ART. IV.—*Notes on the Urinary Diseases and Morbid Conditions of the Urine in Children.* By CHRISTOPHER FLEMING, A. M., M. D., M. R. I. A., Surgeon to the Richmond Hospital, Examiner on Medicine and Surgery in the Royal College of Surgeons of Ireland, &c.

DISEASES of the urinary organs, so common of occurrence in the more advanced periods of life, are occasionally met with in children, modified to an extent to entitle them to separate consideration. Difficulties often attend their investigation, and the symptoms which characterize their presence not unfrequently escape notice, as well from the carelessness of the ordinary attendants, as from the oversight of the practitioner. Yet they are a painful, a serious, and a distressing class of affections, and neglect in diagnosis at their earlier formation may lead to protracted misery, and often to incurable disease,—if life in the interim be not compromised. The principal varieties of these diseases at this period of life to which I wish to direct attention are,—irritable bladder, incontinence of urine, and retention of urine; and, in connexion with them, those morbid derangements in the secretion of this fluid, attention to which is often so valuable an assistant to our practice. These urinary complications are met with as attendants on febrile diseases—whether exanthematous or not—and on their sequelæ; and they are not unusual accompaniments of those chronic ailments, both glandular, cutaneous, and gastro-enteric, so very common at this period of life. It is, however, to affections distinct from these, that I shall now direct a few observations. I have met with them at all periods of childhood, during lactation and up to puberty, and either sex may be attacked by them; although I am of opinion, that they occur more frequently in boys, between the ages of eighteen or twenty months, and eight or ten years. At an earlier age than the former, they are very rarely, if ever, recognised, for reasons too obvious to specify, unless some palpable alteration takes place in the character or in the amount of urinary secretion.

Irritable Bladder.—Irritable bladder occurs much more frequently in young children than would at first sight appear, and this, where the irritability is not the consequence either of inflammation or of organic disease, although occasionally attributable to some abnormal defect. The mother or nurse of the child so affected states that the child is constantly applying the hand to the organs engaged; that it appears to suffer pain during micturition; that the act is frequent; that it is urgent, but when

the urine has passed off the child appears relieved; that often, if the urine falls on the floor or clothes, it rapidly becomes muddy and whitish, and it is even stated by some, that it is so at the moment of being passed; that when the child sits down for such purpose, it has an inclination to remain longer than is requisite, and in some cases, that there is a disposition to prolapsus of the rectum, from the forcing and straining attendant, and very frequently a discharge of bloody mucus from the rectum takes place; that these symptoms have continued for some time, notwithstanding the exhibition of medicines to regulate the bowels and produce other ordinary effects; that the child is losing strength and wasting in flesh; that the appetite is most precarious, and that there is a great desire for drink; that the quantity of urine passed is very variable, sometimes deficient; that its quality is equally changeable, at times being pale, at others, deep in colour, and again, clear and often muddy, and with copious sediment.

If accurate inquiry is now instituted, it will be found, that many such children are born of gouty parents, or of persons much subject to dyspepsia, and that they are children whose diet and habits of life are irregular; and in the humble walks of life that they are, in addition, irregularly clad and irregularly cleansed: such are by no means of unfrequent occurrence. The quantitative and the qualitative analysis of the urine satisfactorily explains the symptoms; and attention to the physical condition of this secretion, to its chemical constitution, and to the appearance of the deposits—particularly the deposits of rest—assisted by the microscopic characters of the latter, point out the curative indications which are suitable to each variety of case. It is beyond all manner of doubt, that, as in adult age, many practical hints can be taken from attention to the general constitution of the urine in the surgical diseases of these organs, and that in the child the normal essential constituents of this important fluid may be increased or diminished, and that abnormal ingredients may be superadded. We have here the lithic, the oxalic, and the phosphatic diatheses, and each has its special influence. In fact, with few exceptions,—and the presence of sugar in the urine of children is one worthy of note,—there is no derangement of the urine found in the adult which I have not also found in the child, in its most exaggerated form, both as regards the disproportion between its normal constituents, and the introduction of abnormal substances. I feel perfectly satisfied that attention to these details, as subsidiary means, will be found of value in the diagnosis and treatment of many of the diseases of children,

and especially in those cases of cerebral complication which so repeatedly puzzle the practitioner, and where the quantity of this secretion, on the one hand, is materially diminished, or, on the other, increased.

With a view to the practical study of the morbid condition of the urine, as auxiliary to the diagnosis and treatment of diseases of the urinary organs in the child, I find it difficult to condense my remarks so as to avoid the introduction of any irrelevant matter, and at the same time to escape the charge of an attempt to undervalue those more minute particulars to which, justly, much importance is attached. In my lectures on these subjects, I have been in the habit of directing attention to the colour and smell of the particular specimen under examination, to its chemical re-action, and to its density; and I have always attached very great importance to the *deposit of rest, as to shade and outline*, and to the transparency or otherwise of the supernatant fluid. From an analysis of these several leading features of urine I have derived the greatest advantage, and even, in the absence of any microscopic examination, have been enabled to decide in very many cases, with sufficient certainty for practical purposes, on the peculiar nature of the deposit. Of course in some, particularly the "non-crystalline organic deposit," the assistance of the microscope is often indispensable; but in children they do not constitute the majority of the cases met with. As attendant on the "irritable bladder," I would say that, according to the classification of urinary deposits by Golding Bird, those of uric acid and the urate of ammonia and of oxalate of lime are particularly frequent in occurrence; and that, next in order of frequency are conjointly or separately with these "the non-crystalline organized products," such as blood, pus, occasionally mucus, but very often indeed vibriones. It would be too great an occupation of space and of time to enumerate the many cases I have witnessed, as illustrative of these statements; they are of almost daily occurrence. I do not deny that phosphatic deposits are to be met with, but these deposits do not occur, under ordinary circumstances, as a substantive deposit in the urine of children. The prisms of the neutral triple phosphate are to be seen conjointly with the crystalline deposits above specified, just as in adults, but it is very rare indeed to meet with them as solitary deposits, although so frequent in advanced life; and it is equally rare to find them combined with that physical and chemical condition of urine almost necessarily present under such circumstances. Indeed I find it difficult to bring to my recollection—unless under the most aggravated form of vesical and renal disease,

complicated with phosphatic calculus in the child—that excessive secretion from the mucous membrane of the bladder which takes so very prominent a part in the formation of such deposit in advanced life. Amongst the numerous cases of urinary disease I have witnessed in the child, such is excessively rare, and it is equally rare as a symptom of calculus in the child. There was in one case a source of deception, which was by the merest chance unfolded to me, and which, perhaps, may be noted as confirmatory of Sir Benjamin Brodie's opinion as to the special source of those phosphatic salts in the urine.

In May, 1852, a boy, aged three years, was brought to my study by his mother, in great alarm from the suffering the child had endured for some weeks in passing urine. There was frequency and urgency, and so much forcing and straining as to produce distressing prolapsus ani. The urine was largely loaded with lithates, and contained a remarkably tenacious mucous deposit, deeply coloured with blood, and adherent to the glass. I found in it numerous blood discs and large crystals of the triple phosphate. Symptoms not improving, I felt justified in sounding the child, which I did with a silver catheter, and whilst the urine was escaping, a severe paroxysm, resembling a fit of the stone, occurred, during which a considerable quantity of gelatinous mucus escaped from the rectum. I collected the urine drawn off through the catheter in one test-glass, and the discharge from the rectum in a second. The urine was acid, the latter alkaline; the former was loaded with lithates interspersed with some crystals of oxalate lime, the latter, in addition to mucus, blood globules, and epithelial scales, was studded with large, distinct, triple phosphatic prisms. I merely mention these details incidentally, as interesting and not unimportant phenomena, and particularly in connexion with the statement of Sir Benjamin Brodie already alluded to. They were to me then novel, and I took the opportunity of showing the microscopic appearances and the specimens to my colleague, Dr. Hutton. I have since been enabled to confirm them.

I have said that the lithic acid and lithate of ammonia deposits, and also that of the oxalate of lime, are the most frequently met with in children, and they will be found to be productive of most decidedly distressing urinary symptoms. I have often found these deposits present conjointly; very often the oxalate of lime and the urate of ammonia, the latter cloaking the former, unless carefully looked for. I have found the red sand, as the lithic acid is sometimes termed, in the child, but it is

far more frequent to find the colourless, or nearly colourless, crystals of lithic acid, and all are met with of every variety of shape and form, and they are to be seen in the children of the poor as well as of the rich; and really it does not appear that diet very materially influences their presence or their character. I have a boy, aged about 7, now in hospital, with suspected calculus in the bladder, and in him numerous crystals of pale lithic acid exist in combination with oxalate of lime; whilst in another ward in the same hospital, there is a boy, somewhat about the same age, a patient of Dr. Hutton, in whom the red sand is visible to the naked eye in the test-glass, floating through the urine, and under the microscope the deep orange crystals are to be seen distinct, and in large aggregated masses. It is in this class of deposits, and in that of the oxalate of lime, that the surgeon requires to be more circumspect, as the physical and chemical characters of the urine are often not remarkable. The colour is in such cases often pale; the density very low, so low as 1007 to 1010; the deposit a mere tomentous, semitransparent cloud, but one which will not escape detection by the practised eye. The suffering experienced in some cases of this nature is really very great; and if the child happens to have a long narrow prepuce, or an abnormal opening in the urethra, he may be put to unnecessary torture from inattention to the morbid state of the urine. I have known such cases:—one, a fine child, the only son of a fond father, who lived freely, and thought the child could not do better; the other, a boy aged three years, with hypospadias, from which the child had not previously experienced any visible inconvenience. In each the usual traces of symptoms of irritable bladder existed; in each, the ordinary clear condition of urine diverted attention from the examination of its actual state; and in each, its normal restoration caused the subsidence of all annoyance. I do not dwell on the lithate of ammonia deposit; its characteristic appearance is too obvious to require any comment. I shall merely add in conclusion, as regards it and the other crystalline deposits noted, that when from their continued presence they produce local or general irritation, they demand the watchful care of the practitioner to put rigidly in force those dietetic and therapeutic means which are laid down in systematic treatises on the subject; and if the symptoms do not yield to such treatment, he should search for some local cause either in the bladder or in some portion of the organs implicated; and he should also bear in mind, that such character of urine is the most likely to lead to the formation of stone in the bladder, as proved by

its composition in the child, and by the fact of its being the most common attendant on its presence when found there; and that hence two practical lessons should not be lost sight of, namely, to alter, as quickly as can be effected, this morbid condition of urine, and to suspect the presence of calculus, should it be obstinate.

The cases in which we meet with blood, mucus, pus, or epithelium in the urine of children, apart from general disease, or as isolated or substantive urinary affections, are comparatively rare. In the ordinary diseases of children, acute and chronic, urinary deposits of this class are to be constantly found, and a knowledge of their presence is most valuable. The surgeon should, however, be prepared for the fact, that some cases will present themselves, and these by no means few, where no such complication exists. I have known boys pass blood, and in no small quantity, from the bladder, and yet they were apparently enjoying excellent bodily health, and, in the intervals of the attacks of hematuria, free from any appreciable urinary irritation. The very identical statement may be made as regards pus. The history of a few cases will illustrate this.

A boy, aged about nine years, fell from a height, and, amongst other symptoms, it was observed that his urine was bloody. It was supposed to be the result of the injury, and yet the boy complained of no local uneasiness, neither did he manifest any local lesion to account for such complication. I doubted much the statement made, when the child mentioned that on two or three former occasions, within the past year, previous to the accident, he had observed his urine similar in colour, without being able to attribute it to any particular cause, and that the urine spontaneously resumed its natural appearance. I watched the progress of the case, and made the boy pass urine in my presence. It was as dark as coffee; and, on examination, was found to be loaded with blood globules. The result proved the accuracy of the boy's statement.

I have notes of another case where intermittent attacks of hematuria (the blood being of a bright arterial hue) occurred in a boy aged between six and seven years possessing all the semblance of health, and where the hematuria was provoked by the most trifling causes, was unaccompanied by pain or uneasiness of much moment, and ultimately almost spontaneously subsided.

Although it would appear from the report of these cases that blood may be present in the urine of children, and in large quantity, and yet be productive of not much local or general

distress, nay, more, not leading to any serious results as far as can be ascertained, we are yet to keep in mind that bloody urine may be pathognomonic of renal disease, and that disease sometimes malignant. However, a train of symptoms will manifest themselves in the progress of such cases, which must necessarily lead to suspicion. I have examined the urine of a child, containing a large amount of blood, the child dying under twelve months old of encephaloid disease of the kidney, and during life the urine being almost constantly more or less tinged with blood. The morbid specimen in this case was exhibited by Professor Montgomery, at one of the meetings of the Dublin Pathological Society. Blood *singly*, however, is a rare addition to the urine of children unless the result of injury, or unless traceable to calculus in its passage along some portion of the urinary tract: nevertheless it is a very rare attendant on stone in the bladder in the child.

With regard to pus, it is far more frequently met with in the urinary diseases of children, and it is surprising how tolerant both the general health and the bladder are of its presence. Unless very particular inquiry is made by the surgeon into the history of the case, such a complication will wholly escape detection. Cases of this kind occur in both sexes. In girls, as in grown up females, very considerable circumspection is requisite as to accuracy of diagnosis. Indeed I should have made a similar remark as to hematuria when it occurs in girls, but this caution is so palpable that it merely requires a passing notice.

It is otherwise, however, with respect to purulent urine. To be accurate, when the affection is persistent and obstinate, local inspection must be made in the female child, as morbid secretions from the vulva and vagina are by no means of unfrequent occurrence in such children if badly cared, and the urine, "in transitu," will be loaded with pus globules, with mucus, and even with an amount of phosphates sufficient to render it neutral or alkaline, and this quite apart from urinary diseases, although attended with much urinary irritation.

The following case is a good illustration. A girl, aged about ten years, was brought to the Netterville Institution, the mother stating that she suffered from pain and frequency in micturition, and that her urine was offensive in smell and whitish in colour; that her general health was tolerably good, but that her present ailment was so distressing as to prevent her from attending school; that her bowels were regular and her appetite fair. No other particulars were noted by the mother, though she appeared to be an intelligent woman. I directed

some simple aperient, and desired that some of the urine passed on the following morning should be brought to me. I took the following notes of it:—Colour, muddy and whitish; odour, offensive and sour; re-action, almost alkaline; density, 1015 to 1018; deposit of rest, opaque, greenish-white stratum about one-quarter of an inch in depth at bottom of glass, and with defined upper surface; supernatant fluid clear and of a light straw colour.

The density of the specimen, and the colour of the supernatant fluid, led me to suspect that the origin of the pus was not from the urinary tract. Under the microscope, pus globules were distinctly evident; there were also some mucous globules, and a large amount of epithelial scales; amongst these were interspersed granular masses of phosphate of lime, and some few crystals of triple phosphate prisms.

On the next visit I made more particular inquiries as to the presence of any discharge from the vagina, and, receiving no satisfactory answer, I examined specially, and found the mucous membrane of the vulva and the whole pudendum swollen and villous, and absolutely soddened with fetid sero-purulent discharge. A drop of this under the microscope showed myriads of pus globules, epithelial scales, and granular masses of phosphate of lime. It restored the blue colour to reddened litmus. Now, drawing off the urine through a catheter, it was found acid, and free from more than a few pus globules, but loaded with lithates^a. Attention was paid to the local affection; astringent lotions were directed, and cleanliness enjoined, and in a short time the vesical symptoms disappeared.

Here, then, is a source of pus in the urine which should command attention. It must be inquired into. From what cause I know not, but details will not be voluntarily communicated by child or parent. Irritability of the bladder in girls may arise from another source than that of general engagement of the vaginal mucous membrane in the secretion of pus. The quantity of pus may be more limited, but yet pus globules will be distinctly visible. I allude to an ulcerated fissure of the vagina, resembling a similar affection engaging the rectum in the adult. The agony attending this can hardly be described or exaggerated: the principal suffering is referred to the bladder, and the pain during and after micturition is most acute. It is also quite intelligible that the whole mucous membrane of the vagina, in consequence of this partial ulceration,

^a In adult life, where leucorrhœa in females is attended with vesical irritation, I have derived much assistance in diagnosis from a similar proceeding.

may become secondarily engaged, and that the purulent secretion will be proportionably profuse.

Here, again, the urine gets its morbid properties from the disease notified, and the cure of it insures the healthy function and secretion of the bladder. As far as my experience is concerned, however, cases of purulent urine in children occur more frequently in boys than in girls. They are, in very many instances, strangely tolerant cases, and strangely obstinate; some of them have a resemblance to those cases of hematuria I have noticed, as being somewhat intermittent in their character, and in not being productive of any considerable local or general irritation. I may instance the following case:—

A boy, aged about twelve years, rather delicate in appearance, and somewhat strumous in aspect, applied to me at the Netterville Institution, complaining of irritability of the bladder, and describing the urine he passed as having the colour of milk diluted with water, or muddy whey. He stated that such had been the case, with irregular intervals of a freedom from pain and clearness of urine, for more than twelve months, but that he was, notwithstanding, obliged to leave school in consequence of the irritability of his bladder: that he could only attribute the attack to damp and cold. I tested and examined his urine. It was loaded with pus globules to an amount so great, that the deposit of rest occupied nearly half an inch of one of my ordinary test glasses,—namely, between four and five inches in height, and about one inch in diameter. Yet the boy did not appear to suffer materially in general health. I procured his admission into hospital, and examined his bladder. I could not detect any local cause to account for his complaint. He left the hospital benefited by the exhibition of *uva ursi*, alternated with buchu and the mineral acids, but he is not cured. The pus I can always detect in the urine, and it is liable to recur with intensity at irregular periods from different causes, but particularly damp and cold. He appears to attach little importance to its presence, the irritability of the bladder being slight, and his general health good. Through the kindness of my colleague, Mr. Adams, I have at present a case under my care, in the Richmond Hospital, in which this purulent condition of the urine exists. The subject is a boy aged seven years; and, when his prolonged sufferings are borne in recollection, it is absolutely astonishing to witness the almost perfect state of his bodily health. His symptoms are very severe, and contrast remarkably with those, comparatively mild, in a boy in an adjoining bed with calculus in the bladder, under the care of Dr. Hutton. The attendant irritability of the blad-

der is extreme, so much so, as to be almost incessant. The urgency to pass water is great; the agony excruciating towards the end of micturition, and the act only tolerant in the sitting posture. The pain he describes as a cutting kind of pain; he refers it to the bladder and to the glans penis, and tries to relieve himself by pulling and pinching the prepuce and end of the penis. The child moreover states, that there is often a sudden interruption to the stream of urine, and that by changing his position it recovers itself, and then dribbles off. In observing the passing of the urine, its muddiness throughout the whole act of micturition is obvious, and the quantity discharged is very variable, but always small. There is no incontinence; there is no prolapsus. The penis is somewhat largely developed for the age of the boy. He complains of no pain or uneasiness in the lumbar region. I may add, he has a symptom which, in cases of this description, I have not unfrequently observed, namely, great tenderness on pressure and on percussion in the supra-pubic region.

The disease is stated as being of more than twelve months' duration; and the boy, who is very intelligent for his age, is disposed to attribute the supervention of the attack to his being obliged to keep his bladder painfully distended during school-hours; that when he had the opportunity of emptying it, he required to force and strain considerably, and that often he could not for a time discharge any urine; that gradually the present train of symptoms set in, and became more intense; and that his urine has been often mixed with blood, and latterly has become of a whitish colour. Such is the history of the case of this poor child, who has been admitted into hospital whilst these pages are passing through the press. I have intentionally given them in detail, as being admirably illustrative of this peculiar form of irritability of the bladder. The character of the urine I have carefully noted, and it is that which will be found most usually present in such cases. It was examined within a few hours after it was discharged, and was as follows:—Colour, muddy and whitish; re-action, acid; density, 1010 to 1012; deposit of rest, an opaque, greenish-white stratum, abruptly defined at its upper surface, and about one-fourth of an inch in depth at the bottom of test glass. Supernatant fluid almost aqueous, nearly transparent, and, within a limited period, uniformly miscible with deposit. Under the microscope, numerous pus globules visible. No fibrinous or tubular casts; no epithelial *debris*; no phosphatic deposit.

As a precautionary measure, the bladder was examined by Mr. Adams, with a view to the presence of calculus, but none

was detected; and I stated beforehand that such would most probably be the case, from the consideration of the peculiar morbid condition of the urine, with the existing symptoms, although the rational signs of stone appeared very prominent.

I do not for one moment attempt to assert, that stone in the bladder, when attacking children, may not be accompanied by a purulent condition of the urine; but I am certain that it will occur very rarely, if ever, where the character of urine, noted in the case just detailed, is found to be present. Purulent urine did exist in the case I am about to allude to, but that purulent character was derived from a source external to the urinary apparatus, or supposed to be so.

A boy, aged five years, was admitted into the Richmond Hospital, under the care of Dr. Hutton, with symptoms of vesical calculus, and with a constitution so shattered by protracted disease that he only survived his admission a few days. In his bladder there was a rough calculus of oxalate of lime, about the size of a nutmeg; and in the left ureter, about its middle, an oval, ulcerated opening, communicating with an extra-renal tumour on the same side, full of fetid and purulent urine. The particulars of this case are given by Dr. Hutton in the Proceedings of the Pathological Society, and will be found in the Reports printed in the sixth volume of the present series of this Journal. From the highly inflamed state of the lining membrane of the bladder, as delineated in a drawing illustrative of the pathological appearances, it is quite evident that it did not exercise any prominent part in the secretion of the pus; and I have no doubt that the urine contained, in addition to pus, other characteristic organic deposits, both in a crystalline and in a non-crystalline form, which would have led to an opinion as to the nature of the calculus, and especially when it was not coated with phosphates.

Such examples of blood and pus in the urine of children are rare, compared with their frequent occurrence in adult age and advanced life. They are yet worthy of note, as being, in many instances, so strangely tolerant and intermitting, demanding careful inquiry and investigation as to their origin and cause.

I have often thought that purulent urine was occasionally vicarious in the child as in man, and especially in those pyogenic conditions of the system so common in the earlier periods of life, as evinced by glandular suppuration and chronic abscess. From the patients to be dealt with, it is not easy to carry out investigations on this subject accurately, but I have reason to think I have seen cases of the kind. I do not wish, however,

to speak too confidently on the matter, as the statements of attendants cannot be depended upon, unless the specimens of urine are procured with great care,—and this is as requisite in private as in hospital practice,—and unless they are minutely examined under the microscope. Copious deposits of urates, in the cases I allude to, are by no means unusual, and general statements made respecting the external characters of the secretion would be deceptive. This investigation may be more interesting in a physiological than in a practical point of view, but there are cases in which our prognosis must be very materially influenced by it; at all events they occur in advanced life.

Here a question of vast practical importance suggests itself as regards the source from which the urine acquires its purulent character; and the same question may be asked as regards blood. Too frequently here, the symptoms which the French term “commemorative symptoms,” are so defective in the cases of children, that it is very difficult to solve such questions. A great deal must, therefore, depend on the accuracy of observation of symptoms as they present themselves.

In hematuria there are palpable cases of injury where a confident opinion can be given; but diseases are our present object. In the strictly surgical application of the term, renal hemorrhage is a rare disease in children. One case has been noted where malignant disease of the kidney originated it. Again, the symptoms of nephritis and nephritic calculus are as obscure and as equivocal as they are rare in children. Pyelitis is equally rare; so that the subject is surrounded with very considerable difficulty. I have experienced great assistance in diagnosis from attention to *the condition of the urine as it escapes in the act of micturition*, and afterwards to the prominent features in its examination notified. *The uniform miscibility of blood or of pus with urine, whilst passing from the urethra, is no invaluable guide in estimating their source*; the peculiar colour or tinge of the former *then*, and when *the deposit of rest* forms, is equally so; and as regards pus, it is beyond all manner of doubt that the surgeon will acquire much information by attention to similar details, though apparently trifling. He will see that in nearly all cases of purulent urine in children, the change in the fluid is obvious throughout the whole act of micturition; and this alone, independent of the examination of its morbid condition, will lead to more than a suspicion as to the source and extent of disease. In the case of the boy at present under my care in the Richmond Hospital, I apprehend there is a complication of renal disease, although no complaint

is made of any lumbar pain or uneasiness, and no particular fulness or tenderness exists on examination. Pathology teaches us how deceptive symptoms are as to the actual existence or site of organic lesion of the urinary apparatus even in the adult. In a case of irritability of the bladder in the adult, I have found the kidneys extensively diseased and the bladder free from disease, although the latter was nominally the seat of all the suffering of the subject of it. The same occurs in the child. Irritable bladder in the child, accompanied by purulent urine, has in some instances been found to be attributable to tuberculosis of the kidney, and not a trace of disease in the bladder existed.

In other instances, again, this same form of disease, as now termed, has had its seat in the vesical mucous membrane and in the submucous tissue, forming large prominent tumours, of varied consistence, projecting into the bladder, which was proportionably contracted, with its mucous membrane congested and villous in some cases, in others frayed and ulcerated to a greater or less extent and depth, and presenting an appearance very different indeed from that trabeculated or columnar condition accompanying ordinary forms of disease in the adult. This condition of the bladder is not isolated; the kidneys partake of the same character of disease, and ultimately the sufferer must fall a victim to it singly, or conjointly with more general tubercular development^a.

This is, however, the extreme case, but others are to be met in which disease is limited to some one portion of the bladder, and where it is reasonable to suppose the affection is curable. In our prognosis we will be materially assisted by attention to those conditions of the urine noted in the cases detailed. It must be most unfavourable when the combination of pus, of blood, and of mucus co-exists, or even of blood and mucus, and especially if the density of the urine is low, and continues so; if its colour be aqueous; the smell fetid; the re-action alkaline; and the deposit phosphatic; and if the morbid conditions of the urine are attended with lumbar or nephritic pains, and general symptoms of urinary hectic. These symptoms are not peculiar to irritable bladder attended with purulent urine and referrible to the form of disease described. Similar symptoms will present themselves in cases of calculus, where the phosphatic diathesis predominates, and hence great caution is required in the diag-

^a There is a preparation in the Museum of the Queen's College, Belfast, which shows these morbid appearances; and I believe there is one also in the College of Surgeons here. The disease resembles much a similar affection in the rectum of young children, and is decidedly strumous in its nature.

nosis, lest the operating surgeon should confound them, and thus materially compromise his character. I could bring forward cases where the operation of lithotomy was declined, from the conviction that the rational symptoms of stone, though strongly marked, were all attributable to general urinary disease, in the absence of calculus, as proved by subsequent post-mortem examination; and others, where persistence in opposite views led to most distressing and unsatisfactory results, from non-detection of stone after the operation of lithotomy; and equal ill success as regarded it on the fatal termination of the case.

Within the last two years two cases have occurred to my knowledge, in which the operation of lithotomy was declined, from the impression that this special form of disease existed to the exclusion of stone in the bladder. In one of the cases the boy was aged ten years. The rational signs of calculus were particularly well marked, and, amongst them, the penis was most remarkably enlarged. The paroxysms exactly resembled those attendant on a fit of the stone. The urine was muddy whilst being passed, and bloody towards the end of micturition. Its density was 1005 to 1008; its re-action feebly acid; its deposit, characteristic of blood, pus, and mucus: the latter so considerable as to cause firm adhesion to the test glass. The pus globules were in abundance, also the blood. The diagnosis given was disease of the lining membrane of the bladder, and renal complication. The boy died of urinary hectic. The bladder exhibited marks of extensive disease, implicating the mucous membrane, which was extremely ulcerated in different portions. The kidney contained strumous abscesses in isolated patches; not a trace of stone. As regards the second case, I believe the child is yet alive, but the symptoms of stone are so characteristic that is with some difficulty the disposition in the surgeon to operate is controlled. In neither of the cases were the physical signs of stone manifest.

In concluding these remarks on irritability of the bladder, as connected with morbid urine, I may add, that on very many occasions I have been enabled to trace the presence of vibriones in the secretion, and that I have detected these animalcules most frequently in deposits demonstrative of the lithic acid diathesis. They are detected with the greatest ease; very little care is requisite to place them under the field of the microscope, and the only caution required is to bear in mind that they are cloaked in the muddy deposit of the urates. I have so repeatedly found them immediately after the urine has been passed, that I cannot but entertain the opinion that they come

ready formed from the bladder in not a few instances. I have seen them in purulent urine, but they are far more common in the lithic acid, or in the oxalate of lime diathesis, and particularly in the children of the poor.

It is unnecessary to state that irritability of the bladder is no uncommon attendant on the ordinary worms of children; and I may add, that the remedy I find very beneficial in the case of vibriones I have found equally so in these parasites; I allude to creasote. I have been in the habit of giving it for the last few years, in cases of the kind, in combination with the common aperients of children, and with very great benefit; and in the irritable bladder of children I constantly direct it, with or without calomel, according to circumstances.

In dispensary practice these urinary affections are not very manageable; indeed it is not to be wondered at that our treatment is not very successful as regards them. The state of the skin, as to warmth and cleanliness, must be attended to, and also diet; and I need not add, that the subjects are badly clad and badly fed, and they are little disposed to take medicine, or persist in its use; nay more, that their parents are often perfectly listless as regards the directions given them, or even the presence of their ailment. The case of the little boy, to which I have so often alluded, is a proof of this. He has laboured under his urinary symptoms for about twelve months, and it was only within the last week that the mother applied for medical advice.

I shall not enter into the details of the therapeutics suited for these cases. I have found buchu and uva ursi, with lime or magnesia water, or with the nitric or hydrochloric acids, in suitable doses, of great benefit; and I have combined them with hyoscyamus. In the chronic cystitic affection,—for I believe it often to be of that nature,—cod-liver oil, alternated with those preparations of iron fitted for children, do much good; and mild counter-irritation in the supra-pubic and lumbar regions with the tincture of iodine, will materially assist their action. Sea air, and tepid or cold bathing, as may be suited to each patient, are most valuable in many cases.

In addition to these general and local means, it is indispensable to attend to the state of the bladder. Its capability of discharging its contents must be tested occasionally, and such operation must be performed very gently, and with a gum-elastic catheter. I am under the impression that in all painful urinary affections children do not empty their bladders fully, and the very position which they select for the purpose shows that they circumscribe as much as possible the action of the

abdominal muscles, so as to measure with more precision the amount of contraction of bladder suited to alleviate their sufferings. In the posture they select they absolutely prevent much pressure of these muscles on the parietes of their bladders, in them so liable from its position to be so affected thereby; and, therefore, in calculus, and in the disease under consideration, there is not a diminution of capacity to the extent to be expected from the repeated action of the bladder. In such cases I have often tested the bladder as to its contents after the child had made every effort to empty it, and in it I have always detected from four to six ounces of urine: even without the introduction of a catheter I have found that percussion in the suprapubic region will enable the surgeon to estimate the amount of distention. I am particular in alluding to this practical fact, as a knowledge of it is important in treatment. It is being carried into effect in the case so often alluded to, where, notwithstanding the great irritability of the bladder, the catheter must be had recourse to, to empty it.

In other instances of irritable bladder, notwithstanding all the curative precautions adopted, and attention to the character of the secreted fluid, the symptoms of the disease advance, the bladder becomes seriously engaged, and even retention of urine may supervene; and all this from a local cause which the inspection of the surgeon could at once detect, and which, strange to say, often escapes the notice of the daily attendants on the child. I allude to some abnormal defect in the genital organs in the immediate vicinity of the urethra, in the labia, or nymphæ, or prepuce of the clitoris in the girl; in the prepuce or orifice of the urethra in the boy. That this is no exaggerated statement the following cases will testify, and, doubtless, similar have occurred, or will be seen by other surgeons if they are on the watch. I shall select cases occurring in both sexes. The first is one of congenital adhesion of the labia pudendi in a child aged two years and some months, and accompanied by a peculiar state of the orifice of the urethra. This child was in progress of recovery from anasarca after scarlatina, and was observed by her mother, some days before my visit, to have repeated, painful, and urgent calls to pass water, which was discharged with considerable and forcing efforts, and the paroxysms were attended with violent screeching. She was also observed repeatedly to apply her hand to the pudenda. The urine gradually assumed a deeply-coloured brownish and sooty hue, and deposited, on settling, that cloudy deposit so characteristic of the albuminous nephritis attendant on the exanthemata. The quantity of urine, which, at the commencement of

the symptoms of anasarca, had materially diminished, and, as is often the case, was accompanied by irritability of the bladder for the last fortnight, was under treatment remarkably increased; but until the within mentioned period there had not been any uneasiness in micturition.

The night previous to my visit, irritability of the bladder had supervened, and was excessive; the cries and suffering of the child were most acute, and considerable hematuria was present. I had been frequently in attendance on the child for the ordinary ailments of children during dentition, and had not on any occasion observed any indication of urinary distress. The almost sudden supervention of the above symptoms, their decidedly local character, and their extreme severity, led me to suspect the presence of calculus in the bladder or in the urethra, with the view to the ascertainment of which I proceeded, when, to my surprise, I found the labia adherent from before backwards, with the exception of two openings through which little more than the point of a probe could be introduced; one of them existed at the forepart, behind the clitoris, and the other posteriorly, in the site of the fourchette. The intermediate junction was very consistent in front, without the presence of any raphè, and, as it approached the perineum, resolved itself into a membranous line almost transparent.

During my examination a vesical paroxysm came on, when I had an opportunity of witnessing the mode of the passage of the urine, almost *guttatim* through the openings alluded to, with a marked protrusion of the intermediate band. The difficulty of the case was now solved; the band was divided; but the orifice of the urethra could not be seen, and every effort to get assistance from the child failed; she would not pass water, and the hemorrhage obscuring the opening of the vagina, further interference was then dispensed with.

The symptoms of irritable bladder subsided, when, on the eighth day, a disposition to their return manifested themselves. Now, on more minute examination, a small cribriform veil of mucous membrane was detected, cloaking the orifice of the urethra, and continued over it from the prepuce of the clitoris. This was divided, and all symptoms of irritation rapidly subsided.

There are many interesting features in this case, but it is sufficiently demonstrative of the object in view at present. The sufferings of the child would not have been alleviated by other means than by those adopted, and, no doubt, to say the least, the irritability of the bladder would have been persistent, and have necessarily led to further mischief. I mean

not to assert that these congenital adhesions of the labia always produce the above symptoms. I know the contrary to be the fact, both here and when they are accidentally adventitious, and particularly if the orifice of the urethra is free; but the recollection of the possible involving of the latter, in either lesion, will put the surgeon on his guard where symptoms such as those I have described are persistent, and do not yield to ordinary treatment. I have divided these membranous septa traversing the nymphæ, and the amount of vesical irritation was hardly appreciable. However, when we reflect on the cases which present themselves, and those not very few, in adult life, of irritable bladder, ostensibly traceable to warty or other growths at or in the vicinity of the urethra and orifice of the vagina, it may not, perhaps, lessen the importance attached to this subject, as demanding early interference; and this especially when from any cause the quantity or the quality of the urine should undergo any morbid change, and hence be productive of more or less irritation.

I must now pass on to the case of boys. Where local circumstances exist, to which are distinctly referrible the symptoms I have above enumerated as attendant on irritable bladder, the value of the remark of Sir Benjamin Brodie is particularly striking, namely, "to combine with the observation of symptoms the study of morbid anatomy" (we may here substitute "abnormal anatomy"), otherwise we are apt to confound with one another affections which are essentially different, under the general appellation of irritable bladder, and torture our patient with remedies worse than useless. I put completely out of the question, for the present, any derangement in the healthy character of the urinary secretion. I will assume that the surgeon is acquainted with it, and that he has adopted the requisite remedial agents; but he is yet unsuccessful; the irritability continues, and if any change has taken place, all symptoms are aggravated, and this although the urine may be restored to its normal state. Whence the cause of this? Let the surgeon examine the penis, and he will frequently get a clue; let him place the child before him, and make him pass water, and let him cast his eye on the appearance of the penis, both before and during the passage of the urine. In not a few of such cases he will find that the orifice of the prepuce is at a considerable distance from the extreme end of the glans; that that orifice is so small as to admit with difficulty the end of an ordinary probe, and that when the child makes water, the urine does not escape in a uniform stream; that it is scattered, and that during its transit the prepuce is distended into a pouch by

the accumulation of the urine within it, the glans being at a considerable distance behind. Cases of this kind are really so frequent, that I do not deem it necessary to specify them; and I venture to state, that if attention is directed to the fact, its practical importance will be admitted. Such a state of organ will not necessarily entail symptoms of irritable bladder. The contrary, as in the case of the female child already noted, may be the fact, but I do affirm, that where deranged action or function of the urinary system arises, no matter from what cause, that the presence of it will be found to be often attributable to the lesion. I mentioned that no *permanent* cure will or can be affected, if it is overlooked; nay more, on a careful revision of the cases which came under my observation, I am disposed to go farther, and to state, that on the supervention of disease, a more aggravated character is traceable to it. Who will deny that cystitis and its uncertain consequences may not arise from it; that stricture may not arise from it; that retention of urine, and that calculus, may not be superinduced by it? Cases illustrative of this will appear in the sequel.

As regards the treatment of such cases, the division of the prepuce may be ultimately required; but from the results of such operation in children, trifling as it is, I am disposed to prefer mechanical dilatation of the orifice of the prepuce by the occasional insertion of a piece of prepared sponge within it for an hour or so, or by the withdrawal of the prepuce on the glans during micturition. Much success has attended this expedient.

One of the most distressing cases I have witnessed of irritable bladder, arising from these abnormal defects, was where an excoriation took place at the orifice of the urethra, in that deformity termed hypospadias. The mother was actually ignorant of the condition of the organ present; ulceration had supervened, and the subsequent cicatrization had so completely closed the orifice that it would admit only the finest probe. The severe distress present was removed by a slight division of the delicate membrane surrounding the orifice, and the securing of its permanent patency by a piece of bougie.

This portion of my subject has extended so far, that I must for the present postpone the consideration of Incontinence and Retention of Urine in the Child.