good if they can be corrected. As a whole, however, it is best to understand that the results are very unfavorable.

The **treatment** varies. If there are organic changes, operative interference is indicated. Affection of the constitution and the central nervous system must each receive appropriate treatment. Nephritis, diabetes, and locomotor ataxia are the most common diseases in which this symptom is present, and, in fact, occasionally it is the first symptom. Psychical impotency requires psychical treatment. This is paramount in all cases of this class. Assurance of success must, of course, naturally be given very guardedly. No patient should attempt the sexual act too often, especially if failures are the rule. Weeks and even months should intervene. Neurasthenic impotency must be treated from the standpoint of the etiologic factor. If anæmia is present, this must be treated. Besides this, hydropathic, dietetic, and hygienic measures must be ordered. In all the cases of neuroses, and where not accompanied by any organic or inflammatory change, local treatment is best omitted. It is just in this type that instrumental treatment and applications with irritating chemicals often cause change for the worse. However, in all the types of nervous impotency—neurasthenic and paralytic—hydrotherapy is of value. Probably seashore bathing is desirable; however, a large number of patients cannot afford this luxury, hence substitutes for this, in the way of cool baths, douches, etc., are desirable. In addition to this electrical treatment is certainly of great value and must never be omitted. It must be given carefully,—either

the faradic or the galvanic current,—and the rule is, the more sensitive or the more painful the application, the weaker is the current, and the more carefully applied, the better are the results. Of late various mechanical devices which give support to the organ have been used, but are of doubtful value. Therapeutical treatment practically confines itself to organotherapy—*i. e.*, preparations made from the testes, and given either internally or subcutaneously. Besides this, strychnine, phosphorus, and cocaine, in physiological doses, are useful.

Sterility.

In this class of cases are included, in the male, only those in which the semen ejaculated has not the power of fertilization. There may be absence of erections—*impotentia cœundi*—and of the power of fertilizing an ovum—*impotentia generandi.* Either one or the other of these conditions may be present or absent.

There may be an absence of ejaculate. In some cases the ejaculate, which may or may not contain spermatozoa, regurgitates, and this is referred to as *aspermatismus.* It may be due to stricture of the urethra, occlusion of the ejaculatory ducts, or may even be psychical. If the ejaculate is free from spermatozoa, the condition is referred to as *azoöspermia.* In these cases there may be a disease of the testes, as atrophy, or it may be due to occlusion of the vasæ deferentiæ, or even in cachectic diseases. Whenever the number of spermatozoa are compared with the normal number, and they are found to be decreased, this is spoken of as *oligospermia;* if the spermatozoa have but slight motility, as *asthenozoöspermia;* and if non-motile, as *necrospermia.*

Diagnosis.—Necessarily a thorough physical examination is indicated, but the examination of an ejaculate is nevertheless obligatory in order to differentiate the one from the other. In azoöspermia the microscopical examination reveals absence of spermatozoa and secretions only from the prostate, either mixed or unmixed with secretion from the seminal vesicles. In cases of oligospermia, asthenozoöspermia, or

necrospermia, spermatozoa are present in the first in diminished number; in asthenozoöspermia there are usually changes in form, due to rapid development and low vitality; while in the latter the spermatozoa are non-motile.

The **prognosis** varies. In aspermatismus it is good if the organic changes can be arrested. In the other cases the prognosis is always doubtful.

The **treatment** must also vary with the cause. If these are strictures, then these should receive appropriate treatment. If old chronic epididymitis is the cause, resolvents and massage of the parts are indicated. If due to cachectic diseases, syphilis, or tuberculosis, then rational medication is demanded. Finally, if chronic posterior urethral diseases are present, and the prostate or seminal vesicles are affected, massage of these and instillation to the parts constitute the treatment. In certain cases dietetic and electrical treatment and the like should be instituted.

Masturbation.

As an etiologic factor onanism, or the irritation of the external genitalia by an individual himself (male cases under consideration), usually producing erections and causing orgasms, also called *masturbation*, is of such significance as to need a few words of attention. This practice has been common to all races and ages. It is practised by the young as well as by the old. It is of most importance when practised during adolescence. Whenever the habit has been persistent and frequent, it apparently influences the constitution of the individual. The cause cannot always be elicited, but in some cases abnormalities of the external genitalia, phimosis, etc., stone in the bladder, or even inflammatory disturbances, especially involving the posterior urethra, may be found present. It leads up to a characteristic condition of affairs practically similar to sexual neurasthenia, yet as the most prominent complex of symptoms may be mentioned loss of energy for work, inability to concentrate the mind, and pathological losses of semen.

Treatment.—This varies. If the cause is ascertainable, this should be rectified; if not, tonics, hydrotherapy, electricity, and suggestion therapy are the most important. As sexual neurasthenia may accompany or follow masturbation, impotency, losses of semen, and sterility, it will be best to discuss briefly this most important topic. It is now a distinct neuropathic affection, yet cannot easily be confined to narrow limits, but as the etiologic factor, some genital disturbance seems to be fundamental, usually persisting and accompanied by various symptoms referable to the external or internal genitalia, such as hyperæsthesia, anæsthesia, and indefinite pain involving these parts. Besides, there are symptoms arising in the cerebrum, as involvement of all the special senses, and indefinite symptoms from any organ may arise and persist. Here, again, the treatment varies and the cause must be looked for and, naturally, be treated. In addition the treatment already outlined under the various headings must be considered.

Occasionally nothing but sexual intercourse will effect a cure.

QUESTIONS ON THE SEXUAL DISORDERS OF THE MALE.

What groups are there of these disorders?
What is meant by a pathological loss of semen?
Are there physiological losses of semen?
What is nocturnal pollution?
When do pollutions become pathological?
How do they affect the individual?
Do pollutions ever occur during the day? If so, of what importance are they?
What is spermatorrhœa, defecation, micturition, and artificial spermatorrhœa?
What is meant by spermaturia?
What are these conditions due to?
What are the etiological factors?
How is the diagnosis made?
What is the treatment? Describe in detail.
What is meant by impotency?
What is "organic," "nervous," "psychical," "relative," "neurasthenic," "temporary," impotency?
What is the prognosis in these different classes?
What is the treatment in these different classes?
What is meant by sterility?
What is impotentia cœundi?
What is impotentia generandi?
What is aspermatismus?

What is azoöspermia?
What is oligospermia?
What is asthenozoöspermia?
What is necrospermia?
How is the diagnosis of these conditions made?
What is their prognosis?
What is their treatment?
What is meant by masturbation?
What is often the cause?
What does masturbation lead to?
What is the treatment of masturbation?
What is meant by sexual neurasthenia?

CONGENITAL ANOMALIES, INJURIES, AND DISEASES OF THE URETERS, PELVES OF KIDNEYS, AND KIDNEYS.

CONGENITAL ANOMALIES OF THE URETERS.

Anomalies of these organs occur most often at the upper or kidney-end, but the bladder-end is also occasionally involved.

Double ureters have been frequently observed. In most cases the ureteral opening is into the usual place in the bladder, but once in a while they have been noticed to have abnormal locations in the bladder, and may even end in the urethra. Urethroscopic, cystoscopic, and skiagraphic examinations will often verify a diagnosis. The treatment is necessarily an operative one if it is deemed advisable.

INJURIES TO THE URETER.

Symptoms vary with the exact nature of the injury: whether or not complete passing of urine from the kidney has occurred; whether only a crushing injury has transpired, and then, in the course of some days, a necrotic condition and perforation arise, allowing a collection of urine in the retroperitoneal space. If the injury to the ureter opens up the general peritoneal cavity, the urine escapes chiefly into it, and then in a short time the symptoms of septic peritonitis arise. Urine in the peritoneal cavity is diagnosed by a decrease in total quantity of urine voided and the signs of fluid by rectal and vaginal examination. In women aspiration helps.

Diagnosis.—It is to be remembered that a careful palpation through the abdomen is necessary, and the lower end can often be felt through the vagina and also through the rectum.

From the foregoing it must be noted that the quantity of urine passed by the urethra is less than normal, besides, whether or not it is tinged with blood; the gradual or rapid formation, with severe symptoms, of a fluctuating tumor in the course of the ureters, or especially the lumbar regions, from which, by aspiration, a hemorrhagic urine may be gained. Whenever the symptoms are progressive, an incision which will reach the ureter extraperitoneally should be made. If the symptoms subside, no immediate operative interference is necessary. In cases of complete destruction of the ureter it may even be necessary to remove the kidney. If, at the time of operation or after the establishment of a fistula, injury to the ureter has occurred, anastomosis, by one of the many operations proposed for these conditions, may be undertaken. In all vaginal and abdominal operations great care must be taken to avoid the ureters. Even catheterization and allowing catheters to remain *in situ* during an operation have been advocated, in order to furnish fixed landmarks of the course of these organs with relation to the deep operative field.

DISEASES OF THE URETER.

Ureteritis, an inflammation of the ureter, may occasionally arise primarily, but is most often an extension from some inflammatory process either descending from the kidney or ascending from the bladder. *Ureteritis cystica* is a distinct disease and may exist *per se*. It consists of cystic formations covering more or less the entire mucous membrane surface of the ureters. Other benign tumors, such as the benign polypi of the bladder, have been frequently observed. Malignant tumors, however, such as carcinomata, are almost always secondary. Stones may lodge in the ureter, either wholly or partially obstructing the flow of the urine, or may even be situated in a sacculation of the ureters. Valves, strictures, or angulations, as well as all the preceding conditions, may give rise to hydronephrosis.

Diagnosis.—All points regarding kidney and bladder symptoms must be excluded, and on palpation in the acutely inflamed area, tenderness is present. In the chronically inflamed, a thickened ureter may be felt.

Periureteritis, probably due to the passage of stones through the ureter, may occur.

The **treatment** in all except acutely inflammatory cases must necessarily be operative.

Hydronephrosis.

Causes.—This is a dilatation of the pelvis, and, in the further course of the calyces of the kidney, and due to a mechanical obstruction of urinary outflow: in other words, due to retention of urine. This obstruction is situated either low down in the ureter or high up where the ureter is attached to the pelvis of the kidney. It may be congenital or acquired. The obstruction, when low down, may be caused by impacted calculi, by distortion, or by compression of the ureter by tumors or cicatricial processes following inflammatory conditions or even traumatism. Or the obstruction may be an artificial one, caused by the ligation of the ureter during an operation. Obstructions near the attachment of the ureter are caused either by sacculation of the pelvis or by formation of obstructing valves or folds. Partial obstruction may be due to tangential insertion of the ureter, the latter being drawn to the kidney through inflammatory adhesions. The condition of floating kidney may bring about temporary obstruction and temporary hydronephrosis by twisting and bending of the ureter. This may recur, followed, perhaps, by periods of rest—the so-called *intermittent hydronephrosis.* Through the pressure which becomes increased through the additional quantities of fluid, aided by the remittent character, the parenchyma of the kidney atrophies, either partially or totally, so that in extreme cases only a sac is to be found, without any trace of secreting tissue. If the hydronephrosis is a moderate one, the kidney is to be palpated as enlarged. Larger accumulations make the kidney appear as a fluctuating,

elastic tumor of considerable size. Dislocations of these tumors are not uncommon, so that quite often they have been mistaken for abdominal tumors—for instance, for ovarian cysts.

The **symptoms** may vary with the cause. A condition resembling that of an increasing tumor may gradually arise when due to a gradual but increasing pressure on or gradual narrowing of stricture of the ureter, which may be of an inflammatory type; or the symptoms may arise very acutely when due to an obstruction by stone, or by an acute bend in the ureter, as in case of a floating kidney. When slowly forming, the symptoms are usually loss of appetite, constipation, nausea, feeling of fulness in the abdomen, and later a dull ache, and even pain in the back, which may radiate to the genitals. All these symptoms may arise suddenly with the greatest acuteness. There may be marked vomiting, and a rise of temperature may occur. Whenever the sac is of large dimension, any traumatism may cause it to burst. If of long standing, the entire kidney parenchyma may have become destroyed. It may become infected at any time, and should this occur, the condition becomes more grave.

If the obstruction is only a partial one or can be removed by replacing the kidney,—as in cases of hydronephrotic floating kidneys,—the tumor disappears and a large quantity of urine is passed. A hydronephrosis may become infected and suppurate in consequence, being then termed a pyonephrosis, and presenting signs of acute inflammation, tenderness, and fever, and the discharge from the sac, so that the urine contains pus and blood.

If a hydronephrotic tumor becomes of very large size, symptoms of compression in the abdominal cavity may appear.

Treatment.—In cases of floating kidney the therapy consists in anchoring the kidney by nephropexy. If the seat of the existing ureteral obstruction is diagnosed, it is necessary to cut down to this place and eliminate the obstructing factor (ureterotomy for impacted calculus). If malformations in the ureteral attachments are suspected, the pelvis of the kidney is split open and the necessary plastic operation is

performed. In very rare cases total or partial extirpation of the hydronephrotic sac is indicated. If only a small amount of secreting tissue is left, complete restoration of the renal function is always to be hoped for if favorable conditions for the outflow are provided and the hydronephrotic pressure relieved.

Suppuration of the hydronephrosis calls for evacuation through a lumbar incision. If a fistula remains after any of the operations and it cannot be relieved, nephrectomy may become necessary. There may be exceptions, but most operations are best done by the retroperitoneal route. So-called conservative methods have also been used. Aspiration, repeatedly carried out on one and the same patient, has been followed by good results. It is, however, not to be advised, but may be considered as a palliative method. Catheterization of the ureter may also afford relief, but can scarcely be expected to give permanent relief, except if a distinct stricture were the cause. If an organic stricture of the ureter is suspected, catheterization had best be omitted on account of the manifest dangers of puncture.

Pyelitis.

Causes.—Pyelitis is the suppurative inflammation of the renal pelvis and calyces. The condition may either be an acute one or is chronic, with occasional exacerbations. It is produced either by ascending infection through the bladder or by local conditions; at the same time kidney abscesses or the so-called surgical kidney may arise. Chronic retention of urine in the pelvis or the presence of calculi may lead to circulatory disturbances and secondary infection. The bacillus tuberculosis may also produce pyelitis. Some authors claim that certain drugs may, by their chemical action, produce suppurative inflammation of the kidney.

Symptoms.—These are variable clinically. In acute infectious diseases, where a concomitant kidney affection occurs, there are irregular fever, nausea, vomiting, colicky pains, pains in the back, radiating, with tenderness over the affected area.

The symptoms of pyelitis are deep-seated pains in the small of the back and in the region of the kidney. The pain quite often radiates into the hypogastric regions. The fever is usually of a remitting character. Acute attacks or exacerbations are marked by chills. The urine shows pus-cells, red blood-corpuscles, and a great many epithelial cells. The urine is turbid, because pus is thoroughly mixed with it; it is usually of a light-brown color, and the quantity is greater than normal. In order to decide whether the pus comes from the bladder or from the kidney, and from which or from both kidneys, cystoscopy and ureteral catheterization are the most certain methods. By observing the ureteral opening through the cystoscope, pus may be seen exuding, while if no cystitis is concomitant, the inspection of the bladder-wall will reveal a normal condition. In doubtful cases ureteral catheterization will show which kidney is diseased. If the pyelitis leads to considerable accumulation of pus, on palpation the kidney may be felt as a large and very tender tumor. The urinary examination must be carried out carefully in these cases. The efficiency of the kidney is established with the methods already described elsewhere. The amount of pus and the quantity of albumin should be accounted for.

If the kidney is not opened surgically, pyelitis may lead to perinephritic abscess, which may perforate to the surface, thus establishing a renal fistula. Through such fistula calculi may occasionally be voided. In all cases in which pyelitis is of long standing, or where the acute symptoms are very urgent, nephrotomy is indicated. After this drainage must be continued until all signs of inflammation have disappeared. If ureteral obstruction is present, this should be attended to at the time of the nephrotomy. If abscesses of the kidney are very diffuse and the condition complicates pyelitis, nephrectomy must be undertaken. Some cases of pyelitis may be benefited by general treatment and by the drinking of certain mineral waters. In connection with the treatment regular catheterization and irrigation of the pelvis with antiseptic fluids might be of service and undertaken in certain cases.

The **prognosis** is always serious. If pyelitis is bilateral, it is especially gloomy.

CONGENITAL MALFORMATIONS OF THE KIDNEY.

Horseshoe kidney is probably always due to the union of the two lower poles, thus giving the shape that the name implies. It is comparatively common. Again, a *single*, but usually much elongated, kidney, rounded and flat, is occasionally seen. There may be more than two kidneys. All these deformities necessarily change the form, position, and number of kidneys, and practically constitute all the malformations that may occur. However, a rudimentary kidney (a *hypoplasia*) on one side, or a complete absence of one kidney (*aplasia*), or an abnormally large kidney (*hyperplasia*), are occasionally met with.

INJURIES TO THE KIDNEYS.

Injuries to these organs are comparatively infrequent, as the kidneys are quite thoroughly protected, yet as they are of importance, it will be best to mention them. They may either be—

1. Injuries without any external wound.
2. Injuries with open wounds.

The mechanism is varied, yet direct injuries are the most common. Of the first variety there are different degrees, and for all practical purposes these may be classified as follows:

1. Crushing injuries to the parenchyma, to the perirenal tissue, and even complete separation from the ureter and vessels.
2. Tears of the capsule with the parenchyma of the kidney.
3. Contusions of the fatty capsule, with or without contusion of the kidney parenchyma.

In the second class of cases the injuries resulting from stabs or gunshots are the most frequent. They are, however, often accompanied by injuries to other organs. If this is not the

case, then whether or not there is involvement of the vessels or the peritoneum is to be considered.

The **symptoms** must naturally vary with the precise nature of the injury. With or without traumatism to any other part of the body, *shock*, with its concomitant symptoms, may occur at once and continue for hours. *Pain* may arise at once, or first make its appearance later, and may be very mild in character or most excruciating. It may become progressively worse if the ureter has become severed or injured or obstructed, with secondary hydronephrosis, and if hemorrhages occur in the different layers of the tissue about the kidney. Crushing or other injuries may show in the soft parts, or even the spine and ribs may indicate *externally the effects* of the same, and then, of course, take part in the symptoms. *Hæmaturia*, whenever present,—and it is present in the larger number of cases,—is of the greatest import. It is absent in those cases which do not affect the pelvis, and in the light injuries, or in those grave injuries where there is complete tearing of the ureter. The hemorrhage may be steady, so that the flow down the ureter into the bladder is constant for some time, or it may be so slight that microscopical examination of the sediment of the urine may be made in order to detect it. Hemorrhages which occur at a later period,—days to weeks,—really secondary and due to the breaking down of a clot, may occur. Or, again, an *anuria* following immediately upon the injuries has been noted, due to a reflex action. But wherever the kidney is injured, the *total quantity* of urine is *usually diminished*. In either state the symptoms of *uremia* may occur. In the grave cases, catheterization should be undertaken, as the patients are unable to urinate; this urine should then be examined carefully. Palpation of the parts should be undertaken cautiously, and sometimes it may be advisable to palpate under anesthesia, in order to outline any swelling that may have arisen from the accident.

The **prognosis** varies with the severity of the cases, but is naturally grave.

The **treatment** is practically symptomatic. Shock, hemorrhage, and the progressive formation of swelling are the

important factors to be taken into consideration. It is best in all other cases to be conservative in the treatment. Absolute rest in bed, ice pack to the parts, hypodermic injections of morphine to conquer the pain, and diluents for the urine are needed. Shock may mask the signs of an internal hemorrhage, and this should not be forgotten, for in the latter case surgical interference is imperative. It may demand either a simple nephrotomy or again nephrectomy may be called for, depending entirely upon the character of the injury. Complications, as uræmia, secondary infection, etc., require their regular treatment.

THE "ESSENTIAL" HEMORRHAGES FROM THE KIDNEYS.

Causes.—Hemorrhages from the kidneys are not uncommon, occurring in cases of stone, tumor, traumatism, following violent exercise, floating kidney, tuberculosis, nephritis, or any inflammatory condition, hydronephrosis, during lactation, periodic hemorrhages due to oxalates, and any condition causing congestion of the kidneys, and, finally, in individuals suffering from hæmophilia. Originally, certain hemorrhages whose cause could not be differentiated, even if belonging to any of the foregoing classes or not accountable by any toxic or infective cause, were called "essential" hemorrhages. This term, however, is used only when a hemorrhage occurs from the kidney in which no pathological condition can be found, and when the hemorrhage can be accounted for only by *angioneurotic disturbances*, the vessels dilating to such an extent and bursting, hence causing the appearance of blood in the urine. Since this use of the term has been made, "essential" hemorrhages have been few in number, and it is necessary to be extremely careful in making the diagnosis. In some of the cases severe pains—neuralgia—in the lumbar region have accompanied the hemorrhages, and these may be of any grade of severity.

Diagnosis.—It is necessary to ascertain, by the aid of the Harris segregator or with the cystoscope, best with catheterization and the cystoscope, whether the hemorrhage occurs

from one or from both kidneys, and then to exclude all the causes mentioned.

The **treatment**, if the hemorrhage is not severe, consists of milk diet, rest in bed, hydrastis, and ergot. However, if the hemorrhage continues or becomes progressive, *nephrotomy* is to be advised. If the diagnosis has been correct, tamponade is to be employed. Tuberculosis, tumor, stone, and other pathological condition, if found to be present, may demand a different procedure. Nephrectomy is to be done only whenever the hemorrhage can be arrested in no other manner.

Kidney Neuralgia.

This condition has become less common as accurate diagnosis has become more common, because all the pathological conditions enumerated under hemorrhages have also been found to be the cause. Hence whenever an operative interference is done for the relief of this symptom, certain pathological conditions are almost always found.

Floating Kidney.

Causes.—It is due to anatomical conditions. The fixation of the kidneys in their position is a relatively unstable one. In no case is the kidney absolutely fixed, for there occurs a movement imparted by respiration. Whenever the kidney becomes movable beyond this limit, it has been termed a "floating kidney."

Diagnosis.—Such a kidney may be found in different positions in the same individual—oftentimes in the pelvis. Bimanual palpation, sometimes under anæsthesia, establishes the correctness of the diagnosis.

The **symptoms** are most variable: nausea, vomiting, constipation, icterus, palpitation, and, in women, symptoms referable to the internal genitalia. Occasionally most acute symptoms arise, due probably to some obstruction of the ureter.

The **treatment** depends upon the severity of the case as shown by the symptoms. Bandages, corsets with the aid of certain supports, may fix the kidney in such a way as to free

the patient from every symptom while the apparatus is worn. However, operative procedures obviate all braces, and ideally are correct, but many recurrences have been recorded. These are often due to not selecting the proper operation. If this occur, another operation—one particularly adapted to the case—should be undertaken. All the operations aim to reach the kidney by a retroperitoneal route, yet differ in the manner of "fixing" the kidney. The operation is called *nephrorrhaphy* or *nephropexy*.

Syphilis of the Kidney.

Syphilis, either acquired or congenital, manifests itself in three ways: (1) *Diffuse nephritis;* (2) *Amyloid degeneration;* (3) *Gummata.*

In cases of syphilitic nephritis there are fatty degenerative changes, occurring usually in the secondary stage, and practically giving rise to the symptoms of an acute Bright's disease. In cases of amyloid degeneration the liver and spleen are also thus affected. Gummata may occur in any part of the kidney, and any number may be present. All forms may be associated with one another.

Symptoms.—The clinical signs may resemble tumors of the kidney, and at the time of the breaking down of the gummata tuberculosis especially must be excluded. Only in the latter cases, practically, is surgical interference necessary—nephrotomy and removal of the necrotic tissue. In all the varieties antisyphilitic treatment is absolutely necessary.

Tuberculosis of the Kidney.

The probable mode of infection in the large number of cases is by way of the vascular system from some initial source. It may, however, ascend from the bladder or by direct extension from the neighboring organs.

Tuberculosis appears either as miliary tuberculosis or in the form of solitary tubercles, depending upon the gravity of the infection. The former manifests itself by minute tuberculous nodules scattered throughout the kidney or just

under the capsule, which appear as gray granulations in the tissue between the tubules. If these nodules are crowded together and break down, cheesy degeneration of the kidney takes place. The kidneys may become enormously enlarged and uneven on their surface, and the capsule much thickened. With the progress of the cheesy degeneration large cavities are formed which fill with detritus and pus. Whenever such a cavity empties itself into the pelvis, it gives occasion for obstruction of the ureter and for retention. The solitary tubercles are found as rather large nodules in the pelvis or in the parenchyma, microscopically containing giant-cells surrounded by round-cell infiltration. Sometimes calcification may set in, and the kidney may retain its normal shape and size; or, again, a fibrous change occurs or paranephritic abscesses may form. In any of these cases tuberculosis of the ureter may occur, and the ureter may become enormously thickened. Tuberculosis is readily transplanted from the ureter to the bladder, either from above the detritus and urine or by direct extension of the tuberculous process.

In all cases of tuberculosis of the kidney it is of the most vital importance to determine whether or not both kidneys are affected. From the pathological outline it can readily be seen that there can be no uniformity of symptoms; hence the possibility of its presence can only be surmised. The beginning of an attack may be entirely free from any symptoms, and if calcification sets in, no symptoms whatever may arise.

Symptoms.— While miliary tubercles do not necessarily give rise to kidney symptoms in the early stages of the disease, the first symptom may be pain on urination, and even tenesmus with pain at the end of urination, and the passing of large quantities of urine. Afterward, pain in the lumbar region, with tenderness on pressure, appears. The urine contains albumin, pus, and detritus in which tubercle bacilli and casts may be found. Vesical irritation then usually becomes a prominent symptom. Again, the course of the disease may be entirely different. The symptoms may be tumultuous in their onset, the pain most severe and sometimes colicky.

The bladder symptoms are greatly aggravated. The kidney may rapidly enlarge and be palpated, and the urine show albumin, casts, detritus, red blood-corpuscles, epithelial cells, and, in order to make an absolute diagnosis, tubercle bacilli must be found in the sediment of the urine.

These most acute symptoms may, however, subside, and in both instances the kidney may or may not be found to be enlarged or have a nodulated surface, and the seat of constant dull or even acute pains. Dysuria, tenesmus, pain on urination, pyuria, and even hæmaturia may all be present in a variable degree. Exacerbations in such a course are not at all uncommon. It is not unusual for such a course of symptoms to extend over a period of years.

Diagnosis.—Tuberculin injections may be of service. In tuberculous kidneys usually a greater number of tubercular germs appear in the urine, with more detritus and even blood, greater tenderness over the area of the kidney affected, and a general rise in temperature. This is of the greatest importance in differential diagnosis. Sooner or later constitutional symptoms are present, and manifest themselves by fever, malaise, weakness, and cachexia.

Surgical Treatment.—It is important to know whether the disease involves one or both kidneys, and the severity with which each may be affected. This may be done, as already described in another chapter, by the following methods: cystoscopy reveals the presence or absence of bladder diseases; methylene-blue or phloridzin reveals the efficiency of the kidneys; besides, the collection of the urine separately from the two kidneys, either by the aid of catheterization or of the cystoscope, by which one or both ureters may be catheterized, or of the Harris segregator, and an examination the separate specimens microscopically, bacteriologically, and chemically for pathological elements. Cystoscopy discloses the "efficiency" of the kidneys. Urine may also be injected into guinea-pigs in order to establish the presence or absence of the germs.

Medicinal Treatment.—In all cases this should be instituted, whether or not surgical interference is to be undertaken.

The large majority of surgeons favor immediate interference; however, all doubtful cases should be treated hygienically and medicinally with the usual antituberculous remedies. In all cases where there is no improvement and where the urine continues to be acid and the bacilli to be present, and where the symptoms increase in severity, it becomes necessary to operate. If the symptoms are very acute, such as colicky pain, hemorrhages, and severe pain, progressive at once, surgical intervention should be carried out at once. If it is proved absolutely that there is a second kidney and that there is a normal elimination of solids, hence absence of pathological conditions, the entire diseased kidney should be extirpated (nephrectomy), or if but one pole is affected, a resection is to be done, thus removing the entire diseased parts. Formerly, when the condition of the other kidney was not known, a simple nephrotomy was performed. If both kidneys are affected, certain conditions, as pain, hemorrhages, etc., may also demand nephrotomy; however, a resection might also remove the pathological area; hence this may be indicated in some cases. Nephrotomy is also performed as a preliminary step to a nephrectomy. Here acute symptoms may thus be alleviated, and then the secondary step becomes more free from danger. If the ureter is involved, it must, necessarily, be removed at the time of nephrectomy.

Renal Calculus.

Causes.—Stones in the kidney may originate in the tubules, in one of the calyces, in the pelvis, or in any part of the kidney. They may be dislodged from their situation and passed on into the bladder, or they may remain in their original site and enlarge through additional depositions of urinary solids. The form and size of the stones are influenced to some extent by their location. Those of the parenchyma are usually small—of a bean-like appearance; if in the pelvis, they may take the form of the part they fill. The most common forms of renal calculi are those of uric acid and oxalate of lime. In rare instances the carbonate and phos-

phate of lime and ammonium-magnesium phosphates are found, and rarely cystine and xanthine stones occur.

Etiology.—The etiology of renal calculi is somewhat obscure. It may be that in some cases a shred of pus, a coagulated blood particle, mycelia of some kind, or some necrotic tissue débris acts as a nucleus around which a deposition of the constituents of the urine takes place. Recent researches serve to support the theory that at least a part of the renal stones are formed under bacterial influence. Stone is more common in some countries than in others. Certainly, age and mode of living seem to be etiologic factors in their formation. They are much more common in the male sex.

Stones which do not produce any inflammation and do not obstruct the urinary outflow may be retained for a long time without giving rise to any special symptoms. Stones in the tubules quite often cause symptoms which are in no way related to the size of the stones, and are sometimes accounted for by the increased tension upon the kidney capsule. Stones in the pelvis may give rise to chronic dilatation of the pelvis and eventually to suppuration. Every stone, however, must act as an irritant and be the forerunner of chronic inflammatory or degenerative changes in the parenchyma of the kidney. These, of course, may be variable, depending to some extent upon whether or not the urine from the kidney harboring the stone remains sterile. Infection usually sets in, and pyelitis and nephritis follow. This infection may be ascending or may be hematogenous. A stone may occlude the ureter and a hydronephrosis or pyonephrosis result. It can be stated almost positively that any long-continued process of this kind will always influence the other kidney in some degree.

The **subjective symptoms** of kidney stones, if there are any, are variable, depending upon whether or not the stone is fixed in the parenchyma, whether movable, so that it may cause obstructive symptoms from the ureter, and whether or not infection is present; they usually, however, consist in dull pain in the renal region, often increased by exercise. If the stone is not movable and if no infection is present, pain may be slight or absent. Again, pain may be constant, and in-

creased on pressure in the lumbar region. The bladder, as a rule, is in an irritable condition, but may be perfectly normal, and yet severe pains in the bladder region may occur; tenesmus, with or without pain, and frequent urination may all be present. The microscopical examination of the urine reveals epithelial cells, and almost always red blood-corpuscles—sometimes sufficiently distinct to be seen macroscopically. If infection is present, pus-cells are also necessarily present. The urinary findings, especially of blood, are of importance. The renal stones—necessarily small ones—passing into and through the ureter occasionally become impacted and cause special symptoms which are classed under the name of "renal colic." This attack is brought about by the obstruction in the ureter, by the stretching of the ureteral tissues, and by the spasmodic contraction of the ureteral wall in efforts to get rid of the impacted stones. The symptoms are: the patient is suddenly seized with severe pains, which usually start in the renal region and radiate in almost any direction —into the hypogastrium, the spermatic cords and testicles, the bladder, the glans penis, etc.

This pain may arise during sleep or at any time, and may be so severe that the patient collapses, faints, falls into a cold perspiration, temperature rises and respiration increases, and pulse becomes small and rapid. Nausea and even vomiting set in, and tenesmus is followed by the voiding of small quantities of a highly colored and even bloody urine. If infection is present, pus may also be present in the urine. The urine may cease to pass from the kidney if the obstruction of the ureter is complete, which is then a *retention anuria* of this particular side, but in addition a *reflex anuria* of the other kidney is possible, and the secretion of all urine is then completely arrested; signs of collapse arise; perhaps death may follow from the uræmia. The duration of the attack is variable, according to the time which it is necessary to relieve the impaction. The attack ceases promptly as soon as the stone is delivered into the bladder, or when its position inside of the ureter is changed in such a way as not to provoke the spasmodic contractions.

Whenever kidney stone is suspected it is advisable to learn the anamnesis as to the character of the pain, whether or not there have been previous attacks, etc. The examination, especially by palpation of the kidney, may give information. The examination of the urine, catheterization of the ureters, or collection of the urine with the segregator may be of the greatest importance. The chemical, physical, and microscopical examination of the separated urine from the two kidneys is often of vital interest. *The examination with the Röntgen rays is often sufficient to show the presence or absence of stone, and in other cases substantiates a diagnosis.*

Treatment has in view the removal of the stone or stones, the improving of any pathological conditions caused by them, and also the prevention of their recurrence. To remove stones surgical interference must be depended on, although whenever a uric acid or other diathesis is present, urocedin, piperazin, urol, carbonate of lithium, and alkaline mineral waters are serviceable. In case of severe pain, morphine in sufficient quantity to control it must be given. Whenever renal colic is present, hot packs, diuresis, and catharsis should be invoked. In all cases the stone should be removed, and not the kidney, if relief can thus be obtained. Whenever there is severe hemorrhage, or whenever there is reflex or retention anuria, or if signs of an acute infection are present, these are all indications for an immediate operation. Repeated attacks and infection are sufficient causes for operation. Only when the urinary, the physical, and the Röntgen-ray examination are negative, and when the anamnesis is not absolutely positive, operative interference is not to be urged.

The incision of the kidney (*nephrotomy*) is the operation of choice in most cases, even if the stone is in the pelvis of the kidney, on account of the poor results in pyelotomy—*i. e.*, incision into the pelvis. In cases of impaction in the ureter it may become necessary to incise the ureter in order to remove the stone. Only when the entire kidney parenchyma is destroyed or where the impaction is so severe is it necessary to remove the kidney (*nephrectomy*).

Tumors of the Kidney.

Tumors may arise from the kidney substance or from the pelvis of the kidney. Those arising from the fatty capsule and suprarenal bodies are not uncommon, and, as they cannot always be differentiated clinically, they are of great significance and will here be considered.

The **benign tumors**—angioma, lymphangioma, osteoma, and enchondroma, lipoma, fibroma, and adenoma—are comparatively uncommon and rarely diagnosed. Occasionally, when they become of sufficient size, it is possible to palpate them, especially the lipoma or lipomyoma; these are often under the capsule and may reach the size of a hen's egg.

The **malignant tumors**—the primary sarcoma and cancer, angiosarcoma, endothelioma, perithelioma, adenosarcoma—are the more common and of the greater importance.

The primary sarcoma may occur at any age. Pathologically, the tumors are of mixed types—may be either single or multiple. As regards primary cancer, it appears in two ways: as *nodules* distributed throughout the kidney or *diffusely* throughout the parenchyma; the former referred to as *nodulated*, and the latter as the *infiltrated* varieties. They may vary from the soft or medullary to the hard or scirrhus types. Necessarily the tumors vary in their palpatory findings. Besides, the malignant tumors do not necessarily show marked symptoms.

The adenosarcoma or the embryonal sarcoma arising in childhood, commonly in the first to the fourth year, are of much importance, and take a rapid and malignant course. Hemorrhages are comparatively uncommon, and metastases are often present.

Cystic tumors of the kidney are of different types: (1) Cystic degeneration of the kidney; (2) echinococcus cysts. As regards the former, *solitary* cystic formation has no practical significance, as but small quantities of the kidney parenchyma become destroyed. But when there is *polycystic* degeneration, in which the entire kidney substance may become destroyed, it is of much importance. It is usually congen-

ital, although it may develop during life; if the former, then usually both kidneys are affected. Children do not live long under it. Practically, the only sign is the finding, in the region of the normal kidney, of a large tumor studded with rounded nodulations. The acquired form is of greater significance, and the diagnosis is not easily made. The tumor is first felt on one side and later also on the other side. It may give rise to renal colic, and, of course, to symptoms like any other kidney tumors. A trace of albumin and hypertrophy of the heart may occur.

Treatment.—If solitary cyst, extirpation; if multiple, with severe symptoms, nephrotomy and drainage or aspiration may give relief. *Whenever total extirpation is undertaken, the second kidney must be free from disease.*

The **echinococcus cyst** has been met with, although it is very uncommon. The cyst develops slowly and comparatively without symptoms; only when it is of large size does it become noticeable. If such a cyst bursts and empties itself into the pelvis, the urine will show the *hooklets* and *daughter cysts* which are so characteristic of the echinococcus, and the diagnosis is established positively. Nephrotomy, with suturing of the walls of the cyst to the edges of the incision, and thorough drainage are indicated.

Secondary infection of the raw wound-surfaces is very common in echinococcus cysts. It is best, therefore, always to protect the entire field carefully with gauze pads and, when possible, not to open the mother cyst at all, but rather to ablate it "in tact and in mass."

Tumors arising from embryonal suprarenal tissue occurring in the kidney are called hypernephroma. Their classification is still in doubt, yet they have the characteristics of both sarcoma and carcinoma. Their course is usually quite slow, and consequently there are apparently no symptoms. They occur usually after the fortieth year. There may be a dull pain in the lumbar region, and later a tumor may be felt, or colicky pain may arise suddenly, and then blood in the urine may be noticeable. Metastasis may also arise, hence operative interference is advisable.

Diagnosis.—In tumors of the kidneys it is to be remembered that certain tumors arise in the first years of life, another class after middle age, and that syphilis and tuberculosis are more frequent in the intervening period. Tumors are readily palpable in individuals with lean abdominal walls, and in those cases in which individuals are stout and have rigid abdominal walls the tumor may become of large size before palpation becomes possible. If progressive enlargement can be made out from time to time the diagnosis becomes certain, but the time for operative interference has possibly been passed. The tumors may give an outline of the kidney and of the pelvis; the body may be covered with nodules, or it may be uneven, etc. The consistency varies, of course, depending upon whether it is cystic or scirrhus, etc. The radiograph may give the outline of the tumor and of the kidney. If a metal bougie is passed through the ureter and a skiagraph is then taken, valuable information regarding the topography may be obtained; this information may be useful at the time of operation. The urine may contain débris, possibly numerous tumor-masses, epithelial cells, and blood. The last may coagulate within the ureter and take the shape of the ureter. The quantity may be large or small. Microscopical examination of the sediment will not always give the key to the diagnosis. Chemically, albumin is usually found to be present. Dull pains in the lumbar region are common. "Renal colic" may rise if particles cause obstruction. Symptoms of vesical irritation may also occur. Varicocele on the affected side has been noticed and is of some significance. In malignant tumors radiating pains and cachexia appear.

Perinephritis.

By this term is meant usually a chronic inflammatory process of the fatty capsule and a secondary thickening and contraction. It may also become a purulent process. In the case of tuberculosis of the kidney, stone, nephritic abscesses, etc., paranephritis is always a secondary process, and the term

is often applied when the process has gone on to suppuration —*i. e.*, paranephritic abscess. However, such a condition may arise where the urine has always been negative and where the kidney is healthy at the time of operation. In the latter cases, where there may be a history of traumatism or over-exertion, if simple drainage of the abscess is made, a rapid recovery often results. This is not the case if the kidney is affected—here the operation depends upon the cause, and naturally the course varies. The clinical course is not always the same, and the etiologic factor must be searched for. The onset is often very sudden, with acute symptoms of chills, fever, and then local signs of a phlegmon—pain, often radiating, increased on motion and on palpation, swelling, and later even redness of the skin. Nausea and vomiting may arise; the temperature becomes lower, but remains irregular.

The **diagnosis** cannot always be made very early.

Treatment is always operative, and the incision always from the lumbar region.

REMARKS ON THE OPERATIONS ON THE URETER, PELVIS OF THE KIDNEY, AND THE KIDNEY.

In regard to the surgical procedure involving these organs, a few general facts should be understood.

The kidneys and ureters are protected anteriorly by the peritoneum. It is best to avoid entering the peritoneal cavity, thus probably preventing the urine from entering such cavity, and avoiding subsequent infection by the germs gaining access thereto. It is positively known that bacteria may be eliminated by way of the kidneys through the urine, and the latter contain no pus. In order to do this the so-called lumbar or retroperitoneal route should be taken. In cases of large tumors, in certain cases of floating kidneys, or where an operation must be performed rapidly, or in obstruction of the ureter, an incision passing through the protecting layer of peritoneum may become advisable; this is called the *transperitoneal route*.

Therefore, the *retroperitoneal incision* is the incision of

choice in the larger number of cases. The incisions vary in number, each being advocated for some particular purpose; hence it will be impossible to give more than an outline. However, these incisions may be used for interference on the ureter, pelvis of the kidney, or kidney, no matter what the indication is. It may be a stricture or stone of the ureter, pyelitis, hydronephrosis, perinephritic abscess, for resection, or for therapeutical effects on the kidney, as splitting the kidney capsule in cases where the tension within is increased and where the capsule has become secondarily thickened, injuries to the parts, floating kidney, or whenever incision or excision of kidney is demanded.

NEPHROTOMY, NEPHRORRHAPHY, AND NEPHRECTOMY.

Nephrotomy.—This is an operation for opening the parenchyma of the kidney or the kidney pelvis. The incision of Simon begins at the twelfth rib, runs down in a vertical line to the crista iliaca, parallel to the anterior border of the sacrospinal muscle. This incision is often insufficient, as it does not allow a thorough manipulation of the kidney. It has the advantage of not causing much tissue laceration. Another incision, also a lumbar incision, is made, so that the direction runs obliquely from behind forward, commencing at the outer edge of the erector spinæ muscle. After the skin and fat are split, the muscles are either severed by cutting or separated by blunt dissection, which should follow the course of the fibres of the muscle. After this is done the renal fat is passed through, and the kidney itself is approached.

Nephrorrhaphy.—For the anchoring of a floating kidney different methods are devised. While several operators are satisfied with laying sutures through the parenchyma of the kidney and the adjacent muscles, others strip off the renal capsule or form flaps out of the latter before suturing. Still others make a pocket for the lower half of the kidney, or try to secure the kidney in its normal position by producing granulation through the packing of the cavity or by closing the peritoneal pouch in which the kidney is movable. All

these methods, however, do not give a complete guarantee against recurrence.

In nephrotomy the kidney is shelled out of its fatty capsule, and by blunt dissection is made as movable as possible, so that it can be brought out of the incision or "delivered," as it is often referred to. This procedure, however, must be done very carefully in order not to injure or tear any of the blood-vessels which run in the renal pedicle. The nephrotomy itself may either consist in cutting the kidney substance open partly, or the kidney is split into two halves, by beginning the incision over the convex border and leading it down to the hilus—the so-called postmortem incision. If this incision is selected, digital compression of the pedicle will serve to prevent hemorrhage. After manipulation inside the kidney the organ may be closed by suturing entire, or a small space for the insertion of a drainage-tube may be allowed to remain. In all cases in which the kidney pelvis is incised drainage is to be instituted. Of course, the skin sutures may be partly or entirely united, depending upon the character of the operation.

Nephrectomy may be performed either by the above-mentioned incision or by the so-called transperitoneal incision. Here access is gained to the kidney by the usual laparotomy incision. The posterior parietal peritoneum is split, and the kidney is loosened and removed from its site. The ligation of the pedicle must be done very carefully, and the vein and the artery should be ligated separately.

In cases of tumors incisions or combination of incisions may be made. In certain cases both retroperitoneal and transperitoneal incisions may be necessary. Whenever entering from in front, the opposite kidney and ureter should always be palpated carefully in order to be positive of their presence and condition.

QUESTIONS ON THE ANOMALIES, INJURIES, AND DISEASES OF THE URETERS, PELVIS OF THE KIDNEYS, AND KIDNEYS.

Enumerate the anomalies of the ureters.
How would you diagnose and treat these conditions?
Do injuries to the ureters ever occur? How?

How are they diagnosed?
What is their treatment?
What is ureteritis?
What other pathological conditions of the ureters are met with?
What is their treatment?
What is hydronephrosis?
What is the pathology of this condition?
What are the causes of this condition?
With what is this condition often mistaken?
What are the symptoms?
Of what does the treatment consist?
What palliative methods are there?
What is pyonephrosis?
Give symptoms and treatment.
What is pyelitis?
What is meant by a "surgical kidney"?
What are the causes of pyelitis?
Give the symptoms.
How is the diagnosis made?
What is the prognosis?
Describe the treatment.
What are the more common congenital malformations of the kidneys?
Are injuries to the kidneys common?
For practical purposes, what classification can be made?
What are the symptoms in the different kinds of injuries? Give in detail.
What is the prognosis?
Give their treatment.
To what may hemorrhage from the kidney be due?
What is meant by an "essential hemorrhage from the kidney"?
How is the diagnosis made? Whether from one or both kidneys?
What is the treatment?
What is meant by neuralgia of the kidney?
What is a floating kidney?
How would you make the diagnosis?
Give the symptoms.
What treatment is to be advised?
Does syphilis of the kidney ever occur? In what different ways?
How is the diagnosis made?
What are the symptoms?
What should the treatment be?
What is meant by tuberculosis of the kidney?
What different pathological findings are there? In what manner do the ureter and the bladder become affected in these cases?
Give the symptoms. Do they differ in different cases? Why?
Is tuberculin useful as an aid to diagnosis in the doubtful cases?
What does the treatment consist of?
What aids are used in establishing the fact whether one or both kidneys are affected?
What are the operative procedures undertaken? What are the indications for each?
What is meant by renal calculus?
Where do they originate? Are the form and size influenced by any condition? What are the chemical constituents of the more common stones? What is probably a prominent etiologic factor?

Do all stones produce symptoms? If not, why?
If located in the pelvis, what symptoms may arise?
Does infection often occur in these cases? Why?
What are the more prominent symptoms?
How is the diagnosis made?
What is renal colic? Describe this condition.
Does reflex anuria ever occur in these cases?
In the diagnosis of stone, of what value are the X-rays?
What is the prognosis?
What should the treatment consist of?
Is it necessary to overcome the pain? If so, with what? Is medicinal treatment of any special value?
What operations are undertaken in these cases? What are the indications for the different operations?
Are tumors of the kidney ever met with?
What are the more common benign tumors? The malignant tumors? Are they primary?
Describe the characteristics that carcinoma may take. When do they occur? At what age is the adenosarcoma met with?
To what symptoms do tumors give rise?
What kind of cystic tumors are there?
Have the solitary cysts any great significance?
When there is polycystic degeneration, of what importance is this condition?
Is this condition congenital or acquired?
What is the treatment?
What is the echinococcus cyst of the kidney? How is it diagnosed?
What is the treatment?
What are hypernephromata?
What symptoms may they cause?
From what other tumors must they be differentiated?
Give the differential diagnosis of the different tumors.
Give the treatment for the different types.
What is a perinephritis? How do you account for the condition?
Give the symptoms.
What is the treatment?
Why is it best to take the lumbar route in operating on the kidneys and ureters?
In what cases is it necessary to take the abdominal route? Why?
In what cases is splitting the kidney capsule done?
Why would you take the retroperitoneal route? Why the same route in floating kidney, stone in the kidney, etc.?
Describe the operations of nephrotomy, nephrorrhaphy, nephrectomy. Give in detail the indications for these different operative steps.

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