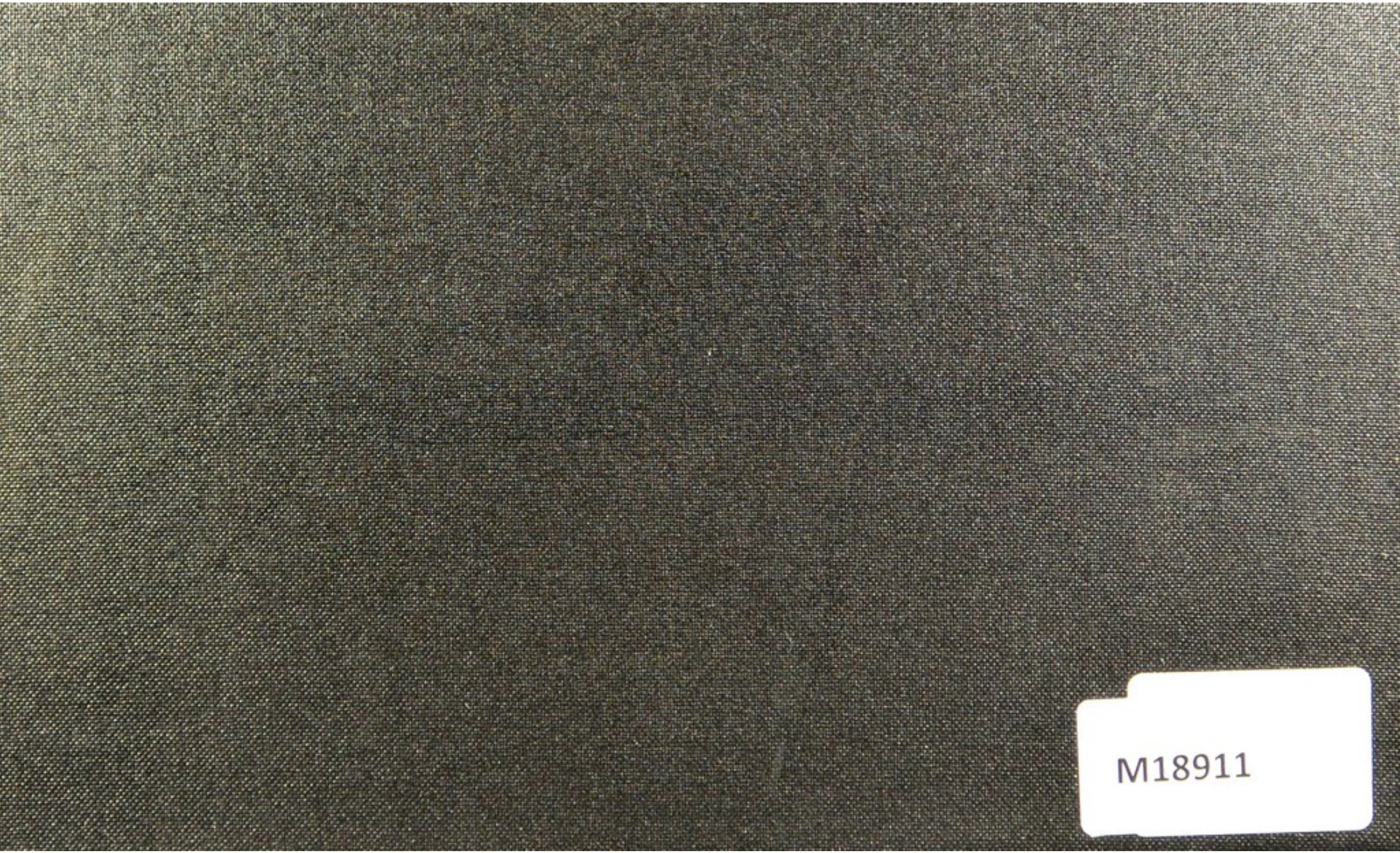
Stone in the bladder : with special reference to its prevention, early symptoms, and treatment by lithotrity / by Walter J. Coulson.


M18911

STONE IN THE BLADDER.

STONE IN THE BLADDER:

WITH SPECIAL REFERENCE TO

ITS PREVENTION, EARLY SYMPTOMS,

AND

TREATMENT BY LITHOTRITY.

BY

WALTER J. COULSON, F.R.C.S.

SURGEON TO ST. PETER'S HOSPITAL FOR STONE AND OTHER DISEASES OF THE GENITO-URINARY ORGANS, AND TO THE LOCK HOSPITAL.

LONDON:

JOHN CHURCHILL & SONS, NEW BURLINGTON STREET.

MDCCCLXVIII.

LONDON:
PRINTED BY BENJAMIN PARDON,
PATERNOSTER ROW.

PREFACE.

THE main object of this work is to draw particular attention to the early symptoms of stone in the bladder, with a view to its safe and more easy treatment; and to certain conditions which predispose to the formation of stone, with a view to preventive treatment.

The first portion of the subject I have allowed to remain in the form of lectures, which were delivered this summer at St. Peter's Hospital. In placing these lectures before the second portion of the work—the preventive treatment—I have shown perhaps a surgical bias. But I am anxious to place prominently before the reader the importance of attention to the early symptoms of stone, as the greatest success in

the surgical treatment of all calculous affections will always attend their early detection.

In the lectures on lithotrity and the after-treatment, I cannot too highly acknowledge the advantages I experienced from witnessing the late M. Civiale's practice at the Hôpital Necker, from my teacher M. Bazin's demonstrations on the subject, and the opportunities afforded me in the practice of Mr. Coulson.

The chapters on preventive treatment owe much of any value they possess to my friend Dr. Broadbent, with whom the various points have been fully discussed, and to whom I am also indebted for the careful examination of all specimens that I could forward him. This division of the work was completed long before the lectures were commenced. I must acknowledge also my obligations to Dr. Roberts, whose valuable experiments on the solvent treatment of calculus, first published in vol. xlviii. of the *Medico-Chirurgical Transactions*, and since embodied in his work on Urinary and Renal Diseases, have deservedly attracted so much attention. The preventive treatment of cal-

culus differs, however, from the solvent treatment, inasmuch as the object of the former is to prevent the tendency to the formation of that which the latter is intended to remove. That this preventive treatment will be found of service I am well assured; as, in patients who have been under my own observation, and on whom I have operated for stone, it has been the means of successfully combating the strong tendency to a return of the disease.

29, St. James's Place, S.W.,
December, 1867.

TABLE OF CONTENTS.

LECTURE I.

THE EARLY SYMPTOMS OF STONE, AND BEST METHOD OF DETECTING CALCULUS.

II. BEST METHOD OF DETECTING CALCULUS.

LECTURE II.

THE PREPARATORY TREATMENT OF PATIENTS, AND THE OPERATION OF LITHOTRITY.

LECTURE III.

CASES WHERE LITHOTRITY IS NOT APPLICABLE: AMOUNT OF WORK TO BE DONE AT EACH OPERATION: AFTER TREATMENT, WITH NOTICE OF COMPLICATIONS.

I. LITHOTRITY SOMETIMES NOT APPLICABLE.

II. WORK TO BE DONE AT EACH OPERATION.

III. AFTER TREATMENT.

PREVENTION.

URIC ACID.

OXALATE OF LIME.

CYSTINE AND XANTHINE.

PHOSPHATES OF LIME AND MAGNESIA.

PREVENTIVE TREATMENT.

LECTURE I.

The early symptoms of stone in the bladder, and the best method of detecting calculus, have been chosen for the subject of the first lecture to be delivered in this Hospital, on account of their paramount importance to all who are interested in the treatment of calculous affections. The comparative success of the treatment of most diseases greatly depends on the longer or shorter duration of the particular affection, and this general proposition is especially applicable to the diseases of the genito-urinary organs. To take the familiar example of stricture, the primary lesion which occasions it, when early recognised, is completely under the control of the surgeon, and involves no serious consequences to the patient; while, when overlooked, the gravest results ensue. Not only is the stricture then much less amenable to remedial measures, but the

secondary effects are far more serious, as evidenced in the affections of bladder and kidney, which follow in the train of long-neglected stricture. But, however desirable it is at once to detect stricture, it is of still more importance to recognise the earliest symptoms of stone; for stricture is in itself more amenable to treatment, and, whether detected sooner or later, the surgeon has the option of the same methods of treatment; but such is not necessarily the case with calculous affections. When stone has existed a long time in the bladder, the operation of lithotrity may cease to be applicable, either owing to the size of the calculus, or to the diseased condition of the bladder which it has induced. Under these circumstances recourse must be had to lithotomy, which is a much more hazardous operation; but in all cases, whichever operation is resorted to, it will be found that the larger the stone, the greater the danger.

In considering the early symptoms of stone, I must state at the outset that they are by no means uniform. The greatest difference is observed at the two extremes of life, childhood and advanced old age; and even in the same periods of life, the symptoms are not necessarily the same. In early life the symptoms are commonly very acute, but not so, as a rule, in more advanced age; and for this reason, children with calculus are almost

always submitted to early examination, while, with the aged, stone often remains for some time unsuspected.

It is hardly necessary for me to enumerate the early symptoms of stone in children; they are, from the first, the symptoms you read of in every text-book; in fact, according to authorities, they are the symptoms which ought to be present, though few of them really are present, in the majority of patients suffering from stone in the bladder. Most of the following symptoms are met with in children, when even the smallest calculus is present in the bladder:—irritation of the bladder, with incontinence of urine; severe pain during and after micturition, which they attempt to alleviate by pulling the prepuce; severe straining during micturition, often causing prolapse of the rectum; and occasional appearance of blood in the urine. This stone, weighing only eleven grains, I removed from a child four years old, at this Hospital; as will be seen, it had produced most of the acute symptoms described.

C—— L——, æt. 4, admitted into St. Peter's Hospital, June 25th, 1866, with the following symptoms, which were given by his father:—He often passes blood with his urine, complains of great pain after making water, which he does more than twenty times in the twenty-four hours; frequently passes fæces from the straining during micturition; and his stream of water sometimes stops suddenly, occasionally with sharp pain. The symptoms have been present only one month. The child's general health good; bowels regular; tongue clean.

June 28th.—It was found necessary to administer chloroform for the purpose of sounding, and a small stone was distinctly felt. As the child was much frightened, he was left to get used to the ward and the nurse, until

July 13th, when, the bowels having been freely cleared by oil and a simple enema, chloroform was administered, and the lateral operation for lithotomy was performed. No difficulty was experienced. The stone extracted weighed eleven grains, and had the appearance of a rather elongated horse-bean.

On the 2nd of August following, the child left the hospital cured.

Now, in old age, it is uncommon to meet with such acute symptoms, even when the stone has attained to four times this size. The explanation appears to be, that the bladder loses its sensibility as age advances. Anyhow, I consider it injudicious to lay too much stress on what may be termed the exaggerated symptoms of calculus. When present in advanced life, they usually indicate either a rough calculus, or one of large size and long duration, with consequent inflammation of the bladder. Accordingly it happens that, up to middle life, the symptoms are generally acute, in consequence of a healthy condition of the bladder; as, before this age, it is rare to find the structure of the bladder materially altered by disease, unless as the result of stricture; but, after this time, vesical calculus may occur as a consequence of chronic inflammation of the bladder, and its presence is then indicated by increased severity of all the symptoms. Thus, as a rule, the early

symptoms of stone are more typical in early life than they are in the majority of patients of more advanced age; although a notable exception occurs to me of a gentleman, æt. sixty-five, who lately consulted me; and his case is in other respects so instructive, that I cannot do better than briefly detail it.

In January of this year he caught cold returning from a party; experienced slight pain over the region of the right kidney, and for a couple of days passed coffee-coloured urine, indicating the presence of blood. He kept quietly at home for a week, and the symptoms disappeared; and when I saw him shortly afterwards he was apparently perfectly well. He saw me again, May 11th, and brought me a bottle of bloody urine, passed the day before, the blood having appeared again after catching cold. There was not more albumen than was accounted for by the quantity of blood present. The blood corpuscles were very numerous, and they were altered somewhat by immersion in urine. There was no vesical epithelium. From this, and the history, I concluded that the blood came from the kidney. He returned to the country, and about a week after was seized with all the symptoms of gravel passing along the ureter from the right kidney. These were succeeded by other symptoms yet more acute, namely, constant and intolerable desire to pass water, with great straining, small quantities only being expelled. From these frequent ineffectual forcings, the pain extended from the neck of the bladder over the whole abdominal region. This so alarmed him, that, thinking he had an attack of inflammation, he sent some miles, though it was past midnight, for his medical attendant. After a time the pain subsided; and when he saw me shortly afterwards, he experienced only slight uneasiness at the neck of the bladder and towards the extremity of the penis. On questioning him, he admitted that he was more uncomfortable during

and since his journey by train. Strongly suspecting that he had a small stone in his bladder, I made arrangements to examine him; but he was anxious first to return home, and, before we again met, he had another sharp attack of bladder irritation similar to that described, and passed a small angular uric-acid calculus.

You will have noted that, after the great suffering which marked the presence of the stone in the bladder, the disquieting symptoms gradually disappeared, and they remained in abeyance as long as he was perfectly quiet; they returned, in a slight degree, after his journey to town, and were aggravated by his return home. The railway journey and the resumption of exercise, produced on the mucous membrane the mechanical effect that you would expect from any foreign body moving freely over the surface of the bladder.

This case is exceedingly instructive, and leads me to the point to which I wish to draw your particular attention, viz., the direct mechanical effects of a foreign body in the bladder. For the early diagnosis of stone, the most reliable and the most valuable indications will be met by closely watching the influence of exercise, by concentrating the attention on this one point, by ascertaining the one condition that aggravates the symptoms, and noting whether they are consistent with what you would expect from the mechanical effects of a foreign body in the

bladder. The chief symptoms which furnish these direct indications of mechanical injury are hæmorrhage, pain, and irritation.

The presence of blood in the urine is more common than is generally supposed, as an early symptom of stone; and the variations in the amount at different times are most significant. It may be little or it may be much; but, if it occurs at all, it will appear after exercise, and will be proportionate in quantity to the duration and character of that exercise. In patients suffering from stone, frequently the first symptom that causes alarm, and induces them to consult a surgeon, is the presence of blood in the urine. I could adduce several striking examples from my own practice, but the following will suffice for the purpose :—

A gentleman, æt. 67, consulted me in October, 1862. In September of the previous year, whilst riding, cub-hunting, he passed some blood in his urine. This disappeared with rest. He tried hunting again in October, and the blood re-appeared. He consulted an eminent surgeon in London, who, however, did not consider his symptoms occasioned by stone. Early in November, hunting again induced blood, and he was sounded, but no stone was detected; still, he was advised to give up riding, which to him was a great privation, as he was a master of fox-hounds. At the beginning of the next season, after riding, he again passed blood. When he consulted me, walking exercise produced occasional incontinence of urine, and increased frequency in passing water. But, apart from these two important symptoms, I felt sure, as I told both himself and his medical

attendant, that there was a foreign body of some sort, freely moveable, in his bladder, to account for the appearance of blood after exercise, and its disappearance after rest. I felt the more certainty of this, as I had previously satisfied myself that there was no urethral stricture or kidney affection to account for its presence.

October 28th.—I met Mr. Stevens, his medical attendant, in consultation. The bladder being empty, was injected with four ounces of water : then, introducing a lithotrite, after some little difficulty I caught a stone, the size of an almond, lying on the floor of the bladder, a little to the right of the median line. This was crushed at once, and the instrument withdrawn.

There are other cases where slight exercise may produce blood, but not in sufficient quantity to be apparent to the naked eye; here the greatest assistance is derived from the microscope in arriving at a correct diagnosis.

A gentleman, æt. 68, consulted me some three years ago, with the following symptoms :—He had observed, for four or five months previously, that, after walking for some hours, the urine assumed a darker colour, and that with exercise he had more frequent calls to micturate. On close questioning, he admitted that he also experienced slight uneasiness in the region of the bladder, but nothing that deserved the name of pain. From the absence of this latter symptom, he was firmly convinced that the condition of the urine depended on some kidney affection ; and this view was strengthened by the opinion of his medical attendant. He was very averse to any kind of examination, and from his symptoms alone there was nothing to warrant me in advising it. I was consequently compelled to rely to a great extent on a microscopic examination of the urine. Accordingly it was examined after rest and after exercise. When no exercise had been taken, it presented a few pus-cells and blood corpuscles,

with an occasional particle of vesical epithelium. After exercise, the blood corpuscles were found to be much more numerous, and epithelium, detached from the mucous membrane of the bladder, was abundantly present. This difference pointed to the existence of a foreign body in the bladder, and crystals of uric acid furnished a further indication of its character. Fortified by this opinion, I prevailed on my patient to submit to an examination. A lithotrite was introduced, and with little difficulty I succeeded in seizing a small calculus.

These two cases are selected, as they illustrate the value of hæmaturia as an early diagnostic symptom of calculus. In both it was the one symptom which confirmed my suspicion that a foreign body was present in the bladder; and, when you have to persuade patients to submit to that which they dread, it is hardly necessary to state how greatly important it is to be possessed yourself of a strong conviction of the necessity of such a course, based on sound tangible reason, for this imparts confidence alike to patient and surgeon.

The next important and prominent symptom that declares itself early is pain, either in the region of the bladder, rectum, perineum, or penis. It is commonly influenced by various conditions, by the absence or presence of urine in the bladder, by contraction of the viscus, by exercise, posture, &c.

When this symptom is present, a careful consideration of the circumstances which tend to

induce it, relieve it, or aggravate it, renders it pathognomonic even as an early symptom. I say when present, as it is by no means constant as an early symptom, and it is not always experienced even when a calculus has attained a medium size. This may be accounted for in four ways, which I will enumerate in what I believe to be their order of frequency:—An enlarged prostate, occasioning a pouch behind it; a feeble bladder which never empties itself; a sacculated bladder; and lastly, a bladder rendered less sensitive by age.

The first condition depends on hypertrophy of the prostate, especially of the middle lobe, which has the effect of raising the internal meatus above the level of the trigone of the bladder, and of occasioning a pouch in this situation. A small stone in this position rarely occasions marked pain, unless from a violent jolt, as, by the conformation of the prostate, the calculus is mechanically prevented from interfering with or blocking the internal meatus during micturition. As this condition also prevents the bladder from completely contracting, it saves the patient the pain he would otherwise experience from the compression of the stone between the coats of the bladder after the urine has been passed.

The second condition, that of atony, produces a similar effect; it amounts either to partial or

complete paralysis; and as long as the bladder is not over-distended, there is, as a rule, an absence of pain in that region. In such a state of bladder, where I have suspected stone, my suspicions have been strengthened by the acute pain produced after drawing off the urine with a catheter.

The sacculated bladder arises from hypertrophy of its muscular fibres, and from the protrusion of a portion of the mucous coat between their meshes; a stone encysted in one of the depressions so formed will occasion but little uneasiness. When this condition exists and a stone is also known to be present, some doubt arises what kind of operative interference, if any, should be resorted to.

The last state is one met with most commonly in old people, when the bladder appears to have lost to a great extent its normal sensibility; and it is in such cases that mistakes in diagnosis most commonly occur. A sufficient illustration of this is found in the two cases already quoted, where the first symptom to attract attention was the presence of blood; in both these patients no marked uneasiness was ever present.

Nevertheless, pain is often one of the earliest symptoms of calculus, and, when occurring in certain ways, and accompanied by some other symptoms, it is almost certainly pathognomonic. For instance, the mechanical effect of a stone falling across the internal meatus during micturi-

tion gives rise to acute pain, accompanied by sudden stoppage in the flow of urine, at the same time inducing violent straining, the urine passing again from some change of posture. This, as an early symptom, is not so frequently met with in the old as in the young, though it occurred in the patient aged 65, whose case has been alluded to. The following case is interesting, as it exemplifies the effect of posture in producing pain :—

A distinguished member of the legal profession first consulted me in November, 1863. Some months before, he had had a small calculus removed from his bladder, and had previously passed at various times small uric-acid calculi without assistance. At his request, I examined him with a lithotrite, and crushed a minute concretion. On three subsequent occasions I removed gravel from him by means of a scooped lithotrite; on one occasion, three small calculi, the largest not bigger than a grain of wheat, and one of the same size four months ago. This gentleman always knows when he has any foreign body, however minute, in the bladder, by the sensation it produces. Its presence occasions at times a peculiar grating sensation, which gives rise to a kind of half-shudder; and he experiences the nearest approach to pain when he crosses one leg over the other. Whenever these symptoms occur, he insists on an examination, and I have never found him mistaken in his opinion when I have used a lithotrite for this purpose.

Sharp pain at the end of the penis, after making water, is a common symptom of stone, and often an early one, arising from the compression of the stone between the coats of the bladder.

The diagnostic value of pain occurring after

micturition cannot be too fully insisted on, depending as it does on the mechanical effect alluded to; it is a symptom invariably present with all patients who possess the power of emptying their bladder. The pain may be felt at the neck, or over the region of the bladder, but more commonly it is referred to the end of the penis, and lasts sometimes some minutes after micturition. That irritation of the bladder, arising either from the presence of a foreign body, or from the existence of disease, should occasion pain so commonly at this spot may be thus accounted for. The impression, made on the branches of the sacral plexus distributed to the mucous membrane of the bladder, is referred to the ramifications of the filaments from the same plexus distributed to the extremity of the penis.

A patient whom I relieved of calculus by one crushing, some eight years ago, had this prominent symptom. He applied to me again this year with the same symptoms, and was admitted into this hospital; a calculus was detected, and after two crushings he left cured.

The mechanical effect of sudden jolts, of horse exercise, of driving, &c., in inducing pain, is generally a striking symptom, often an early one; the pain is sometimes felt at the neck of the bladder, and in the region of the rectum, but more commonly towards the end of the penis.

But, to attach due importance to these symptoms of pain, you cannot be too minute in your questioning, in order to satisfy yourself whether or not they depend on the presence of a foreign body. In other affections of the urinary organs, there may be pain in the bladder and at the end of the penis, blood in the urine, &c.; but take these symptoms one by one, follow them closely, and mark well when and how they are produced, and you will generally be able to make out pretty clearly whether they can be accounted for by the mechanical action of a foreign body in the bladder.

The third symptom that has been referred to, as indicating mechanical injury, is bladder irritation, the signs of which are increased frequency of micturition, and occasional incontinence of urine. These symptoms alone are of little import; they are certainly not to be regarded as in any sense characteristic; though they become most important when taken in conjunction with other symptoms. To make them of value, it is necessary, by a process of exclusion, first to ascertain on what they do not depend, as one or both of these symptoms may occur simply through an acid condition of the urine, and they are, moreover, commonly met with in nearly all diseases of the bladder and prostate, and in most cases of long-standing stricture. At the same time, it must be

borne in mind that vesical calculus often occasions inflammation of the bladder, and I have known a case in which urethritis, giving rise to all the symptoms of acute gonorrhœa, had been produced by the presence of a stone in the bladder.

At the end of last year, I operated on a patient for stone, who had been treated for months, both in this hospital and Guy's, for spasmodic stricture, and I was compelled to open the stricture in order to perform lithotrity. In this case, my suspicions were aroused by the persistence of acute pain, and a muco-purulent condition of the urine, showing continued inflammation of the bladder, and this, in spite of the relief afforded him by the dilatation of his stricture. In such cases, doubt as to diagnosis will be removed by a careful examination of the urethra and prostate, and by a chemical and microscopical examination of the urine. These symptoms, therefore, though not characteristic, have a great diagnostic value, when properly appreciated and considered in conjunction with others, as generally they are amongst the earliest symptoms.

At the risk of appearing tedious, I have dwelt thus minutely on this the first part of the subject of my lecture, in order to enforce as much as possible the object I have in view, namely, to make the early diagnosis of stone, and its treatment while yet small, the rule in calculous affec-

tions, and thereby to avoid, as far as the surgeon is concerned, the responsibility of overlooking its presence until it has attained large dimensions.

Mainly in consequence of the labours of M. Civiale, the treatment of calculus has been removed from the appalling fatality of so-termed capital operations. It would entirely cease to be regarded as a dangerous disease were it grappled with in its early stages. If we are to attain success in this hospital—if we are not to be mere self-seekers, but genuine workers in this domain of surgery—we must not be content to acquire mere operative dexterity, though this is of great importance, but we must avail ourselves of all the means at our disposal for improving and sharpening our powers of diagnosis. By doing this, we shall be rewarded by a success in the treatment of these affections, unprecedented in this or any country.

I now come to the consideration of the second part of my subject, the best method of detecting the presence of a calculus by examination. And first, as regards children, a careful examination with the sound, and attention to certain precautions, will generally prove successful. It is hardly possible to make a thorough and satisfactory examination in a very young child without chloroform, even when you have sufficient assistance to prevent all movement; for the first consequence

usually resulting from the introduction of an instrument will be an escape of the urine, a prolapse of the rectum, and most probably an action of the bowels. Under these circumstances, an examination, however minute, will often fail to detect a small stone; and I therefore always prefer to make the examination under chloroform.

The best kind of sound is that introduced some years ago by Sir William Fergusson, with a narrow shaft, about No. 5 size, and a short bulbous extremity. This instrument is freely moveable in the urethra, and the short lithotrite-like bulb allows it to be moved freely in the bladder. You will see at a glance, by comparing this with the old sound, the superiority it possesses for exploratory purposes. There are other sounds which I show you, perforated like catheters, and they are valuable if the bladder is empty, as they enable you to inject the necessary quantity of water. For my own part, however, I prefer the solid instrument for sounding; and if the bladder is empty, a second introduction is of no great consequence, when the patient is under chloroform.

In using this instrument, I generally commence from the neck of the bladder, making a succession of half-turns, first on one side, then on the other, as the instrument is passed slowly backward along the floor. Failing to detect anything, I

introduce my finger into the rectum, and repeat the same manipulations; by this means it can be ascertained, with considerable certainty, that every part of the bladder has been explored.

I well remember the case of a child with all the symptoms of stone, the presence of which, however, I was unable to detect with the sound, until, introducing my finger into the rectum, I distinctly felt through the septum the stone lying on the floor of the bladder, and was enabled without difficulty to tilt it against my instrument. In fact, with most young children, a stone of any size can nearly always be felt by the finger through the recto-vesical septum.

This method of exploration is not, in my opinion, so satisfactory for adults: in them the cavity to be examined is not only larger, but it is sometimes altered by disease; and with the sound no amount of care will enable the surgeon invariably to detect a stone, for in the best hands failures repeatedly occur. To one in the habit of performing lithotrity, the sound is not a satisfactory instrument for examining the bladder, whether healthy or diseased. With this instrument you can never be perfectly certain, even after repeated explorations, that the stone does not exist. The history of surgery is replete with cases illustrative of the uncertainty of bladder explorations with the ordinary sound. When,

therefore, from the symptoms, the existence of a foreign body is suspected, if the option is left to me, I always examine with a lithotrite, especially where previous explorations have been made unsuccessfully; and patients have often assured me that the examination with a lithotrite has occasioned them less pain than previous soundings. In endeavouring to elicit sound by striking the stone, the bladder is subjected to certain concussions occasioning pain and irritation; and as any kind of examination must give rise to some pain, I am always unwilling to make it, unless the evidence from the history is strong, and then the surgeon is bound to make it as thorough as possible. For this purpose there is no instrument so valuable as the lithotrite. I am firmly convinced that examinations carefully conducted by it are not a whit more painful than those made by the sound or the catheter. I insisted on this in 1864, in a paper which I read before the Medical Society of London; and subsequent experience has fully confirmed the opinion I then entertained of the advantage of this kind of examination.

I could illustrate this part of my lecture by numerous examples, both in hospital and private practice, where, over and over again, I have been enabled to detect the presence of calculi, after the ablest surgeons had failed to detect them by the

sound. Only this year we have had no less than three cases in which this occurred, where the patients had been previously examined in this hospital with the sound, and two of them had been examined in like manner elsewhere. This failure of the sound to detect the presence of a calculus is a strong argument in favour of the use of the lithotrite, for, as I remarked just now, it should be the surgeon's object to spare his patient the pain of every unnecessary examination, when once he is justified in suspecting the existence of stone in the bladder.

The examination with the lithotrite offers other important advantages: it enables you to ascertain the exact condition of the bladder, its capacity, its sensibility, the size of the stone when present, or whether the symptoms are occasioned by a foreign body of another description, such as a polypoid growth; and again, whether the bladder is sacculated, and the stone as a consequence encysted; and, more than all, it enables you to deal with the enemy at once, and to that extent saves your patient the mental disquietude of a dreaded operation; while, as I said before, the examination and crushing, when properly conducted, will occasion no more suffering than a patient would experience from the ordinary introduction of a catheter. Unnecessary pain will be avoided in making this examination by

attention to the following rules, which apply to all manipulative procedures about the urethra and bladder. The two watchwords of the late M. Civiale, in conducting all his manipulations, were "DOUCEMENT ET LENTEMENT." In passing the instrument along the urethra, and in moving it in the bladder, you cannot be too gentle and too deliberate. Avoid as much as possible all lateral motion, and prevent the weight of your instrument from pressing down the neck of the bladder. Hold the instrument lightly, while opening and closing the blades; grasp it as firmly as possible, when you have seized and are about to crush the stone.

Above all, do not weary and tire out the bladder by a prolonged examination; make the examination of each portion of the viscus thorough, and thereby avoid the necessity of looking for the stone a second time in the same place. It will be the object of my next lecture to show, as best I can, how this may be accomplished.

LECTURE II.

In my first lecture I attempted to show the extreme importance of being able to recognise the early symptoms of stone in the bladder, and I illustrated, by reference to cases, the great significance of certain prominent symptoms as influenced by exercise and rest. I also advocated the use of the lithotrite, in preference to the sound, for the purpose of exploratory examinations of the bladder in the adult, and at the conclusion of the lecture examined a patient with M. Civiale's lithotrite. Most of you witnessed that examination, and I think will bear me out in saying that it apparently occasioned less suffering than ordinary sounding, and that it was, for purposes of diagnosis, a far more satisfactory and certain procedure.

The object of the present Lecture is, first, to consider the preparatory treatment of patients before the operation of lithotrity; and, secondly, to describe the operation itself.

I may illustrate the preparatory treatment in ordinary cases by reference to the patient whom I examined after the last lecture. He was admitted into the hospital on the day previous to his examination, having travelled by rail from Sheffield. On admission, he stated that he had been operated on for stone in St. Bartholomew's Hospital two years before, and he was fully persuaded, from his symptoms, that he was again suffering from the same affection. By my instructions he was kept in bed all the morning, and directed to retain his urine for two hours previous to the examination. This precaution enabled him to bear a lengthened and thorough examination, without distress.

As a rule, this is the only preparation a patient requires who is about to be submitted to the operation of lithotrity, and when it is practicable the same precautions should be taken where the symptoms warrant an examination of the bladder.

These precautions are often neglected. I conceive them, however, to be of great importance, especially in certain cases; and, as it should be our object to avoid all unnecessary elements of risk, I would recommend them for general adoption. At the same time, care should be taken not to overtax the bladder; you must therefore gather from the history of your patient how long the urine can be retained without causing distress;

for if, at the time of the examination, there exists a strong desire to pass water, with an irritable bladder, you will almost certainly have involuntary escape of the urine, the moment the instrument comes in contact with the coats of the bladder. Usually a sufficient quantity of urine, say about 4 oz., will accumulate in the bladder in an hour or an hour and a half, and most patients will be able to retain this quantity, when kept perfectly quiet. If unable to do so, and the symptoms of irritation are but of recent date, it is advisable to wait until the irritation subsides, which it generally will do after a few hours' rest, especially where it depends on the presence of a foreign body. It is too commonly the habit, both in hospital and private practice, to submit patients to an examination when they first consult us; but, by adopting this practice, the presence of stone is often overlooked; as the patient is unable to tolerate the proper examination.

Certain patients, perhaps the majority, experience no ill effects from ordinary explorations; others, and especially those who have been unaccustomed to the application of instruments, suffer very much, not only at the time of the examination, but subsequently, from the shock which it occasions. It is indeed impossible to foretell the effect of instrumentation on patients who have been unaccustomed to it, since cases have occurred

where shock has given rise to irritative fever, even when the examination has been conducted with the utmost care. In all cases, however, a second and unnecessary introduction of the instrument is to be avoided, since it renders a patient less able to tolerate the presence of an instrument for any time in the bladder, and so prevents a thorough exploration. For this reason, wherever it is possible, I avoid preliminary injections; and on this point I laid stress some years ago, in a paper which I read before the Medical Society.

In all cases where the symptoms lead you to suspect the existence of a foreign body, it is better to keep your patient in bed for a few hours before and a few hours after the examination. For a few hours before, because, the irritation being thus allayed, the bladder is enabled to bear, if necessary, a more prolonged and careful exploration, and to retain without distress a quantity of urine sufficient to permit of the lithotrite being opened and closed with perfect freedom; for a few hours after the examination, as it allows a stone, if present, to be crushed at once; and where, from the size of the calculus, or the state of the bladder, this proceeding is not advisable, these very conditions would be a strong reason for avoiding exercise and exposure. I cannot, however, too much insist on the necessity of this, where the presence of calculus has occasioned

inflammation, or even marked irritation of the bladder. Under these conditions such a precaution is absolutely essential, and a grave responsibility rests with the surgeon, when serious symptoms arise from its neglect.

The preparation of a few hours' rest is important for the surgeon, as without it a thorough and efficient examination is often rendered impossible; it is true he may sometimes find the stone, but, when increased irritation has resulted from exercise, he will often be prevented from finding it, where he otherwise would have done, had the bladder been in a more favourable condition. I have been foiled over and over again by neglect of this precaution; while, on the other hand, patients who were unable to bear the least movement of an instrument in the bladder when they came to me, have borne lithotrity perfectly well, when kept in bed a few hours before being examined.

Previous to examination it is important to ascertain that no renal complication exists. This will be discovered by a microscopic examination of the urine, which is always advisable before an examination. When there is evidence of kidney affection, it does not necessarily contra-indicate lithotrity, but rather is a strong reason for preferring it to lithotomy. At the same time, however, it is a warning that very

little should be done at each sitting, and that all unnecessary instrumentation should be avoided.

It is necessary also to ascertain before examination that there is no constriction existing in any part of the urethra, and this may generally be gathered from the history of the patient. When there is stricture, it must of course be treated before any attempt is made to introduce the lithotrite, and it will be for the surgeon to decide whether to treat it by ordinary dilatation, rapid dilatation, or by rupture. As to the method most suitable he will be mainly guided by the urgency of the bladder symptoms, by the circumstances of his patient, and by the seat and character of the stricture. When the stricture is confined to the orifice of the urethra, it may be divided by M. Civiale's urethrotome, and the operation of lithotrity may with safety be proceeded with at once.

There is another condition of the urethra to which I must advert, as likely to delay examination, that of hyperæsthesia, that is to say, an abnormal sensibility of the canal, a condition not uncommonly co-existing with calculous affections and other diseases of the bladder. In well-marked instances, the passage of an instrument causes intolerable pain, and renders it impossible to conduct a careful examination. Many, and amongst others the late M. Civiale and Sir William Fergusson,

have recommended in such cases the preliminary introduction of bougies, with the view of diminishing the hyperæsthesia, and, in course of time, by this means the abnormal sensibility of the urethra is materially diminished. For my own part, I consider the practice is open to this objection, that time is lost, and the patient is submitted to much unnecessary suffering, not only from the repeated introduction of the instruments, and the acute symptoms occasioned by the stone, but from the mental anxiety arising from the dread of impending operations.

To avoid these two evils of delay and unnecessary suffering, I think it far better to perform the operation of lithotrity under chloroform, and this is one of the few conditions in which I recommend anæsthetics in lithotrity. I do so, because this state of the urethra does not in any way contra-indicate lithotrity; on the contrary, I have often known its sensibility materially diminish as the operation has progressed, that is to say, it has become less sensitive, as other symptoms of irritation have subsided with the diminution in the quantity of stone. In fact, this abnormal sensibility in many cases seems to depend on the presence of a foreign body in the bladder, and consequently subsides with the other symptoms, in proportion as the bulk of

the calculus is diminished, so as to offer less impediment to the flow of the urine.

Another condition that renders the administration of chloroform desirable in lithotrity is cystitis, where this has arisen from the presence of stone, and does not subside with rest. In such cases the stone is generally a rough one, and nothing but its removal will cure the cystitis, and the more rapidly this is effected with safety to the patient the better. In such a case chloroform is of great assistance.

I shall not attempt to describe the various instruments that have been invented from time to time for lithotrity; as with most other inventions, suggestion followed suggestion, until finally, after many years of patient labour, M. Civiale succeeded in producing this instrument.

It consists, as you see, of a round steel shaft, with a curved and flattened extremity, projecting about one inch from the line of the shaft at an angle of 120 degrees, or thereabouts. The shaft is adapted in diameter to the calibre of the urethra, and in length it exceeds the length of the urethra by three or four inches. Throughout its whole length runs an open channel, in which fits a sliding steel rod, freely moveable. The extremity of this sliding rod is curved and flattened, like the extremity of the shaft, only narrower; these curved extremities are called the blades of the

lithotrite, the end of the shaft being termed the female blade, and the end of the sliding rod the male blade. At the opposite end of the sliding rod is a screw, turned by a wheel. This screw can be connected or disconnected with the shaft at pleasure, by means of a disc fitted at the upper extremity of the shaft, containing a kind of double bolt, which, by a quarter-turn of the disc, is made to press and rest against the groove of the screw. When the screw is connected with the shaft, the male blade, by turning the wheel, can be closed upon the female blade, so as to crush any stone grasped between the two; and again, by a quarter turn of the disc, the screw can be instantly disconnected with the shaft, and the male blade released from its position without the interruption that would be caused by unscrewing, enabling the operator to proceed at once to search for another stone. The inner surface of the male blade, namely, that side which fits on the female blade, is roughened, to facilitate the grasping and crushing of the stone; and there is a small hole at the angle of the shaft, to prevent accumulation of débris. In one class of instruments, used when a stone is very hard and large, and it is required to crush without pulverising it, the female blade is open or fenestrated, as it is termed, to admit of the escape of fragments through it on crushing. For all ordinary pur-

poses, however, the lithotrite with plain blades is sufficient.

As a surgical instrument, it is nearly perfect; it combines, with the requisite strength, a shape that permits of the most delicate manipulations; and though, since its first appearance, numerous alterations and modifications have been proposed, there have been no real improvements. To be a successful lithotritist, it is absolutely requisite, in the first instance, to learn how to use this instrument properly; and this preliminary knowledge can only be acquired by continual practice on the dead subject. In this respect, there is no operation in surgery that requires such special education as lithotrity. As to most other operations, except those practised on the eye, a knowledge of anatomy, combined with attendance in the operating theatre, will enable the surgeon to perform them; but it is not so with lithotrity. To acquire proficiency in this, it must be learnt on the dead subject, and practised on the living. Its every stage requires learning and mastering, and it is a matter of no small regret that the study of this operation on the dead subject has been so much neglected in this country. The substitution of lithotrity for lithotomy is one of the greatest discoveries of modern surgery, and yet, so far as I can learn, there is no school in London where the operation is taught,

as it is in Paris, on the dead subject. This is a great want, which we hope before long to supply at this hospital.

Before proceeding to perform lithotrity, you must determine first the best position for yourself and your patient. The best for the surgeon, undoubtedly, is on the right hand of the patient, as it necessitates no change in his position after the instrument has been introduced, and when he proceeds to search for the stone. The patient should lie on his back, his body being slightly inclined towards the operator. The operation may be performed on the ordinary hospital bed; but, as this involves stooping on the part of the surgeon, it would be better if raised a foot higher; though, of course, in determining the height of an operating couch, account must be taken of the stature of the surgeon; a convenient average, however, is thirty inches.

Many operators, following the example of M. Civiale, are in the habit of placing a firm cushion under the sacrum for the purpose of raising the pelvis, so that any foreign body may roll back from the neck of the bladder. I do not generally adopt this plan, as it is only really necessary when there is considerable hypertrophy of the prostate, occasioning a regular pouch behind it, in which the stone lodges.

We come now to the introduction of the

lithotrite; to effect which, without injury to the urethra, is only second in importance to crushing the calculus without injury to the bladder; for there is no accident in lithotrity that is attended with more distress to the patient, both at the time and after the operation, than that occasioned by laceration of the urethra. I shall, therefore, be somewhat minute in my description of the best method of introducing the instrument, as, by careful and cautious practice of the various manœuvres required, injury can in all cases be avoided.

On comparing the lithotrite with the catheter, it will be at once perceived that the difference in the shape, size, and weight of the two instruments will necessitate a corresponding difference in the method of introducing them. And it is from a disregard of these differences, and from an attempt to pass the lithotrite in the same manner as the catheter, that failure sometimes occurs, and that the patient is often subjected to much unnecessary suffering and occasional injury. The more abrupt and irregular curve of the lithotrite, together with the much greater shortness of the bent portion, at once prevents its being carried, like the catheter, with one continuous sweep into the bladder. And these differences, together with its greater weight and greater volume, render it essential that in the use of this instru-

ment we should be much slower and more deliberate in all our manipulations.

The operator stands with his back towards the face of the patient; the lithotrite being held horizontally in the right hand, and this hand being placed immediately over the right anterior superior spinous process. The penis is taken between the middle and ring finger of the left hand, and the lips of the meatus are opened with the thumb and index finger; the instrument is then introduced into the meatus, and the penis gently drawn over the short curve of the lithotrite, the instrument being at the same time allowed to decline slowly towards the perineum. To accomplish this, it is necessary to raise the lithotrite, and at the same time to draw the penis towards the hand holding the instrument. When the extremity of the instrument reaches the bulbous portion of the urethra, the handle will be still inclined towards the right side, though it will have approached nearer the median line of the body. The lithotrite is now swept slowly round till it is brought to a perpendicular direction, the shaft forming a right angle with the body of the patient, and it results from this that the curved part is in the direction of the canal under the pubic arch. In this position the penis is drawn upwards, and the lithotrite allowed to penetrate slowly by its own weight the membranous portion.

When this part of the urethra has been reached, the left hand is withdrawn from the penis, and the instrument is lowered carefully and without force towards the patient's thighs, at the same time that it is pressed forward into the bladder. It is this last part of the introduction that requires the greatest care, for it is here the greatest difficulty arises, especially when the prostate is enlarged. And only by constant practice on the dead subject can you learn the natural amount of resistance to be expected. The instrument has to be lowered in proportion to the hypertrophy of the prostate; cases have occurred to me in which this organ was so large, that it was found impossible to lower the instrument sufficiently until the pelvis had been raised by a bolster; the handle of the lithotrite coming in contact with the couch before the instrument was sufficiently depressed to enter the bladder. When the instrument enters the membranous portion of the urethra, the left hand of the operator is free, and should gently press on the pubic region. This proceeding has the effect of relaxing the triangular ligament, and of diminishing the spasm of the abdominal muscles; and it is always found most useful in proportion to the amount of resistance offered by muscular spasm and the hypertrophy of the prostate.

The instrument having safely entered the bladder, the next business of the surgeon is to

find and crush the stone. The method of operating I prefer is that introduced by M. Civiale, which, in my opinion, presents many advantages over the method originally practised in England, and even now adopted by some. In the latter, the lithotrite is introduced fairly into the bladder, and the convex portion of the instrument pressed on the floor of the bladder, so as to cause a hollow at this part. The blades are then widely opened, and the stone, naturally gravitating to the lowest point, comes within their grasp, when it is secured and crushed. It is sometimes necessary to give the instrument a smart shake in order to dislodge the stone. This proceeding always occasions great pain and severe shock to the patient, and after the first crushing a sharp fragment may at any time get behind the instrument, and by pressure be made to lacerate the mucous membrane of the bladder.

The essential difference in the French operation is, that, instead of the lithotrite being pressed against the trigone so as to produce a hollow into which the stone may roll, the instrument avoids contact with the vesical walls, and its blades are directed in search of the calculus. In one method, it is attempted to make the stone come to the instrument; in the other, the instrument seeks for the stone. In the French method, the patient being placed in the lithotrity posture, the instru-

ment is passed into the centre of the bladder, in the manner already described, with the convexity of the instrument towards the trigone. In this position the blades are opened, and are allowed to fall half over to the right or left side, and then closed. If the stone is not included, the instrument is brought back to the first position, viz., that which it occupied when first introduced; the blades are opened as before, turned to the other side, and again closed, care being taken that the axis of the instrument is still maintained in the median line. In this way the central part of the floor of the bladder is explored. To examine farther than this from the middle line, the instrument should be again opened in the first position, turned laterally, and gently swept over the floor of the bladder, until the convexity of the instrument is brought close to the concavity of the right side of the bladder, so that the sides of the blades should all but rest against the extreme right of the floor of the bladder, the points, of course, being directed inwards: the blades are now closed. The movements are repeated, if necessary, on the opposite side, with the same precautions. These manipulations will certainly find a stone when present, unless the prostate is so large that a pouch is formed behind it. When this is the case, the instrument is opened and turned round until the open blades point towards the trigone; the handle

of the instrument is then raised until the lithotrite just touches the floor. When a stone is seized during any of these manipulations, the instrument should be brought back to the first position, and the stone crushed. The fragments will then fall immediately under the lithotrite, and a half turn of the instrument, without any lateral movement, will be sure to include some of them.

Cases sometimes occur in which the operator experiences considerable difficulty from the insufficient length of the lithotrite as ordinarily manufactured; and many English lithotrites made on the French principle I have found more than an inch shorter than those of French manufacture. Where difficulty arises from this cause, it depends on the unusual length of the urethra, mostly of the penal portion, together with hypertrophy of the prostate gland. The following case is an illustration of this, and, had the calculus in this patient been at all larger than it was, it would have been impossible to open the instrument wide enough to seize it; and certainly the patient suffered more than he otherwise would have done, as, in order to crush the stone, it was found necessary to press back the curved portion of the female blade on the neck of the bladder.

Jan. 20, 1864.—A clergyman, from Suffolk, aged 70, had suffered from pain and difficulty in passing urine for two years. The urine was muco-purulent, and after exercise was slightly

tinged with blood. He had been sounded, but no stone was detected. In accordance with my usual practice, I determined to examine him with the lithotrite on the following day; but the bladder was so irritable that he could not retain the urine during the introduction of the instrument, although he had passed water only an hour and a half before. I ordered him to keep in bed and take a mixture containing morphia. January 23. Having directed that he should retain urine for two hours, I went to his house, intending to operate upon him under the influence of chloroform. In this I was disappointed, as there was reason to suppose that he was not a good subject for its administration. I selected my longest lithotrite, but found it would barely enter the bladder, and I was obliged to push the handle almost on to the pubis to allow of my opening the instrument. A calculus was then seized without further difficulty and crushed. No bad symptoms followed, and a few fragments of the triple phosphate passed. I operated again January 29th and February 1st, and finally examined him on February 16th. After this, he was relieved from all symptoms of stone, but was detained in town two or three weeks by an acute attack of rheumatic gout; consequently, I had an opportunity of seeing him when all symptoms of irritation had disappeared.

Another instance occurred to Mr. Coulson, where, from the unusual length of the urethra, he was obliged to have a lithotrite expressly manufactured some inches longer than his largest instrument.

In conclusion, it is only necessary to say a few words as to the way in which the instrument should be held during the various manipulations. In searching, it should be held as lightly as possible, the right hand being applied to handle the extremity of the male blade; the left hand

holding the disc of the female blade. When the stone is to be crushed, the left arm is pressed to the operator's side, whilst the left hand grasps the disc and wide part of the female blade as firmly as possible, so as to permit of no jarring or lateral movement, the right hand screwing the male blade home. But as I am about to perform the operation on a patient in the wards, it is unnecessary for me to be more minute in my description of these manipulations.

LECTURE III.

In my last lecture I described the operation of Lithotrity, and explained my reasons for recommending the practice of the various manœuvres of this operation as the best and most efficacious method of detecting a calculus in the adult bladder. I moreover attempted to show that it not only possessed the advantage of being the most certain method of diagnosis, but that it was in the majority of cases the least painful, not only in itself, but in the fact that from its efficacy it required no repetition, since it enabled the surgeon to deal with the disease at once, to find the stone and crush it.

To-day I propose :—

I. To direct your attention to some of those cases in which the operation of lithotrity is not applicable :

II. To consider the amount of work to be done in cases of lithotrity at the first operation

and at subsequent sittings, with the length of intervals to be allowed between them :

III. To describe the after treatment ; and to say a few words respecting the complications that may arise.

I. As I have before stated, lithotomy is the best operation for children, and lithotrity, when practicable, for adults. Since the introduction of the latter, it has been too much the habit for surgeons to support the one operation by depreciating the other, and in this way advance in the science of surgery has been retarded. So far, however, from depreciating lithotomy as the more formidable proceeding, we should regard it as a valuable auxiliary to the other, and our aim should be to determine the most appropriate method of operation for each particular case, as I firmly believe that all cases of stone can be treated with comparative safety by one or other of the two operations. As a rule, all small calculi can be crushed, and most large calculi removed. Lithotomy is the operation to be preferred for most old and long-existing concretions ; and lithotrity for all the more recent calculous affections, when the urethra permits of the introduction of the necessary instruments. We should, in fact, make lithotrity the rule in all calculous affections, and study, for exceptional cases, to

make lithotomy as little formidable and dangerous as possible.

It is not in the scope of this lecture to describe the various methods of performing lithotomy, nor is it my intention to make a full inquiry into the kind of operation most appropriate to particular cases: these must be considered on some future occasion. But there are certain conditions, which may be briefly alluded to, which render lithotrity impracticable in some cases, and inapplicable in others. They are as follows:—

When calculi are very large, it is found impossible to seize them between the blades of the lithotrite; and in such cases, therefore, lithotrity is out of the question. The stone I show you is of that description, and was removed by lithotomy. From its size and irregular surface, it occasioned so much irritation that, in spite of absolute rest, the bladder could only contain a small quantity of fluid at any given time, as the urine was constantly passing away; and, in consequence, the vesical coats enveloped the stone so closely that it was impossible to seize it, and, even had it been otherwise, the unusual size of the stone would have opened the instrument too widely to have allowed the screw to be brought into play.

Another condition where lithotrity is not appli-

cable is the presence of several calculi; as in a case that came under my care, when I removed no less than eleven calculi. Under such circumstances, lithotomy is the less hazardous and more speedy treatment.

Stricture of old standing has been commonly considered as an obstacle to lithotrity; but a case that will be afterwards referred to proves that, where other conditions are favourable, this obstacle is not insurmountable.

II. The first operation in lithotrity should always be regarded as a kind of test, and should not occupy more than a couple of minutes; in this time it is usually easy to crush the stone two or three times, and this is quite sufficient for the first sitting. In this way one obtains an insight into the constitution of the patient, and learns how the bladder will tolerate operative interference. Sometimes great delay and much suffering are occasioned by attempting too much at the commencement. After a cautious experiment in the first instance, much more can be afterwards done with confidence. As a rule, at subsequent operations, the instrument may be kept in the bladder for five or six minutes without occasioning marked distress, and in this time many fragments may be crushed. With respect to the interval to be allowed between the different

sittings, I usually give about four days between the first and second; afterwards, I am influenced mainly by the coming away of the detritus. Where, however, the early symptoms of calculus have not been disregarded, two operations should suffice. After an efficient crushing, so long as the débris continue to escape in considerable quantity, it would be useless to do more, but as soon as this ceases to be the case I again crush. The interval of a few days allows ample time for all symptoms of irritation and soreness of the urethra to subside, and for the patient to recover from the slight shock of the operation.

I have often observed that a first operation has afforded marked relief to patients, who, before the crushing, suffered acutely from the more distressing symptoms of calculus; but that others, who had previously suffered comparatively little from the presence of the stone, had all their symptoms materially aggravated after the first crushing. Increased irritation is to be anticipated with hard calculi, uric acid, and oxalates, where the fractured portions are sharp and angular, and in this case it is particularly important to pulverise the fragments as much and as soon as possible; and not only have we a strong reason for speedy operation, but it is useless, and even hazardous, to wait for the subsidence of the irritation, when it clearly depends on such a cause. The following is the

practice my experience has dictated in this matter. If the pain and other symptoms have begun distinctly to diminish before the usual time for the next sitting, I wait until the fourth day for their further subsidence. If they continue, and especially if there are rigors, and much pain of a cutting character, the cause is almost certainly irritation by angular fragments, and I am inclined rather to anticipate by a day or two the usual period. I have done this on several occasions with marked benefit, and have at other times had to regret that I have not resorted to it.

The removal of débris by injecting and washing out the bladder was formerly the rule; now, it is seldom resorted to. At one time, it was commonly practised immediately after each operation, and I have more than once seen patients, who have borne lithotrity with perfect heroism, completely break down under the unnecessary infliction of syringing. I use the term "unnecessary" advisedly, since it is only the smaller fragments that will escape through a catheter, while these, and much larger fragments than these, will pass readily and without pain through a healthy urethra during micturition. The practice, therefore, is to be regarded as a mischievous one, since it involves an unnecessary introduction of instruments, which should always be avoided.

III. The first indication in the after-treatment is absolute rest after each operation. So long as the surgeon has reason to believe that a fragment of any size remains in the bladder, the patient should be kept perfectly quiet.

It often happens, as I said before, that there is marked relief to all the painful symptoms of stone after the first crushing; so much so, that patients sometimes imagine that they are cured of their disease before any fragments have come away. This disappearance of painful symptoms before there is any material diminution in the bulk of the stone, depends, most probably, on the irregular shape of the broken fragments, which permits the urine to filter through them, and so offers little impediment to micturition: so far, however, from the pain subsiding, the symptoms would all be very much aggravated, if the patient attempted any exercise.

The operator will always know from the size of the original stone, from the quantity of débris passed, from the state of the urine, and the facility with which fragments are seized at the subsequent sittings, how much remains to be done. Towards the termination of the case, when all irritation has subsided, and when the urine passed shows little trace of vesical mucus, the patient should be directed to try himself with gentle exercise — walking, driving, or riding.

Should any such exercise induce irritation, or give rise to the appearance of mucus or blood in the urine, it is essential that another lithotritic examination should be made.

Whilst on this subject, I may allude to a fact that must be known to all who have much experience in calculous affections, viz., that patients, after lithotrity, more frequently have return of stone than those who have been operated on by lithotomy. In many cases, the obvious reason for this is, that some fragment has remained after the last crushing. The speedy recurrence of stone appears most commonly in the old, and is often the fault of the surgeon, for trusting too implicitly the sensations of the patient, and not bearing in mind that, with advancing years, the normal sensibility of the bladder is, to say the least, impaired. The absence of irritation sometimes induces the surgeon to neglect that which has been so much insisted on in these lectures, the microscopic condition of the urine, and this as affected by exercise and repose. When either the sensations of the patient, or the appearance of the urine under these two conditions, indicate that a fragment is left behind, a further exploration becomes necessary, and it is at this stage of lithotrity that the most delicate and careful manipulations are required. In the old, when the prostate is very large, or when, from partial

atony of the bladder, a portion of urine is always left behind, some difficulty may be experienced; and, in rare cases, when the bladder is sacculated, this difficulty is materially increased. Under either of these conditions, a careful examination with the lithotrite will enable the surgeon to deal with the offending fragment. The late M. Civiale was, at one time, in the habit of using the trilabe for those cases in which difficulty was experienced in finding a small fragment, but this is an instrument in which I have very little faith. In conducting this final examination, it is important not to have too much urine in the bladder; three ounces is in most cases quite sufficient to admit of all the necessary manipulations, which were fully described in the last lecture.

When the prostate is hypertrophied, it is advisable, for the final examination, to have the pelvis raised by means of a bolster. The patient having been thus placed in the most favourable position, it then becomes simply a matter of manipulative dexterity; at the same time, the previous experience of the operator in the particular case will prove of the greatest assistance in enabling him to select the most suitable instrument, and to judge the position in which the fragment is most likely to be lodged. The instrument generally most convenient and handy for the final examination is a lithotrite with a rather short and broad

curved extremity. With such an instrument, your search is much more likely to prove successful than with the trilabe, which consists of a straight tube, having three branches at the vesical end, which open by pressure and close by traction on the handle of the instrument: there is also a central branch, rounded at its extremity, which acts as a feeler. This instrument is most untrustworthy, and possesses all the disadvantages of the sound, as compared with the lithotrite, for the purposes of exploration; and it has this additional disadvantage that it is perfectly straight, and consequently, in those cases where the prostate is large, and there is a pouch in the bladder behind, the very cases in which trouble is to be anticipated from a last fragment being retained, no manipulative dexterity will enable you to examine with the trilabe this portion of the bladder; whereas no difficulty is encountered in efficiently exploring it with the lithotrite. Even if unsuccessful once with the lithotrite, I should advise a second attempt with it before resorting to any other instrument.

Both in hospital and private practice, I am in the habit of adopting, after each operation, the recommendation of Sir Benjamin Brodie, namely, that of giving the patient a glass of hot negus, or brandy and water. This has the effect of mitigating, if it does not ward off, a rigor which

some few patients are pretty sure to have after each operation.

When the bladder is in an atonic condition, and unable to expel its contents, the urine should be drawn off six times, at least, in the twenty-four hours succeeding an operation, and injected, night and morning, with lukewarm water. The object of these injections is not so much to bring away fragments, as to prevent irritation from decomposition of the urine. Where there is complete paralysis of the bladder, or, rather, where the bladder has no power to expel its contents, it is often advisable to retain the catheter in the bladder for twelve or fourteen hours after each operation. The instruments which I have found most convenient for this purpose, and which patients bear with the least annoyance, are the black elastic French catheters; they are very readily retained, and permit of perfect freedom of movement on the part of the patient, from their lightness and extreme suppleness. They are also the most suitable where frequent introductions of the catheter are necessary, as the patient can readily learn to pass them himself without pain or difficulty.

A good deal has been written respecting the impaction of fragments in the urethra after lithotrity. To the best of my belief, this complication never occurs unless some laceration or tear has

been made in some part of the urethra; and this complication can always be avoided by proper care on the part of the surgeon in the introduction of the instrument, and by taking time and pains to empty the lithotrite as much as possible before withdrawing it. The only case in this hospital where such a complication arose, was that of a patient whose stricture was ruptured previous to lithotrity, and at this ruptured part a fragment became impacted. The following short account of the case will not prove uninstructive:—

W. R——, æt. 35, was admitted into St. Peter's Hospital Sept. 10, 1866, suffering from old-standing stricture, for which he had been treated in Guy's Hospital. His urine was ammoniacal and muco-purulent, and he complained of considerable pain after micturition. The house-surgeon was directed to introduce a small catheter daily, and to inject the bladder with lukewarm water.

Sept. 14.—He was sounded and a stone detected, but the stricture would not permit of the introduction of the smallest lithotrite. The stricture was ruptured by Mr. Holt's dilator. On the following day he suffered from rigors, but feeling much better on the 16th, a No. 11 catheter was passed without difficulty, and the bladder again injected.

— 19.—A lithotrite was introduced, and a medium-sized phosphatic calculus was seized and crushed four or five times.

— 22.—Several fragments have been passed since the last operation. To-day an attempt was made to repeat the crushing, but he was unable to tolerate the presence of the instrument.

— 28.—Has been much freer from pain until to-day, and the urine has been much clearer. Feels as if a fragment was impacted in the urethra. On introducing a lithotrite, a portion of stone

was found impacted immediately behind that part where the stricture had been ruptured. The fragment was pushed slowly back into the bladder, and there crushed. The operation occasioned the patient very little pain, and he was immediately relieved from all painful symptoms.

Oct. 4.—All symptoms of bladder irritation have disappeared, but he has been attacked with orchitis. From this he gradually recovered, and was discharged, cured, Oct. 16, 1866.

In all such cases, where fragments are lodged near the neck of the bladder, attempts should be made to return them to the bladder, rather than to bring them away through the penis. When fragments are lodged in the penal portion, they will often escape without interference, unless there is abnormal narrowing of the meatus; and where such narrowing exists, it is always advisable, before commencing lithotrity, to enlarge it by division with M. Civiale's instrument, which he devised for the purpose. If the fragments are lodged farther back, attempts should be made to bring them away by means of a long pair of blunt dressing forceps; or, better still, with a small urethral lithotrite, made expressly for this purpose, the female blade of which can be depressed and brought in a line with the rest of the instrument, by a turn of the disc to the left. By this manœuvre you are enabled to pass the female blade beyond the impacted portion. With a somewhat similar instrument to this, without a male blade, I have removed fragments impacted

in the penal portion. If it is found absolutely necessary to cut down on this portion of the urethra, the edges of the wound should be brought together by means of a wire suture, and a catheter should be retained until cicatrization takes place, otherwise a urethral fistula is inevitable. Many of you must have seen a boy in this hospital who had a double fistula in the penis, following the excision of a stone from the urethra. He was sent up from the country in this condition, and by paring the edges, bringing them together with wire sutures, and retaining an elastic catheter, the fistules were permanently closed, without any perceptible narrowing of the urethra. Still, the extraction of fragments by incision should only be resorted to as a last extremity; for, apart from the danger of permanent fistula, it materially interferes with the subsequent stages of lithotrity.

It occasionally happens, especially in the old, that retention of urine supervenes immediately after lithotrity. The following case occurred to me in private practice:—

March 21, 1864.—Mr. W——, æt. 69, had suffered for some time from symptoms of stone. He first noticed blood in the urine, after walking, six months before. I operated March 22nd and 26th, and April 2nd and 15th; and, lastly, on the 23rd. The first time, I found a calculus and crushed it at once, in the presence of Dr. Broadbent and Mr. Driver. The prostate was large, and the instrument had to be considerably depressed to

allow it to enter the bladder. This occasioned much pain, and at his request all the subsequent operations were performed under the influence of chloroform. There was no inconvenience experienced after the first sitting; but subsequently there was great difficulty in passing urine, almost amounting to complete retention, a few drops only coming away, after minutes of painful and continuous straining. To relieve this, I passed an ordinary catheter two or three times after the second and third operations. The introduction of this instrument afforded only temporary relief; consequently, after each of the last two operations I retained a French elastic catheter in the bladder from fourteen to twenty hours, and this gave the greatest ease. The retention was, I believe, due to a slight temporary swelling about the neck of the bladder and prostate, which, in addition to the enlarged state of the gland before the operation, rendered micturition all but impossible, and also interfered considerably with the passage of fragments. He was, consequently, much in the same position as a patient with paralysis of the bladder. This condition induced me to deviate from my ordinary rule, and, after the two last operations, I thoroughly injected the bladder by means of a large steel catheter, which brought away a considerable quantity of débris. This instrument, shaped much like a lithotrite, had been made some years before by Messrs. Savigny, on the suggestion of Sir B. Brodie. In this case there was no laceration of the urethra, and the patient was never troubled with impaction of fragments.

The complication of retention of urine after lithotrity is happily rarely to be looked for; when it occurs, unless immediately relieved, it gives rise to most distressing symptoms. It is better treated at first by retaining an instrument in the bladder than by the frequent introduction of the catheter. An instrument thus retained is very apt to become clogged by the accumulation

of pulverulent débris, and it is necessary, every three or four hours, to inject a little warm water, for the purpose of keeping the catheter perfectly open. Other cases are met with, where there is not, as in the case alluded to, complete, but only partial, retention; a condition that has most probably existed prior to the operation. In these, the same method of treatment may be adopted.

In cases where, from the character of the detritus, there is reason to suppose that the stone is composed for the most part of uric acid, great advantage will be derived from the administration of the citrate of potash, taken fasting three or four times a day, in doses sufficiently large to keep the urine constantly alkaline. The best and most agreeable form of giving it is that recommended by Dr. Roberts:—

"The following prescription yields a solution containing a drachm of the citrate in each fluid ounce:—

℞ Potass. Bicarb. ʒ xij.
Acidi Citrici ʒ viij + gr. xxiv.
Aquæ ad ℥ xij. Solve.

"A fluid ounce of this solution, mixed with three or four ounces of water, makes a draught which has scarcely any taste, and which even children take without any difficulty."

In a patient whom I treated in this manner, it had the effect of bringing away a large quantity

of uric acid in a state of solution, and it not only lessened the number of operations, but materially relieved the bladder irritation, by rounding off, as I presume, the edges of the angular fragments.

When the calculus is phosphatic, and the urine ammoniacal, it is well, after the second or third sitting, to try the effect of injections of the bladder with one drachm of dilute nitric acid to the pint of lukewarm water. But it is only in such cases, and under the other exceptional conditions referred to, that injections are either useful or necessary.

There is one more point which I consider of the greatest importance, and on which there is still some difference of opinion. It is whether, under any circumstances, an attempt should be made to bring away fragments in the lithotrite, or scoop. This practice I unreservedly condemn. Fragments cannot thus be removed without great risk of lacerating the mucous membrane of the urethra, or of the neck of the bladder. This does not merely cause pain and constitutional irritation, but often more serious mischief, by entangling fragments which would otherwise pass freely, and thus giving rise to impaction, and sometimes to extravasation of urine. Sir B. Brodie, in a paper on Lithotrity, vol. xxxviii. *Med. Chir. Trans.*, mentions four cases in which this practice was followed by extravasation and urinary abscess, and two of the patients died, notwith-

standing the abscesses were freely opened. I have seen a case in which a small calculus was removed entire in the lithotrite without being crushed, but it caused laceration of the prostatic portion of the urethra; this occasioned great pain at the time, and has left a persistent tenderness, which now, after a considerable interval, renders the introduction of an instrument exceedingly painful at this part.

The only cases which offer any justification for this method of treatment are those of so-called paralysis of bladder; but, even in these, this method is still objectionable, as, from the inevitably attendant laceration of the urethra, the subsequent and necessary introduction of instruments is in all cases rendered painful, and sometimes difficult. In such cases, it is better to introduce the non-fenestrated lithotrite two or three times, and to pulverise the fragments as much as possible. Each time the instrument is withdrawn, some quantity of débris will be brought away; but care should be taken it is not too loaded, and successive half-turns should be made with the screw to empty the lithotrite as much as possible, and prevent any fragment from protruding from the sides of the blades.

Should a rigor occur after any sitting, it may be followed by irritative fever, which may be the prelude to inflammation of the bladder or testicles.

Under any circumstances, the patient should be closely watched, and if the rigor is followed by frequent desire to pass water, and pain over the pubic region, hot flannels should be kept constantly applied over the lower part of the stomach, and opium administered by means of a suppository. No danger is to be apprehended, unless there is reason to fear any renal affection. Should the symptoms, however, indicate that the inflammation is extending along the ureters to the kidneys, counter-irritation should be applied to the loins by means of hot flannels sprinkled with turpentine. Opium should be discontinued, and the patient placed on a strict regimen. If the surgeon is on the watch, and the symptoms are early observed, they will generally yield to appropriate treatment.

When the renal complication is overlooked, it is the most fatal that can occur to patients who have been submitted to lithotrity. It is for this reason most important to ascertain in all cases, by careful examination of the urine, the condition of the kidneys previous to operation. And when there is reason to believe that the kidney structure has been to some extent destroyed — by back pressure, for example — though it need not prevent your having recourse to lithotrity, it should warn you to do very little at each operation, and should prove an additional reason for using the greatest gentleness and deliberation in all your manipulations.

The only other complication which remains to be alluded to is Orchitis, or inflammation of the testicle. This does not often occur, and, when it does, it can usually be traced to some laceration at or near the prostatic portion. It occurred, for example, in the patient already referred to, whose stricture was ruptured previous to performing lithotrity, and who had a fragment impacted at the seat of the stricture. It also happened to another patient under my care, who, after leaving the hospital, injured himself in attempting to pass a catheter. The only treatment necessary is perfect rest, with hot local fomentations. Sometimes, though rarely, suppuration occurs. Apart from the inconvenience and pain, it would be of no great moment, were it not that it delays the convalescence of the patient, as it renders further operative interference for the time inexpedient.

PREVENTION.

From an early period in the history of Surgery, attempts have been made to remove renal and vesical calculi by solution; but no great success could be anticipated, so long as the chemical properties of the different varieties of stone were imperfectly investigated, and the means were inadequate for determining which variety was present. It was of little use administering the so-called specific, whilst the influence of food and medicine on the composition of the urine was so very little known. Certain quack nostrums have, however, had a wide reputation, and some are extensively employed even at the present day. Numerous cures have been attributed to them, and probably, in some few cases, not without reason. It cannot be denied that relief of symptoms of bladder irritation has sometimes

followed; but more commonly the only result has been serious damage to the health.

More recently, attempts have been renewed on a thoroughly scientific basis. The solvent action of various substances on all the forms of stone, under conditions as nearly as possible resembling those met with in the body, has been experimentally ascertained. The microscope has enabled us to say almost positively, what variety of stone exists in any given case; and experiment and observation have taught us how to induce certain desired conditions of the urine. Other conditions, unattainable by medicine administered through the stomach, have been obtained by injection into the bladder. But solution of stone still remains, for the most part, a theoretical question. Cases, however, have been recorded in which this result has been attained, such as the following, which is related by Dr. Roberts, in the *Medico-Chirurgical Transactions*, (vol. xlviii. p. 111.)

M. de L——, æt. 51, was sounded by Leroy d'Etiolles, who found a stone in the bladder. This he believed not to be large, and to be suitable for crushing. The patient, however, went to Vichy, and drank, the first day, seven or eight glasses of the waters (which contain 44 grs. of bicarbonate of soda to the pint). The next day he took fifteen; and the urine, which was previously very acid, became strongly and constantly alkaline. In a few days he took twenty-two and twenty-four glasses. The symptoms, which were before severe, now subsided more and more; and, after seventeen days of treatment, he voided a

smooth uric-acid concretion, which bore evident traces of dissolution. From this moment, he continued wholly free from symptoms, and was able to take violent equestrian exercise without the least inconvenience.

The uric-acid and cystine calculi are alone amenable to the action of solvents taken internally. Oxalate of lime resists any solvent which can be introduced into the bladder by any method; and the phosphate of lime, or ammoniaco-magnesian phosphate, requires an acid which can only be introduced by injection. But for the removal of even a small uric-acid concretion a considerable time is required: five to six weeks is calculated from experiment, and during the whole of this period the urine must be kept constantly alkaline. This may be effected with least risk of injury to health, or impairment of digestion, by means of the salts of potash with the vegetable acids; but, under the most favourable conditions, this prolonged administration of alkalies, and the consequent diuresis, must be attended with waste of tissue and loss of strength. Unfortunately, also, an ammoniacal condition of the urine may at any time be induced, and a layer of mixed phosphates deposited on the stone, which would at once put a stop to the process.

When the stone is larger, not only must the time required be much longer, but, in calculi of

any size, it frequently happens that a layer of oxalate of lime has at some period or other been formed, or they may have received a coat of phosphates, on which the alkalies have no effect.

For any chance of success, then, in solution of calculus, the stone must be small and unmixed. This contracts the application of the process to very narrow limits; and, when it is considered that the stone can only be definitely ascertained to be small by means of the lithotrite, and that uncertainty must always remain as to the uniformity of its composition, there can be no doubt that most commonly an operation will be necessary.

In the prevention of the first formation of stone, or of its recurrence after removal by operation, internal remedies, with due attention to diet and to hygienic measures, have far greater scope. This will be better appreciated by tracing the formation of stone, which is as follows:—The kidneys separate from the blood a variety of substances; these are passed through the capillaries of the malpighian bodies, or the renal cells, and arrive in the tubes dissolved in the water of the urine. Normally, they are held in solution while in the urinary passages; but, from time to time, chemical displacement occurs between two of the substances thus meeting,

and the resulting compounds, being more or less insoluble, are precipitated. This may take place in either the kidney, ureter, or bladder, or only after the urine is voided. When it becomes habitual to any great extent, the precipitate may collect and accumulate, and a calculus be thus formed; or a nucleus may be furnished by a clot of blood or other solid particle, upon which concretion may rapidly take place. These precipitates or deposits are generally to be found in the urine for some time before they are formed in sufficient quantity to produce a distinct calculus, and are readily recognised by means of the microscope. In almost all cases the process can be traced, and the cause removed; failing this, the precipitation may be prevented; or, when this cannot be done, the concretions may probably be dislodged before they can attain any troublesome size. There are thus three modes of prevention open:—by aiding and correcting the vital processes of metamorphosis; by chemical action upon the abnormal constituents of the urine, preventing their precipitation in a solid form; and by the mechanical process of flushing the urinary apparatus.

As the different varieties of calculus have different composition and causation, it will be necessary to consider each in detail, and to give an account of the different ingredients which

enter into the formation of calculi. They are,—

1. Uric Acid and the Urates.
2. Oxalate of Lime.
3. Cystine and Cystic Oxide.
4. Phosphates of Lime and Magnesia.

URIC ACID.

This is by far the most common constituent of urinary calculi, either as free uric acid, or in combination with bases as urates; and as the object in this work is not so much to describe the different kinds of stone, as to trace their formation and account for their origin, those composed of uric acid and of its salts will be taken together.

Dr. Prout stated that two out of every three calculi had a nucleus of uric acid; but this proportion is not met with in any existing collections. In that of the College of Surgeons, according to the catalogue, out of 649 calculi, 212 are composed of uric acid alone; and in 65 others it forms a nucleus around which other deposits have taken place. Urates are given as constituting the entire calculus in 14, and the nucleus of 187 out of the 649, a proportion much greater than is met with elsewhere, and larger than—considering the solubility of the urates—would be looked for. The two together would very nearly reach Dr. Prout's proportion. Layers of uric acid are also frequently met with

upon other deposits, and it is said to form quite three-fourths of all renal calculi.

This great frequency of uric acid as a constituent of stone is accounted for by the fact that it is a constant and normal constituent of urine, the average proportion being about 0·5 in 1000, and the amount secreted per diem by a healthy man about 10 grains. Free uric acid is very insoluble; but it is held in solution in the urine by the bases, ammonia, soda, potash, and lime, the urates of which are soluble. It is in this form, also, that it exists in the blood, and is separated by the kidneys. Its appearance in the urine in a free state is thus the result of precipitation subsequent to secretion.

Uric acid is derived from nitrogenized proximate principles in a state of retrograde metamorphosis, and it has a double source,—from the food, and from the tissues of the body. We look for the causes of its abnormal increase, therefore, in conditions affecting the process of change constantly going on in the tissues on the one hand, or the due assimilation of the food on the other. When the metamorphosis is complete and perfect, the ultimate result is urea and carbonic acid. Uric acid represents a less complete retrograde change, or a lower degree of oxidization; and it has been extensively believed, that uric acid is a constant and regular stage in the

formation of urea. There is, however, no sufficient reason to suppose that such is the case. The amount secreted in health is variable, and is influenced chiefly by diet. A large proportion of nitrogenized food, *i.e.* an excess of animal food, will increase it. Where less is taken, and especially where the proportion of vegetable food is increased, it will be diminished. Certain alcoholic drinks also cause increased formation of uric acid. The influence of other conditions is not so clearly made out. The first effect of exercise is apparently to increase its amount, judging not merely by the deposit of urates in the urine concentrated as a result of perspiration, but as estimated by analysis. It is, however, certain that a sedentary mode of life directly or indirectly leads to habitual deposit of urates, or of free uric acid. Arrest of the cutaneous excretion is also said to augment the amount of uric acid in the urine.

It is increased in all acute diseases—fever, inflammation, acute rheumatism, &c.—and, so far as has been ascertained, *pari passu* with urea; the increase of both arising from the destruction of tissue which is going on. The same effects are produced in all diseases attended with emaciation, and from the same cause. Another important class of affections is attended with increase of uric acid, and often in a degree

disproportionate to the increase of urea; these are the diseases of mal-assimilation, gastro-intestinal, or hepatic, or general; the various forms of dyspepsia and derangement of the liver, and of gout, which is known to arise from accumulation of uric acid or its salts in the blood.

In some cases the uric acid is found in the urine from day to day in about the same proportion. In others it may for a time be almost wholly absent, and then be excreted in large quantity; its appearance in the urine being influenced by the rate of its formation in the blood, and also by its ready, or obstructed, elimination.

In treating of calculus, it is necessary to consider not merely the absolute increase of uric acid or urates in the urine, but more particularly the circumstances which may give rise to their deposit in the urinary passages. This may take place when there is no absolute excess secreted, or, *vice versâ*, may not occur when such is the case.

To speak first of urates. They are soluble only to a limited extent in cold water (1 part in 1150), much more freely as the temperature is raised (at 212° Fahr. 1 part in 125), and their precipitation will depend upon the relative amount of fluid in which they are contained. This may depend either on excess of urates; on

the relative deficiency of water in the urine; or the presence of other substances diminishing the solubility of the urates. The causes leading to increased formation of urates have been given; those diminishing the amount of water in the urine are as follows:—

First, an insufficient amount of water taken as drink, and probably also the presence in the water of saline matters which interfere with its entering the blood.

Secondly, free escape of water from the lungs, skin, and bowels.

Thus, a dry atmosphere which favours evaporation from the lungs and skin, and external heat or muscular exertion, causing profuse perspiration, will leave less water to be excreted by the kidneys, and render the urine concentrated. The profuse perspiration of many diseases, and the loss of fluid by diarrhœa, have the same effect.

Another way in which urine may be concentrated is, by its being long retained. The mucous membrane of the bladder and the rectum have the power of absorbing fluid; and it is this property of the mucous membrane of the bladder that prevents the immediate consequences of prolonged retention from being more serious than they are. Urine compulsorily retained for some time is almost invariably of high specific gravity, and loaded with lithates.

The appearance of the urates, or lithates, as a deposit, is also influenced by the degree of acidity of the urine, as they are less soluble in the presence of an acid. Arrest of cutaneous excretion, dyspepsia, and mal-assimilation generally, may thus give rise to the appearance of lithates, by inducing an over-acid condition of the urine, as well as by increasing the absolute or relative amount of uric acid. One of the effects of decomposition of urea is to precipitate the urates, as carbonate of ammonia diminishes their solubility.

The urates, when precipitated, form a dense, cloudy deposit, more or less copious, and varying in colour from a pale yellow, approaching white, through various shades, to a bright pink or deep red. Sometimes, in urine which has stood for some time, there will be two distinct strata of different colours. The deposit is readily miscible with the urine, which it renders turbid, and it completely disappears on applying heat. It is from the greatly increased solubility of urates by heat that urine is rarely passed in a turbid condition, and that so copious a deposit appears on cooling in urine perfectly clear on emission. The colour is due to colouring matter which is carried down with the urates, and which, to a certain extent, indicates the condition of the system. The deposit arising from accidental causes in health,

or from ordinary forms of dyspepsia, is commonly pale; in febrile affections it is red; in organic diseases attended with waste, it is pink.

The urates are usually recognised by simple inspection. They are readily distinguished by dissolution on the application of heat, or by adding liquor potassæ. Under the microscope, the urates usually appear as groups of minute, dark, opaque granules or spherules; sometimes, but very rarely, in the form of spiked balls. When an acid is added, the uric acid is set free, and after a time appears in the form of crystals.

Uric acid, when it appears as a deposit, has always been set free from urates, in which form it is secreted by the kidneys; but the separation of the uric acid is in no way dependent on the amount of the urates. We frequently see a copious deposit of urates without any free uric acid; and, on the other hand, a deposit may consist entirely of crystals of uric acid without admixture of amorphous urates. The condition required is the presence of some free acid, which may displace the uric acid from its combination with the bases. The acid phosphate of soda, to which the normal acid reaction of urine is due, will not effect this. The acid which does effect it is not known, and it is a disputed question whether it is secreted by the kidneys, or is formed by a sub-

sequent process of fermentation. The fermentation theory is founded chiefly on the gradual deposition of uric acid, frequently observed in urine after it has been passed. At first we find it perfectly free from crystals of uric acid, but in the course of a few hours, with or without the deposition of urates, small crystals may be seen on the bottom and sides of the vessel, and these go on increasing in number and size, sometimes for several days. It is said, that this can only be explained by the continued production of acid, the mucus acting as a ferment; and that were the precipitant present from the first, the deposit would be more rapid and simultaneous. Against this view it is urged, that no increase of free acid is shown by successive testing, by means of a standard solution of carbonate of soda; and that the fermentation must be exceedingly prompt in order to give rise to the deposit in the kidneys which sometimes takes place; and there is also the fact, that even after the addition of mineral acids, for the purpose of precipitating uric acid in analysis, the deposition is very slow, and it is complete only after twenty-four or forty-eight hours, or more. As a chemical question simply, it appears more probable that the acid is formed in the kidneys, and that according to its amount the precipitation is rapid or slow, and this conclusion is strengthened by what is observed in the case of oxalate of

lime, and by physiological and pathological considerations.

It seems much more probable that mal-assimilation (which is known to occasion the deposit of uric acid) should give rise directly to the presence of another acid in the kidneys, than that it should cause some unknown change in the mucus of the urinary passages, which should indirectly give rise to the formation of acid by fermentation.

The occurrence of uric acid, then, in a condition to form the nucleus of a calculus, may be traced thus. Formed either in the tissues or from the food, it exists in the blood in solution, in the form of urates. It may be then present in undue amount from mal-assimilation, from imperfect metamorphosis, or from retention. The urates are eliminated by the kidneys from the blood, and meet with an acid simultaneously excreted, either separated as such from the blood, or formed in the process of excretion, which robs them of the bases. According to the amount of this acid, and the proportion of uric acid to the fluid, the crystals are more or less quickly deposited. For the uric acid to be set free in the kidneys or calyces, the acidity must be great, and the proportion of uric acid considerable. This, therefore, is not so common; but, when it takes place, the chance of arrest of the precipitated crystals is considerable, there being no full stream of fluid

to carry them away. They become centres of further precipitation, and thus renal calculi are formed. The observations, in which crystals of uric acid are said to have been met with in the renal tubes, are very few in number, and are not particularly reliable; but the positions in which renal calculi have been found can only be accounted for by supposing that they originated in the substance of the kidney. Generally speaking, renal calculi are formed in the pelvis or its calyces.

The deposition of uric acid may be favoured by the presence of a fragment of organic matter, such as a minute coagulum of blood, or a particle of mucus, or, as has been shown by Dr. Lionel Beale, the true nucleus of even a uric-acid calculus may be a group of oxalate of lime crystals.

When the degree of acidity, or of concentration, is less, the deposit may only take place in the bladder; but here the periodical emptying of this organ, and the force of the current, will diminish the chance of mere crystalline particles of little more than microscopic dimensions being retained. For the most part, then, uric-acid calculi, which eventually require removal, have their starting point in the kidney, and there attain a certain size.

Most commonly, the uric acid is deposited only

after the urine has been passed, as previously described, but when once a nucleus has been formed, deposition of additional matter will occur from a very weak solution of uric acid, and the calculus will increase, when there would be no danger of a new formation.

The general causes thus enumerated, to which the production of uric-acid calculus is traceable, with their relative influence in bringing about the result, and their application to particular cases, may be classified as follows:—

1. Absolute increase in the amount of uric acid formed and excreted.
2. Formation of some acid, by which the uric acid is set free from the urates and precipitated.
3. Deficiency of water for the solution of urates.
4. The presence of some substance which may serve as a nucleus, *e. g.*, a minute blood clot, or a microscopic calculus of dumb-bell oxalates.

The two last will not need further consideration.

Absolute increase in the amount of uric-acid secretion is often accompanied by the formation of free acid. Where this is not the case, the uric acid remains in the condition of urates, which, being soluble, pass off in the urine, and do not often form calculi, except in children. For this reason acute diseases very rarely give rise to

calculi, although accompanied by the production of much uric acid. It has been stated, however, that an unusual number of cases of stone have followed cholera epidemics; and the symptoms of stone have often been observed after fever in children.

As uric acid may be present in the urine in undue proportion, without forming a deposit, so, when not in excess, it may be thrown down by a free acid, the origin of which may be imperfect action of the secretory organs, or skin. It is difficult to estimate the influence of cutaneous transpiration on the production of uric acid. A chill of the surface will give rise to a deposit of urates; and it has been observed, that skin diseases are often accompanied by precipitation of uric acid. In this last case, however, the skin disease and the uric acid are more probably both results of a common vice of metamorphosis of tissue, than that the uric acid is caused by interference with the function of the skin.

Increased production of uric acid and the simultaneous formation of an acid which may precipitate it, is the most frequent cause of calculus, and the conditions which may give rise to this may be either

1. Defective metamorphosis of tissue; or,
2. Mal-assimilation of food, primary or secondary.

It is not in all cases easy to say to which of these causes the production of uric acid is to be assigned. Imperfect metamorphosis of tissue may give rise to functional weakness of the digestive organs, and deficiency in the digestive secretions, and thus to mal-assimilation of food; and, on the other hand, when the blood is loaded with imperfectly assimilated material, taken up from the intestinal tract, there cannot be the normal reaction between it and the tissues which is necessary to complete metamorphosis. The practical reason for attempting to make the distinction is, that the defective metamorphosis of tissue is the more difficult of the two to reach and cure by any plan of treatment. It may be presumed that peculiarity of tissue-change is the cause, in cases of congenital or hereditary tendency to calculous disease. Cases are recorded in which calculus has existed at birth, and it is extremely common in young children.

There are cases also met with, at all periods of life, in which, without any assignable cause in diet or habit of life, and in spite of opposite and various kinds of regimen, there is a constant production of calculi. In these instances, the tendency is evidently constitutional, and is sometimes distinctly hereditary. That the source of the tendency is in the metamorphosis of the tissues, and not mal-assimilation of food, is abso-

lutely certain in the case of the fœtus, and may be considered exceedingly probable, if not certain, when occurring in infants fed upon milk. An illustration of this difference in the results of metamorphosis is furnished by the carnivorous birds and mammalia. Both live on animal food exclusively; both are of active, predatory habits; but, while the mammals excrete urea exclusively, the birds excrete only uric acid.

In chronic gout, which is caused by the accumulation of uric acid in the blood, and in the course of which it often appears in the urine in large quantity, the source of the uric acid is rather tissue than food. The fact of its being transmissible to children supports this view, as does also its persistence, in spite of diet, when once established.

It is probable, again, that the habitual deposit of uric acid is mainly the product of imperfect metamorphosis of tissue, resulting from sedentary modes of life. Exercise increases the consumption of tissue, and, for lack of it, the changes are languid and imperfect, and the metamorphosis eventually becomes habitually perverted.

We may conclude that the uric acid is derived from food imperfectly assimilated, in those cases in which dyspepsia is a prominent symptom, or which can be traced to the consumption of food in excess of the requirements of the system, or to

disproportion between the nitrogenized and non-nitrogenized constituents; or, again, to the use of alcoholic drinks. Judging from individual experience, stone would seem to be common among hunting men—the last men to suffer from dyspepsia. The occurrence of stone may perhaps be accounted for by their habits. Their prolonged exertion and profuse perspiration, with a liberal allowance of animal food and stimulants during the intervals of repose, undoubtedly favour the formation of uric acid in excess.

As regards the frequency of calculus in children, it should be remembered that the nutritive changes in very early life are much more rapid than at later periods, and that the amount of food and of excretions is greater in proportion to the weight of the body. Any imperfection in metamorphosis may thus give rise to the production of a large amount of uric acid.

The comparative frequency in old age, again, is explained by the fact, that all the causes enumerated have had time for developing their results, while the lessened vigour of all vital processes permits metamorphosis to stop short of its proper point, and, from the diminished tone and strength of the bladder, there is less chance of expulsion.

The comparative immunity of women is explained by the facility with which a stone may escape along the short and wide urethra. A

calculus which has caused much suffering in passing along the ureter is often expelled from the bladder without being perceived.

We may obtain some little aid in investigating the Etiology of calculus by another line of research, viz., statistics. It is a disease affecting both rich and poor: we have no means of ascertaining which most extensively. Personal experience—which, in the case of any individual, is of course an unsafe criterion—would lead us to the conclusion that in early life stone is more common among the poor than the rich; but that in adults, and especially in advanced life, the proportion is reversed. A scrutiny of recorded cases seems to confirm this view.

It has been stated to be a disease of towns, rather than of country; but the grounds on which this statement has been made do not warrant us in establishing conclusions upon them.

Something may be gathered from the comparative frequency of stone under different circumstances of climate and diet, the comparative immunity of certain districts, and its prevalence in others. Thus, stone is more common in England than in Scotland, and in Scotland than in Ireland; and it seems probable that the explanation suggested is founded on truth. In England, more animal food is consumed, and the usual drink is beer; in Scotland, with liberal amount of animal food,

the drink is whiskey; in Ireland, the drink is whiskey, and the diet largely vegetable.

The cider districts of England and the Rhine country are also said to enjoy a comparative immunity, attributable to the fact that cider and Rhenish wine contain a considerable amount of vegetable acids in combination with potash.

The undoubted prevalence of stone in the Eastern counties, Norfolk and Suffolk, is not so easily accounted for. There is no known peculiarity of diet. Of the two causes which have been assigned, climate and water, the latter is the most probable. The soil is chalk, and the water is loaded with salts of lime. It is true that the calculi are not composed of these salts of lime; but water, the universal solvent, and the medium in which all metamorphosis takes place, must be rendered less fit for these purposes when it is habitually loaded with calcareous salts.

It remains to describe uric acid as a urinary deposit, and the calculi composed of uric acid and the urates.

To the naked eye, uric acid may appear as a fine pulverulent deposit, of which the individual particles are too minute to be distinguished. In this form it may be nearly white, or of a yellow tint, more or less deep; it is rarely red. Usually, however, it takes the form of a red, crystalline powder, the individual crystals perfectly dis-

tinguishable, and often of considerable size. Generally speaking, the finer the powder, the less deep is the colour; and the coarser the grains, the darker the brown tint. It collects on the bottom and sides of the vessel, to which it adheres, and feels like powdered glass. The deposit is commonly called sand when the crystals are small, gravel when they are large. The name gravel might, however, more properly be restricted to actual concretions, which are often passed in large numbers, varying in size from a pin's-head to a small pea.

Under the microscope, the crystals of uric acid are seen to present various forms, but they have always a yellow tint. The more common and less important of these—that is, as less likely to give rise to the formation of calculus—are, the thin, lozenge or boat-shaped plates, which are met with of very various sizes. These are often found mixed with urates; they usually constitute almost entirely the pale yellow deposits of children, and are met with in immense numbers in the paler and finer sand of adults, mixed up with thick lozenge-shaped crystals. In coarse, red sand, these thick rhomboid crystals are found aggregated in masses of various shapes and sizes, in which the individual crystals may sometimes be distinguished, at other times not. A less common compound crystalline arrangement presents the

appearance of a number of long prisms radiating from a common centre; besides which, other forms of crystals are met with.

True calculi differ from a mere zeolithic arrangement of crystals. Instead of increase in size and prominence of the component crystals, the interstices between them are filled up by a secondary deposit, and their outlines are obliterated, the points only projecting, or the surface being perfectly smooth. That this is a common process of their formation is shown by digesting small calculi in weak solutions of alkali, when the secondary deposit will sometimes be dissolved, leaving the stellate group of crystals; and we have seen such a group of crystals, passed after treatment, the diameter of which was as large as that of a full-sized pea.

At other times a number of crystals, or of crystalline groups, will be bound together by animal matter; and upon this mass the secondary deposits occur. It is only in this way that urates can form a true nucleus, as they have no natural cohesive tendency.

A nucleus having been thus formed, deposition will proceed with greater or less rapidity, according to the amount of uric acid or urates present, and to this varying proportion the laminated structure of calculi is due.

Uric-acid calculi may vary in weight from a

few grains, of the size of a millet seed, to six or eight ounces, or more. The smaller ones are usually nearly spheroidal, mostly smooth, with a granular aspect, but sometimes rough. They may be passed singly, at various intervals; or in extraordinary numbers, scores in two or three days, and sometimes many hundreds in the course of years. In these cases, the calculi are usually remarkably uniform in size, and they have received the special name of "pisiform," though rarely so large as a pea.

When too large to escape by the urethra, the uric-acid calculus usually has a flattened oval form, is of a yellowish brown or fawn colour, and the surface is smoothly granular. It is hard, and has a specific gravity of 1·5. On section, it exhibits concentric laminæ and radiating striæ, and the cut surface will take a good polish; the fracture may be earthy, or show a crystalline structure in the direction of the radiating markings. Sometimes the layers readily separate from each other.

A calculus is known to consist of uric acid by the insolubility of fragments in boiling water, in cold acetic, and in dilute hydrochloric acids; by its solubility when boiled in solution of potash, and precipitation by acids in the characteristic crystalline forms; by the production of the purple murexide on addition of nitric acid and

ammonia; and by its complete combustion in the blowpipe flame.

Calculi composed entirely of urates are not common, and are said to be found only in children. They are paler, smoother, softer, more earthy and amorphous in fracture, and showing less distinctly the concentric layers and radiating striæ. Fragments are soluble in boiling water, and an acid throws down from the solution crystals of uric acid.

When two or more calculi are present in the bladder, their mutual contact and friction give rise to smooth plane facets. A stone may be thus rendered polyhedral, and the form may be otherwise modified by various circumstances.

As has before been stated, uric acid may be succeeded by the deposit of oxalate of lime, urates, or phosphates: by the oxalate, from substitution of this as a deposit for uric acid; by urates, from commencing decomposition of urea and production of carbonate of ammonia, in the presence of which the urates are less soluble; by phosphates, from more extensive decomposition of urea and precipitation of the mixed phosphate of lime and ammoniaco-magnesian phosphate, by the excess of ammonia evolved.

OXALATE OF LIME.

Next to uric acid, this is the most important constituent of calculi. It may form the entire calculus, or may constitute the nucleus for other deposits; it very frequently forms layers in calculi of uric acid or urates, often of sufficient thickness to be recognised in the classification, but frequently so thin as to escape observation on superficial examination. Of the 649 calculi in the Museum of the College of Surgeons, 13 are composed entirely of oxalate of lime; it forms the nucleus in 62, and layers of greater or less thickness in upwards of 90 others.

Oxalate of lime is not a normal constituent of urine, but is exceedingly common as a deposit, and occurs under a great variety of circumstances. From its chemical relations it has been traced hypothetically to four sources. Oxalic acid can be obtained from starch or sugar, by a process of oxidation by means of nitric acid; or from uric acid, by the less active oxidizing influence of warmth and air. From this it has been concluded that it may be produced in the body, through uric acid, from the nitrogenized matter of food or tissue, or from sugar taken as food, or

formed by the liver, the oxalic acid subsequently combining with lime, for which it has a great affinity. It has been maintained that the oxalic acid is produced subsequent to the secretion of the urine by decomposition of the urates. This may be the case in some instances, but oxalate of lime thus produced can have no importance in the formation of calculus, and it is certain that such is not the only way in which it is formed. The fact that the deposit of oxalates is always increased when the urine has stood for some time, is quoted in support of this view. This, however, is only a result of slow precipitation, as in the case of uric acid. There is a source not yet mentioned, from which oxalate of lime may be met with in the urine, namely, soluble oxalates taken as food or for experiment. It is not likely that calculus is ever produced in this way; but the fact throws light on some of the questions in the pathology of oxalate of lime. The urine of a person after taking rhubarb will be found to contain a deposit of the oxalate, though previously free from it; and the formation of this deposit follows exactly the mode usually observed. If the urine, passed a few hours after ingestion of the rhubarb, be examined immediately, no crystals will probably be met with. After standing a few hours, numerous minute octohedra will be found. Twelve hours after-

wards, these will be more numerous and much larger. It is clear that in this case the oxalic acid is not formed by decomposition, but passes into the urine from the blood. The behaviour being exactly the same when oxalic acid is taken in the food as when it is not, it is probable that the process is the same in both, namely, an instance of slow precipitation. We thus also learn that oxalic acid must exist ready formed in the blood, no doubt, as oxalate of potash or soda. Its combination with the lime present in the blood, and the formation of the insoluble oxalate of lime, which the powerful affinity between the two would lead us to expect, is in some way prevented, just as in other instances chemical reactions are modified in the presence of organic matter, and especially of living structures. It is thus passed into the renal tubes, where the conditions are different, and the oxalate of lime is formed and precipitated, after a longer or shorter time, according to the amount present, and other circumstances.

Oxalate of lime, however, appears in the urine in two forms—octohedra and dumb-bells—and it is only to the first of these that the above statements fully apply. They form slowly, grow and multiply as described; the dumb-bells, on the other hand, whenever they occur, are present when the urine is passed, and do not subsequently increase.

They, as well as the octohedra, may be the result of ingestion of oxalic acid.

The octohedra form beautiful microscopic objects; they are flattened, but this is not often perceptible. They vary in size, the most minute appearing as bright points, which in focus are seen to have a square outline. In those of larger size, the square is crossed by diagonals, showing the angles formed by the facets, while the large crystals show the projection of the octohedron.

The dumb-bells and allied forms, spherules, circular and oval discs, are less common. They are usually, if not constantly, accompanied by octohedra. When present at all, they are found, as before stated, in the urine as soon as passed. They do not increase in number, or grow in size, when the urine is permitted to stand. A peculiar importance attaches to these dumb-bells in considering the production of calculus. They have been detected by Dr. Lionel Beale in the renal tubes far more frequently than any other crystalline deposit; they have been met with embedded in casts, and have been found to form the nucleoli of calculi, the nuclei of which were supposed to be uric acid or urates. Should this, on extended observation, be found to be often the case, some of the anomalies which are met with in the history of calculous affections will be accounted for.

The following are the results of some examinations made for the purpose of investigating this point.

1. Numerous pisiform calculi, mostly whitish, smooth, polyhedral; others of pale red colour, rough, smaller.

Outer layers dense, laminated—mixed phosphates. Within this shell, white, soft, easily pulverised substance—urates and phosphates. In the centre, a minute nucleus (smaller than the smallest pin's head) smooth, reddish-brown colour.—Uric acid. This dissolved in dilute solution of potash, a nucleolus of dumb-bells, oxalate of lime. The dumb-bells of various size and most perfect form.

2. Nuclei of two out of eleven calculi removed by lithotomy. Uric acid. In centre, flakes of organic matter; no dumb-bells.

3. Supposed nucleus of large uric-acid calculus removed by lithotrity. No dumb-bells.

4. Large fragment, supposed to contain nucleus, removed by lithotrity. Uric acid. No dumb-bells.

5. Three out of five melon-seed shaped calculi of uric acid. Yellowish brown, dense, hard; fracture crystalline, laminated by thin pale layers, separating thicker and darker layers, dense to the very centre. Uric acid with oxalate laminæ. Nucleus—large oxalate dumb-bells, form not very perfect.

6. Renal calculus which had occupied the entire pelvis. Chiefly phosphates. An apparent nucleus found to consist of blood. True nucleus—uric acid. No dumb-bells.

Oxalate of lime is rarely so abundant as to form a visible deposit. Frequently, however, when the urine is held up to the light, the crystals may be seen to glitter in the light cloud of mucus in which they are suspended. There is no oxalate of lime sand; the nearest approach is an appearance of microscopic calculi, formed by groups of

dumb-bells. There may, however, be a pisiform oxalate gravel.

The circumstances under which oxalate of lime may appear in the urine are very various. It may be found accompanying any form of debility, and may be present in apparent health. It is not often met with in febrile affections. Usually, it is associated with excess of urea, the urine having a high specific gravity and a deep colour; frequently, also, it is accompanied by a more or less copious deposit of urates, which, when the crystals are minute, may hide them from view. Among the causes which give rise to the presence of oxalic acid in the urine, or oxaluria, as it is termed, are—interference with the respiratory process, as in chronic bronchitis and emphysema; affections of the liver, as in jaundice; exhaustion of the nervous system by mental work, or by extreme bodily fatigue, or sexual excesses, or spermatorrhœa; over-eating and little exercise; and, as has been mentioned, debility, however produced. Perhaps the most common cause is dyspepsia, on the association of which with deposit of oxalates, Dr. Golding Bird founded a diathesis. The characters of this condition he describes as gastric uneasiness with flatus, constipation of the bowels, pain in the loins, painful depression of spirits, irritability of temper, emaciation, and incapacity for either mental or physical exertion.

Nothing is known as to the conditions which give rise to the dumb-bell form of deposit rather than the octohedral, though a question of great interest. The dumb-bells are always preceded, accompanied, and followed by octohedra, which seems to show that they indicate an aggravated stage of the affection; but they occur indiscriminately, whether the cause is ingestion of oxalic acid, or dyspepsia, or debility.

In these various conditions, the oxalic acid is the result of imperfect retrograde metamorphosis of food or tissue. The change may be excessive in amount, as we see by the large amount of urea secreted and the emaciation, but it is imperfect in degree. There is little evidence that it is formed from saccharine elements of food. We conclude, therefore, that the chief source is nitrogenized matter. The experiment of Frerichs and Wöhler, that, if uric acid is given at night, oxalates are found in the urine in the morning, seems to show that uric acid is a stage in the process of oxidation.

It is not necessary again to enter into the question as to the probable source of the oxalic acid from food or tissue, or as to the seat of the primary formation of calculus. The considerations adduced in treating of uric acid apply here. The evidences of renal formation are even stronger in the case of oxalate than of uric-acid calculi.

In considering oxalate of lime as giving rise to

calculus, we are struck with the constancy of the relative proportions of uric and oxalate calculi under different circumstances, and this suggests a relation of causation.

We cannot say that one is a disease of the rich, the other of the poor, or that one affects town, the other agricultural populations, or that one is caused by animal, the other by vegetable diet. We find, moreover, a remarkable correspondence in the proportion existing between oxalate nuclei and calculi, and uric-acid or urate nuclei and calculi, both when unusual frequency of calculus indicates a special cause, and when no such cause is in operation, as may be seen by comparing the collections of the Royal College of Surgeons and Guy's Hospital with that of the Norwich Hospital.

	Uric-acid or Urates.	Oxalate.
Royal College of Surgeons .	479	95
Guy's Hospital . . .	269	47
Norwich Hospital . .	506	84

The proportion being one to five, one to five and a half, and one to six, respectively.

This constant numerical relation, under varying conditions, goes to prove that the two kinds of calculus, as far as causation is concerned, are nearly allied, and shows that whatever combination of circumstances favours the formation of uric-acid calculi in some persons, a like combi-

nation of circumstances will in others favour the formation of oxalate calculi; and that, under similar conditions, the tendency to form the one or the other depends on some individual idiosyncrasy or accident.

My experience would lead me to say, that oxalate calculi were found in larger proportion in children than in adults, and were comparatively rare in advanced age.

The calculus formed of oxalate of lime, as usually met with, has received the name of the Mulberry Calculus, from its dark colour and rough tuberculated exterior. Rare varieties exist, of which the colour is a pale brown, or pure white. It is hard and heavy, and from its weight and roughness it causes more injury to the mucous membrane of the bladder, and gives rise to more urgent symptoms, than uric-acid calculus. The dark colour is attributed to altered colouring matter of blood, effused in the hæmorrhages which the calculus excites. In mixed calculi, oxalate of lime often succeeds, and is succeeded by, uric acid. It is very commonly deposited upon lithates or urates, and very rarely receives a deposit of urates. It is frequently surrounded by phosphates.

CYSTINE AND XANTHIC OXIDE OR XANTHINE.

These substances are altogether abnormal as constituents of urine, and are rarely met with as deposits. Cystine is an organic substance, remarkable for the large proportion of sulphur which it contains. It is readily soluble, in alkalies and mineral acids alike. The deposit takes the form of hexagonal plates, by which it is easily recognised. The calculi formed by this substance resemble at first sight uric-acid calculi; they are yellowish in colour, granular on the surface, and on section are seen to have a radiated structure; they are, however, softer and more friable, and after prolonged exposure to light acquire a greenish tint.

Xanthine is still more uncommon than Cystine. Only a very few cases have been recorded, in which it has been met with either as a urinary deposit or calculus. It bears a close affinity to uric acid, differing from it only in possessing two atoms less of oxygen. In one of the recorded cases, the minute calculi, which proved eventually to be composed of xanthine, were supposed, from

their deep yellow colour, spherical form, and smooth surface, to consist of uric acid. From its extreme rarity, no further description is necessary here.

PHOSPHATES OF LIME AND MAGNESIA.

Phosphatic calculi are often met with of large size, and are readily distinguished by their white colour and their great friability. They are insoluble in alkalies, soluble in dilute mineral acids, the solution yielding a precipitate with oxalate of ammonia. Most commonly, these calculi consist of mixed phosphates, that is, of an admixture of phosphate of lime and the ammoniaco-magnesian or triple phosphate ; they are secondary formations, not due to an excess of the phosphate of lime or magnesia in the urine, but to precipitation by ammonia. Calculi composed entirely of phosphate of lime have been met with, but they are extremely rare.

The phosphates of lime and magnesia are normally present in the urine. They are insoluble in water, but are held in solution in the urine by the acid phosphate of soda. Calculi composed entirely of phosphates are not very common, constituting not more than six to eight per cent. of the various collections. As nuclei, upon which subsequent deposits of other substances occur, they are extremely

rare; but, on the other hand, a crust of phosphates, often of great thickness, encasing uric-acid, urates, or oxalate of lime, is very common.

It is not necessary to enumerate the circumstances which may give rise to an increase in the quantity of earthy phosphates in the urine.

The only conditions demanding consideration are those determining their precipitation; and these are simply such as give rise to an alkaline state of the urine. This may be due to fixed alkali, soda, potash, or lithia, on the one hand, or to ammonia on the other; the mode of causation being totally different in the two cases. The urine may be rendered alkaline by fixed alkali, when any of these are taken in considerable doses, and especially when in the form of salts of the vegetable acids, as citrate or tartrate of soda, potash, &c. Many fruits contain salts of potash, and of course the urine is rendered alkaline by eating freely of these. The urine secreted shortly after a meal is faintly alkaline, and some forms of dyspepsia render this condition persistent. When the urine has an alkaline reaction from the presence of a fixed alkali, the test paper, turned blue or brown on immersion, retains this colour when dried, and unless the alkali is in the form of a bicarbonate, phosphate of lime is precipitated, which renders the urine turbid. This is a whitish deposit, amorphous under the micro-

scope, and is distinguished from the amorphous urate by remaining insoluble on the application of heat, and dissolving in acetic acid. The mere precipitation of phosphate of lime by fixed alkali does not give rise to calculus.

When the urine is alkaline from the presence of ammonia, the phosphate of ammonia and magnesia is precipitated in the form of beautiful transparent, prismatic crystals, together with phosphate of lime. The ammoniacal condition does not arise from increased excretion of ammonia, but depends upon the decomposition of urea, which yields carbonate of ammonia and water. This decomposition of urea occurs whenever the bladder is not perfectly emptied for any length of time, and especially when the mucous membrane is in a diseased condition, and secreting mucus or muco-purulent matter. These conditions may arise from mechanical obstruction, such as enlarged prostate, or stricture of the urethra in the male; and, in the female, displacement of the womb, or severe and prolonged labour; or from irritation caused by the presence of a foreign body such as calculus; or want of power in the bladder, as in atony of the muscular walls, cystitis, paraplegia, disease of the brain, or the comatose condition in fever.

If, from any of these causes, a portion of urine is habitually retained, the urea eventually under-

goes the decomposition mentioned; ammonia is set free, and acts as an irritant on the mucous membrane of the bladder; inflammation is set up, attended with free secretion of mucus, and the urine is discharged turbid from precipitated phosphates, viscid with ropy mucus, and fœtid and alkaline from the ammonia. The association of a solid deposit with mucus, which may act as a cement, is a combination favourable to the formation of calculus; and where a nucleus is present in the form of a uric-acid or oxalate calculus, it will rapidly receive an incrustation of precipitated phosphates.

PREVENTIVE TREATMENT.

It will have been seen from the foregoing account of the different kinds of stone, and of the mode in which they are produced, that calculus is not a sudden formation. Usually, the condition of urine to which it is due comes on gradually, and exists for some time before the actual deposition of solid matter takes place within the urinary passages, giving rise to symptoms or to changes in the appearance of the urine, which are sufficiently marked to attract the attention of the patient. It is here the opportunity is afforded of preventive treatment. Very commonly, also, one or more small calculi escape, or there are indications of the presence of a stone in the kidney or ureter, and preventive treatment includes the attempt to dislodge such calculi before they attain too great a size. In these cases solution is most useful, and, at the same time, most likely to prove successful. The stone cannot be reached by instruments before it arrives in the bladder; there is, further, the greatest probability that it may be both small and of uniform composition, and it is so situated that there will be a constant flow of

urine over its surface, so that the solvent will be continually renewed.

The premonitory symptoms indicating the tendency to the formation of calculus are to be found in the sensations of the patient, and in the appearances presented by the urine. The sensations are due to the presence in the urine of some abnormal constituent, which irritates the kidney and the mucous membrane of the urinary passages. They rarely amount to positive pain, and are often unheeded or attributed to other causes. Sometimes they are altogether absent. There is frequently a dull aching in the loins, or a sense of weight and fatigue, caused probably by congestion of the kidneys, but very commonly supposed to be the result of fatigue.

Another symptom of the presence of uric acid, or oxalates in the urine, is a sensation of heat in the bladder. This gives rise to a more frequent desire to pass water than is habitual with the individual, and sometimes micturition is accompanied by heat along the urethra, which may even amount to scalding.

Any habitual or frequent pain in the loins, then, more especially when not accounted for by over exertion, any uneasiness about the bladder, or heat along the urethra, or any unusual frequency in micturition or urgency in the desire, should direct attention to the state of the urine,

an examination of which will very commonly reveal the cause.

The appearances presented will be some of those already described, but in the case of oxalate of lime, this will not be evident to the patient. The urine may be perfectly clear when passed, but throw down subsequently, on cooling, a more or less copious proportion of urates. This occurs from time to time to every one, but it should not be habitual. When it is so, the urine should be examined with the microscope. Most probably, as soon as the deposit has fallen, crystals of uric acid will be found, which, on subsequent examination, at intervals of twelve hours, will be seen to have increased in number and size. The rapidity of formation of these crystals, and their proportion, will measure the tendency to deposit in the urinary passages, and the necessity for treatment. In more urgent cases there will be found, after the urine has stood for a short time, a red crystalline sediment of uric acid, with or without a superincumbent stratum of lithates, and these crystals are often found firmly adhering to the bottom and sides of the vessel.

Where there is danger of the formation of a phosphatic stone, the symptoms will already have been so urgent that no special description of them is necessary here.

The case of children requires special mention.

Statistics show that calculus occurs as often before ten, as during the whole life afterwards. We cannot get from children an account of their sensations, and any abnormal appearance in their secretions is likely to escape notice. Usually, however, there are indications which may call attention to the state of the urine, even before calculus is formed. The mucous membrane of the child seems to be more sensitive to the presence of abnormal constituents in the urine. This is shown by frequency of micturition, sometimes accompanied with pain, and the urine is expelled with unusual force. There may also be a slight purulent discharge from the urethra, with soreness at the meatus. Nocturnal incontinence is another common consequence of the irritant properties of urine containing uric acid or oxalate in excess, and strangury has been met with which could only be attributed to this cause.

In children, the urine is naturally abundant, paler than in the adult, and less liable to deposit of urates from accidental causes. But all the deposits met with in the adult may occur, and the urates may be present in such quantity as to give the urine a turbid appearance when passed. It is in children only that calculi composed exclusively of urates are found. As the urates are paler, the urine may have a milky aspect. Phosphates would also give a similar appearance. The dis-

tinction is readily made out by simple chemical tests or by the microscope.

The treatment to be adopted, in order to prevent the formation of concretions or calculi, will vary according to the nature of the deposit; but, in all, the same principles are to be applied. These are—

1. To diminish the amount of the abnormal constituent in the urine, or to remove, so to speak, the diathesis.
2. To prevent the calculous material from being precipitated.
3. To keep the urine in a dilute state, by abundant drink, and to flush the urinary system from time to time.

To attain the first of these objects strict attention must be paid to diet, exercise, and the secretions generally. It must be remembered that the constituents of the urine have a double source in food and tissue, and to keep these constituents in healthy condition, perfect digestion and thorough metamorphosis are required.

When uric acid is the deposit to be apprehended, the diet must be carefully regulated. It must be simple, digestible, and, above all, moderate. Animal food must be taken in limited amount, and it must be divided among the different meals, so that at no time shall a large excess of highly nitrogenized material be taken into the blood. Farinaceous food must be substituted, as the state

of the digestive organs permits. Under a strictly vegetable diet the urine becomes alkaline, and uric-acid calculus is an impossibility ; but in many instances even a moderate preponderance of vegetables causes dyspepsia. Perfect digestion is a condition absolutely necessary to success in preventing the formation of uric acid. Ale and porter should be excluded from the list of beverages; so also the stronger wines, port and sherry. The wines best suited for these cases are Hock, Burgundy, Claret. Only one kind of wine should be taken at a meal, and that in moderate amount; the particular kind will be determined by the peculiarities of the case. Brandy with soda-water, or effervescing lithia-water, taken weak, forms an excellent drink.

Exercise is of the greatest importance. It should be moderate and habitual, not violent, and with long intervals of inaction. It introduces abundance of oxygen, by the quickened respiration, increases the metamorphosis of the tissues, and by this consumption of material makes a demand for the nitrogenized constituents of food, which, by their imperfect oxidation, give rise to uric acid. The patient, therefore, should take a daily walk or ride, sufficient to promote a healthy action of the skin, without inducing undue fatigue.

The necessity for attending to the secretions and excretions is obvious. The abundant secre-

tions poured into the alimentary canal have not only an important action on the food with which they are mixed, but are themselves resorbed. They have, therefore, a double influence on the ultimate results of metamorphosis; first, by their action on the first stage of assimilation, and again, as containing matter both nitrogenized and non-nitrogenized, in a state of retrograde change intermediate between the food or tissues and the excretions. Any deficiency or perversion in them must affect the composition of the excretions. It is necessary, also, that the different excretory organs should be in healthy action. Excretions retained in the blood retard and vitiate metamorphosis, just as the products of combustion prevented from escaping will extinguish fire.

The skin, therefore, and the bowels must be attended to. Flannel frictions, and an occasional Turkish bath, will meet the first indication. The bowels should be kept quite open. In selecting aperients, salines, except in cases where the patient is well nourished and plethoric, should be sparingly resorted to. The best purgatives will be those which at the same time act on the liver. The important part this organ takes in the process of assimilation, by the changes it effects in the blood passing through it, as well as by the action of the bile on the food in the intestines, would lead us to expect that any derangement of

its functions would react on the condition of the urine, and such is found to be markedly the case in organic disease of the liver. This must always be borne in mind; any hepatic derangement should be corrected, and, where no indication of this exists, great benefit will often follow the use of medicines believed to increase the activity of this organ.

It is a work of time materially to diminish the amount of uric acid in the urine, and, till this is effected, it is necessary to prevent it from being set free and precipitated—the second of the great indications. This is accomplished by the administration of alkalies; but it is not a matter of indifference either which of the alkalies should be selected, or what preparation employed. Ammonia is useless, as it possesses little or no power of affecting the acidity of the urine. Soda, potash, and lithia do this readily; but the uric-acid salts of these bases differ in solubility; that of potash being the most soluble. Whilst on this point, I cannot do better than quote from an excellent paper of Dr. William Roberts, of Manchester, on the Solvent Treatment of Urinary Calculi, which was first published in the *Medico-Chirurgical Transactions*, vol. xlviii, in which he details the results of the most carefully conducted experiments with solutions of soda, potash, and lithia on uric acid.

"The potash salt was found sensibly to excel the soda salt as a solvent for uric acid." And in a foot note, he says,—"Some experiments were also made with carbonate of lithia, which has been vaunted in recent times as a solvent for uric acid. Its power was found much inferior to that of the carbonates of potash and soda. Its reputation seems to have been gained through its comparative insolubility. Only weak solutions of it *could* be employed, and these were compared with solutions of potash and soda, which were much too strong for effective dissolution."

Potash is for all practical purposes, therefore, the most useful of the alkalies, and it may be given in the form of liquor potassæ, or of the bicarbonate, or of a salt of some vegetable acid; the effect, however, being very different. When the potash or soda salts of vegetable acids, citrates, tartrates, acetates, &c., are given, the acid, by a slight process of oxidation, becomes changed into carbonic acid, and the carbonate of potash or soda appears in the urine, rendering it alkaline. In this form, the potash will prevent the precipitation of uric acid, but will do little or nothing more. It does not affect the chemical processes going on in the tissues, but it may be taken for a considerable time without producing any lowering effect on the system. Liquor potassæ, on the other hand, does not so speedily and persistently

render the urine alkaline, but exerts a powerful influence on the metamorphosis of the tissues. It appears in the urine in combination with sulphuric or phosphoric acid, increasing the absolute amount of these acids in the urine. They are formed at the expense of protein compounds, the oxidation of which has been determined by the potash, just as potash oxidizes organic matter out of the body, and gives rise to acids by which it is neutralized. This liquor potassæ, therefore, is a powerful agent, and may be most useful where semi-effete material accumulates in the blood, and oxidation requires to be pushed on; or most injurious, where the waste is already excessive. It should never be employed merely for the purpose of rendering the urine alkaline. The bicarbonate is intermediate in its effects. It has not the alterative power of the liquor potassæ, but it has a greater eliminant action than the citrate, acetate, &c.

Combining these different indications, the method of medicinal treatment arrived at, from which, with regulation of the diet, the results have been most satisfactory, is as follows:—

Usually, a minute dose of pil. hydrarg., gr. $\frac{1}{6}$th to $\frac{1}{4}$th, is given twice or three times a day with extract of taraxacum in the form of a pill, and, if the bowels do not act regularly, pil. rhæi co.

added or substituted for taraxacum, till this is the case. The use of mercury, in minute doses, as favouring the action of other diuretics, is an advantage, in addition to its influence on the liver and the general nutritive processes. At the same time 15 to 30 grains of the bicarbonate of potash with infus. calumbæ, or other vegetable tonic, is given three times a day. This often improves the digestion; but, when such is not the case, or when the bicarbonate does not seem to answer, or is not required, the citrate of potash, with a bitter infusion, may be substituted. Quinine and iron, or strychnine and iron, will often be found useful, and may be given with the citrate of potash, as ferri et quinæ cit., or ferri et strychniæ cit. The liquor potassæ is very rarely required. To any of these, taraxacum in the form of the extract of the British Pharmacopœia, or of the fluid extract, may be added with advantage, but by far the most useful form is the infusion, dandelion tea, in considerable quantity. This treatment will not only reduce the amount of uric acid in the urine, but will often result in remarkable improvement of the general health where this has previously suffered. In some instances of obstinate dyspepsia and general weakness, the mineral acids may be required; and, when it is found that they relieve these conditions, they may be given for some time. They do not greatly increase the acidity

of the urine, and will not cause the precipitation of uric acid, while, by their influence on the digestive process, they may prevent its formation.

Very commonly, however, patients who are passing uric acid in considerable quantity, or in whom a calculus is actually in process of formation, are otherwise in excellent health. In such cases, very little beyond strict attention to diet will be required, with a plentiful use of water as drink; and the precipitation of the uric acid must be prevented by administration of the citrate or acetate of potash. Dr. Roberts has shown that the urine may be kept persistently alkaline by this means for many months without injurious effect either on the system or on the urinary passages. To effect the solution of a uric-acid calculus, he administers 40 to 60 grains of one of these salts every three hours, in 3 or 4 ounces of water; but a minor degree of alkalescence will suffice to prevent the uric acid from being deposited.

When oxalate of lime occurs as an habitual deposit, the treatment cannot be laid down with the same exactness. It is not probable that food containing oxalates is taken in such quantity as to give rise to danger of calculus, but substances known to contain them should be avoided. The chemical derivation of oxalic acid from either saccharine or nitrogenous substances gives no

indication for diet. The omission of sugar from the food, and limitation of starch, have, however, been recommended on hypothetical grounds. Addition of lime water to urine will cause deposit of oxalate of lime, when previously absent; and administration of salts of lime has been followed by the appearance of oxalates in the urine. On these grounds, the removal of lime from the water used as drink has been prescribed. It has also been ascertained by experiment, that adding any mineral acid to urine retards precipitation of oxalate of lime, and for this reason administration of the mineral acids has been recommended. Oxalate of lime, however, is often associated with urates and free uric acid; and a better reason for giving the mineral acids is, that experience has shown them to have a special influence on the peculiar dyspepsia sometimes accompanying oxaluria. There are thus no sufficient indications for any special line of treatment, and we have to fall back on general principles. It must be borne in mind that oxalate of lime is usually associated with excess of urea, indicating waste of food or tissue, this furnishing an important clue to the treatment.

All known causes of such waste must be avoided; such as overwork, especially mental anxiety; and excesses, especially sexual. Obstinate spermatorrhœa is very commonly accompanied by oxa-

late of lime in the urine. Rest, relaxation, change of scene and of air, will often alone effect much good. As to food, no absolute rule can be laid down. The quantity and kind must be regulated not so much by the chemical composition as by the digestibility; it must, however, be of a nourishing character. It will usually be found necessary to limit the amount. Saccharine matters should be taken sparingly, or, if necessary, prohibited altogether. If there is pain in the epigastrium soon after eating, and especially if accompanied with acidity and flatulence, vegetables, sugar, and beer should not be taken. If none of these inconveniences are experienced, vegetables and ripe fruit may be used in moderation. As regards stimulants, brandy and water, or brandy and soda-water, a dry sherry, or, better than these, a good Burgundy, is most suitable. The action of the skin must be favoured, and the bowels must be kept gently open. The most important matter, however, is to render digestion easy and perfect. This will sometimes be found very difficult. The mineral acids, as recommended by Dr. Golding Bird, are often very useful, especially dilute hydro-chloric or nitro-muriatic acid, with inf. calumbæ. In other cases, bismuth is of great service, or alkalies with ammonia. The good effects of small doses of pil. hydrarg. are often very evident in these cases

as well as in deposit of uric acid, and infusion of taraxacum rarely fails to do good. When the digestion and the general health are improving, the amount of oxalate of lime deposited usually diminishes. Its continued presence, under these circumstances, need not excite apprehensions of the formation of calculus, when it takes the form of octohedra. These are rarely found formed in the urinary passages, or in urine newly passed. But when dumb-bells are met with, as they are formed even in the tubules of the kidney, every measure which experience, or even hypothesis, has suggested for preventing the formation of oxalate of lime in the urine should be tried. Rigorous diet, water free from lime as drink, mineral acids as medicines, with regular exercise and frequent baths, till the threatening deposit ceases to appear, must be insisted on. From time to time, also, the urinary organs should be flushed. Large quantities of pure water should be drunk on an empty stomach, or some diuretic infusion with citrate or acetate of potash. Nothing will answer better than the dandelion tea already mentioned, weaker and in greater quantity than would be ordered for habitual use.

When there is reason to suppose that a calculus exists, the same stringent measures should be adopted, even when only the octohedral form of crystal is found. The presence of a foreign body

will determine precipitation which would not otherwise occur; and a calculus may increase in size when there would be no danger of a new formation.

Little need be said respecting cystine. It is exceedingly rare, and when met with may be kept in solution by alkalies. Little is known experimentally as to the prevention of its formation. Its composition suggests some relation with the bile, and may direct attention to the functions of the liver. The fact that cystine is commonly met with in scrofulous individuals, may lead us to employ cod-liver oil. When cystine calculi are formed, and are of small size, they may be treated by the administration of alkali, or by acid injections into the bladder. Cystine calculi are even more favourable to the alkaline solvent treatment than uric acid, not only from their greater solubility in alkaline urine, but from the fact that they are usually unmixed, being composed of pure cystine for the most part.

When the urine is phosphatic, the danger of calculus will vary. If this be from the precipitation of phosphate of lime by fixed alkali, there is little fear of such a result. It is when the urea has undergone ammoniacal decomposition that a calculus is liable to be formed. If inflammation of the mucous membrane of the bladder has not

preceded this, it will certainly be set up by the irritant action of the ammonia, and the mucus poured out offers the condition required for the formation of stone by glueing together the precipitated mixed phosphates.

When the urine is retained in the bladder by some mechanical obstacle, as enlarged prostate, or stricture, or by paralysis of the muscular coat, the danger is proportionably increased, as in paraplegia, or in atony from general or local debility. When, on the other hand, there is spasm and frequent micturition, it is less. The one point of treatment is, to see that the bladder is completely emptied, by introduction of the catheter twice a day, and to wash it out with warm water simply, or with water to which a small proportion of dilute nitric acid has been added.

Preventive measures are demanded with especial urgency, when one or more calculi have been passed, or when there is reason to suspect the existence of a small calculus in any part of the urinary tract. It is rare that calculi are formed singly. The same cause is in operation in every part of each kidney, and if precipitation takes place at one point, it will probably do so at others. A nucleus once formed, growth is a matter of certainty. Sometimes all the calculi will make their way out ; sometimes all will

be detained in the kidney, or one or more may be arrested at any part of the urinary apparatus. The results are various:—suppurative inflammation of the kidney from direct irritation of one or more calculi; expansion of the pelvis, and inflammation and ulceration of its mucous membrane, with atrophy of kidney or perirenal abscess; suppression of urine by impaction of calculus in ureter-renal colic, from difficult passage of a stone along the ureter. These do not come within the scope of this work. The point here to be considered is the detection of stone while so small that there is a chance of expelling it, and the best means of effecting this.

Except in the case of the passage of a small stone along the ureter, symptoms experienced by the patient give little aid. A calculus of some size lodged in the pelvis will often give rise to pain sufficiently characteristic to warrant a diagnosis; but for the most part careful watching of the urine from day to day, and under different circumstances, is required. This usually affords grounds for diagnosis of the existence and seat of the calculus.

However small a calculus may be, violent exercise, prolonged jolting in riding or driving, will cause it to bruise the part with which it is in contact, and give rise to bleeding; and long before blood becomes evident to the naked eye,

the corpuscles may be detected by the microscope. Blood corpuscles appearing constantly after exercise, disappearing on rest, associated with some precipitate in the urine of a nature to form calculus, and with no evidence, local or general, of other disease to account for it, furnish a strong presumption of calculus. But, before a calculus can rupture capillaries, it must abrade the mucous membrane, and disturb the epithelium; and these cells, with the blood, not only furnish strong corroborative signs, but indicate the exact seat of the calculi. The cells from the calyces are irregularly spheroidal and small; those from the pelvis larger, but still irregularly spheroidal in form. The epithelium of the ureter is conical, that from the bladder between spheroidal and squamous in character, readily distinguished by the large size of the cells.

A patient in whom there is reason to suspect the existence of calculus should be made to take exercise, at first gentle—a simple walk or drive; and, this giving no results, exertion of a more vigorous kind—horse exercise, and the like. The urine passed an hour or two afterwards should be allowed to stand for a short time, and should then be examined for blood corpuscles and epithelial cells, and compared with urine passed before the exercise. A single experiment must not be relied upon, the results being sometimes negative for a

time, though afterwards conclusive. When blood corpuscles are met with, they usually diminish gradually in number, and sometimes disappear. In other cases they are never altogether absent, and the effect of exercise is to increase the number of epithelial cells without greatly affecting the blood corpuscles.

When a calculus has been lodged for a length of time in the pelvis, there is often little or no blood, and the epithelium is replaced by a constant, but not considerable, discharge of pus corpuscles. These cases often require watching for some time; all the urine passed should be submitted to the medical attendant, and most commonly there will eventually be detected small scales detached from the exterior of the calculus, which, by their crystalline appearance under the microscope and behaviour with reagents, will afford some clue as to the character of the stone.

A stage in the early history of calculus requires special mention, that is, the passage of the stone along the ureter. This generally occasions some pain, but not always of a severe character. When, however, the stone is so large as to traverse the canal with difficulty, the suffering occasioned is most acute. There is great pain in the region of the kidney on one side, never altogether absent, but coming on in paroxysms. It shoots upwards and forwards, but more downwards along the course of the ureter, and down the groin to the

testicle of that side. The testicle also is retracted. More or less local tenderness accompanies the pain, and usually there is violent sympathetic vomiting. The treatment will consist of diluents, baths, opium, or subcutaneous injection of morphia, and antispasmodics; and the occurrence of such an attack more or less acute will be an important fact in the history of a case in which stone is suspected to exist.

When positive evidence of the presence of calculus is obtained, no time should be lost in endeavouring to bring it away. This brings us to the third point of preventive treatment. Fluids should be taken in very large quantity, either distilled water or rain water, weak linseed or dandelion tea; or, when the stone is uric acid, weak solutions of acetate or citrate of potash. The use of the more stimulant diuretics, juniper, turpentine, is not unattended with danger, and should be avoided. While these diluents are being given, the urine should be retained as long as possible, so that the bladder ureters and their renal expansions may be distended. At the same time warm baths should be taken, with a view to inducing a general relaxation of the muscular structures, and the dislodgement of the stone may be favoured by movements, walking, riding, &c.

Should there be any reason to suspect constriction of any portion of the urethra, a full-sized

instrument should be passed; and if any stricture is detected, it would be best treated, if possible, by rapid dilatation.

When, from the symptoms detailed, there is reason to believe that a concretion has traversed the ureter from the kidney to the bladder, the patient should be directed to watch closely all the urine excreted. After the calculus has reached the bladder there may be a complete cessation of all the acute symptoms, until the stone has reached a certain size, when the symptoms described in the first lecture will begin to show themselves. In other cases, the distressing sensations will be present from the first, as in a case already alluded to. (Page 5.)

If, after the lapse of a few days, no calculus has been passed, no further time should be lost in bringing it away. This may be accomplished in one of two ways, either by washing out the bladder, by means of a full-sized injecting catheter, or by the use of the lithotrite. Of the two methods, I prefer the use of the lithotrite, as being in all cases the most effectual; and because, in the majority of cases, from the facility with which the operation can be accomplished, lithotrity is the least tedious and painful process of freeing the bladder from stone.

BENJAMIN PARDON, PRINTER, PATERNOSTER ROW, LONDON.

London, New Burlington Street,
December, 1867.

MESSRS. CHURCHILL & SONS'

Publications,

IN

MEDICINE

AND THE VARIOUS BRANCHES OF

NATURAL SCIENCE.

"It would be unjust to conclude this notice without saying a few words in favour of Mr. Churchill, from whom the profession is receiving, it may be truly said, the most beautiful series of Illustrated Medical Works which has ever been published."—*Lancet.*

"All the publications of Mr. Churchill are prepared with so much taste and neatness, that it is superfluous to speak of them in terms of commendation."—*Edinburgh Medical and Surgical Journal.*

"No one is more distinguished for the elegance and *recherché* style of his publications than Mr. Churchill."—*Provincial Medical Journal.*

"The name of Churchill has long been a guarantee for the excellence of illustrated works, and it would be superfluous to repeat the admiration that we have several times expressed in this respect, of the spirit with which this firm engages in these costly but valuable series."—*Medical Press and Circular.*

"The typography, illustrations, and getting up are, in all Mr. Churchill's publications, most beautiful."—*Monthly Journal of Medical Science.*

"Mr. Churchill's illustrated works are among the best that emanate from the Medical Press."—*Medical Times.*

"We have before called the attention of both students and practitioners to the great advantage which Mr. Churchill has conferred on the profession, in the issue, at such a moderate cost, of works so highly creditable in point of artistic execution and scientific merit."—*Dublin Quarterly Journal.*

A CLASSIFIED INDEX

TO

MESSRS. CHURCHILL & SONS' CATALOGUE.

ANATOMY.

CHEMISTRY.

CLIMATE.

DEFORMITIES, &c.

DISEASES OF WOMEN AND CHILDREN.

GENERATIVE ORGANS, Diseases of, and SYPHILIS.

HYGIENE.

HYGIENE—*continued.*

MATERIA MEDICA and PHARMACY.

MEDICINE.

MEDICINE—*continued.*

MICROSCOPE.

MISCELLANEOUS.

MISCELLANEOUS—*cont^d.*

NERVOUS DISORDERS AND INDIGESTION.

OBSTETRICS.

OPHTHALMOLOGY.

OPHTHALMOLOGY—*cont^d.*

PHYSIOLOGY.

PSYCHOLOGY.

PULMONARY and CHEST DISEASES, &c.

RENAL and URINARY DISEASES.

SCIENCE.

SURGERY.

SURGERY—*continued.*

VETERINARY MEDICINE.

MR. ACTON, M.R.C.S.

I.

A PRACTICAL TREATISE ON DISEASES OF THE URINARY AND GENERATIVE ORGANS IN BOTH SEXES. Third Edition. 8vo. cloth, £1. 1*s*. With Plates, £1. 11*s*. 6*d*. The Plates alone, limp cloth, 10*s*. 6*d*.

II.

THE FUNCTIONS AND DISORDERS OF THE REPRODUCTIVE ORGANS IN CHILDHOOD, YOUTH, ADULT AGE, AND ADVANCED LIFE, considered in their Physiological, Social, and Moral Relations. Fourth Edition. 8vo. cloth, 10*s*. 6*d*.

III.

PROSTITUTION: Considered in its Moral, Social, and Sanitary Bearings, with a View to its Amelioration and Regulation. 8vo. cloth, 10*s*. 6*d*.

DR. ADAMS, A.M.

A TREATISE ON RHEUMATIC GOUT; OR, CHRONIC RHEUMATIC ARTHRITIS. 8vo. cloth, with a Quarto Atlas of Plates, 21*s*.

MR. WILLIAM ADAMS, F.R.C.S.

I.

ON THE PATHOLOGY AND TREATMENT OF LATERAL AND OTHER FORMS OF CURVATURE OF THE SPINE. With Plates. 8vo. cloth, 10*s*. 6*d*.

II.

CLUBFOOT: its Causes, Pathology, and Treatment. Jacksonian Prize Essay for 1864. With 100 Engravings. 8vo. cloth, 12*s*.

III.

ON THE REPARATIVE PROCESS IN HUMAN TENDONS AFTER SUBCUTANEOUS DIVISION FOR THE CURE OF DEFORMITIES. With Plates. 8vo. cloth, 6*s*.

IV.

SKETCH OF THE PRINCIPLES AND PRACTICE OF SUBCUTANEOUS SURGERY. 8vo. cloth, 2*s*. 6*d*.

DR. WILLIAM ADDISON, F.R.S.

I.

CELL THERAPEUTICS. 8vo. cloth, 4*s*.

II.

ON HEALTHY AND DISEASED STRUCTURE, AND THE TRUE PRINCIPLES OF TREATMENT FOR THE CURE OF DISEASE, ESPECIALLY CONSUMPTION AND SCROFULA, founded on MICROSCOPICAL ANALYSIS. 8vo. cloth, 12*s*.

DR. ALDIS.

AN INTRODUCTION TO HOSPITAL PRACTICE IN VARIOUS COMPLAINTS; with Remarks on their Pathology and Treatment. 8vo. cloth, 5*s*. 6*d*.

DR. SOMERVILLE SCOTT ALISON, M.D.EDIN., F.R.C.P.

THE PHYSICAL EXAMINATION OF THE CHEST IN PULMONARY CONSUMPTION, AND ITS INTERCURRENT DISEASES. With Engravings. 8vo. cloth, 12*s*.

DR. ALTHAUS, M.D., M.R.C.P.

ON EPILEPSY, HYSTERIA, AND ATAXY. Cr. 8vo. cloth, 4*s*.

THE ANATOMICAL REMEMBRANCER; OR, COMPLETE POCKET ANATOMIST. Sixth Edition, carefully Revised. 32mo. cloth, 3*s*. 6*d*.

DR. McCALL ANDERSON, M.D.

I.

PARASITIC AFFECTIONS OF THE SKIN. With Engravings. 8vo. cloth, 5*s*.

II.

ECZEMA. Second Edition. 8vo. cloth, 6*s*.

III.

PSORIASIS AND LEPRA. With Chromo-lithograph. 8vo. cloth, 5*s*.

DR. ANDREW ANDERSON, M.D.

TEN LECTURES INTRODUCTORY TO THE STUDY OF FEVER. Post 8vo. cloth, 5*s*.

DR. THOMAS ANDERSON, M.D.

HANDBOOK FOR YELLOW FEVER: ITS PATHOLOGY AND TREATMENT. To which is added a brief History of Cholera, and a method of Cure. Fcap. 8vo. cloth, 3*s*.

DR. ARLIDGE.

ON THE STATE OF LUNACY AND THE LEGAL PROVISION FOR THE INSANE; with Observations on the Construction and Organisation of Asylums. 8vo. cloth, 7*s*.

DR. ALEXANDER ARMSTRONG, R.N.

OBSERVATIONS ON NAVAL HYGIENE AND SCURVY. More particularly as the latter appeared during a Polar Voyage. 8vo. cloth, 5*s*.

MR. T. J. ASHTON.

I.

ON THE DISEASES, INJURIES, AND MALFORMATIONS OF THE RECTUM AND ANUS. Fourth Edition. 8vo. cloth, 8*s*.

II.

PROLAPSUS, FISTULA IN ANO, AND HÆMORRHOIDAL AFFECTIONS; their Pathology and Treatment. Second Edition. Post 8vo. cloth 2*s*. 6*d*

MR. W. B. ASPINALL.

SAN REMO AS A WINTER RESIDENCE. With Coloured Plates. Foolscap 8vo. cloth, 4*s*. 6*d*.

MR. THOS. J. AUSTIN, M.R.C.S.ENG.

A PRACTICAL ACCOUNT OF GENERAL PARALYSIS: Its Mental and Physical Symptoms, Statistics, Causes, Seat, and Treatment. 8vo. cloth, 6

DR. THOMAS BALLARD, M.D.

A NEW AND RATIONAL EXPLANATION OF THE DISEASES PECULIAR TO INFANTS AND MOTHERS; with obvious Suggestion for their Prevention and Cure. Post 8vo. cloth, 4*s*. 6*d*.

DR. BARCLAY.

I.

A MANUAL OF MEDICAL DIAGNOSIS. Second Edition. Foolscap 8vo. cloth, 8*s.* 6*d.*

II.

MEDICAL ERRORS.—Fallacies connected with the Application of the Inductive Method of Reasoning to the Science of Medicine. Post 8vo. cloth, 5*s.*

III.

GOUT AND RHEUMATISM IN RELATION TO DISEASE OF THE HEART. Post 8vo. cloth, 5*s.*

DR. T. HERBERT BARKER, M.D., F.R.S., & MR. ERNEST EDWARDS, B.A.

PHOTOGRAPHS OF EMINENT MEDICAL MEN, with brief Analytical Notices of their Works. Vol. I. (24 Portraits), 4to. cloth, 24*s.*

DR. W. G. BARKER, M.D.LOND.

I.

ON DISEASES OF THE RESPIRATORY PASSAGES AND LUNGS, SPORADIC AND EPIDEMIC; their *Causes*, Pathology, Symptoms, and Treatment. Crown 8vo. cloth, 6*s.*

II.

THE CLIMATE OF WORTHING: its Remedial Influence in Disease, especially of the Lungs. Second Edition. Crown 8vo. cloth, 3*s.*

DR. BARLOW.

A MANUAL OF THE PRACTICE OF MEDICINE. Second Edition. Fcap. 8vo. cloth, 12*s.* 6*d.*

DR. BARNES.

THE PHYSIOLOGY AND TREATMENT OF PLACENTA PRÆVIA; being the Lettsomian Lectures on Midwifery for 1857. Post 8vo. cloth, 6*s.*

DR. BASCOME.

A HISTORY OF EPIDEMIC PESTILENCES, FROM THE EARLIEST AGES. 8vo. cloth, 8*s.*

DR. BASHAM.

ON DROPSY, AND ITS CONNECTION WITH DISEASES OF THE KIDNEYS, HEART, LUNGS AND LIVER. With 16 Plates. Third Edition. 8vo. cloth, 12*s.* 6*d.*

MR. H. F. BAXTER, M.R.C.S.L.

ON ORGANIC POLARITY; showing a Connexion to exist between Organic Forces and Ordinary Polar Forces. Crown 8vo. cloth, 5*s.*

MR. BATEMAN.

MAGNACOPIA: A Practical Library of Profitable Knowledge, communicating the general Minutiæ of Chemical and Pharmaceutic Routine, together with the generality of Secret Forms of Preparations. Third Edition. 18mo. 6*s.*

MR. LIONEL J. BEALE, M.R.C.S.

I.

THE LAWS OF HEALTH IN THEIR RELATIONS TO MIND AND BODY. A Series of Letters from an Old Practitioner to a Patient. Post 8vo. cloth, 7*s.* 6*d.*

II.

HEALTH AND DISEASE, IN CONNECTION WITH THE GENERAL PRINCIPLES OF HYGIENE. Fcap. 8vo., 2*s.* 6*d.*

DR. BEALE, F.R.S.

I.

URINE, URINARY DEPOSITS, AND CALCULI: and on the Treatment of Urinary Diseases. Numerous Engravings. Second Edition, much Enlarged. Post 8vo. cloth, 8*s.* 6*d.*

II.

THE MICROSCOPE, IN ITS APPLICATION TO PRACTICAL MEDICINE. Third Edition. With 58 Plates. 8vo. cloth, 16*s.*

III.

ILLUSTRATIONS OF THE SALTS OF URINE, URINARY DEPOSITS, and CALCULI. 37 Plates, containing upwards of 170 Figures copied from Nature, with descriptive Letterpress. 8vo. cloth, 9*s.* 6*d.*

MR. BEASLEY.

I.

THE BOOK OF PRESCRIPTIONS; containing 3000 Prescriptions. Collected from the Practice of the most eminent Physicians and Surgeons, English and Foreign. Third Edition. 18mo. cloth, 6*s.*

II.

THE DRUGGIST'S GENERAL RECEIPT-BOOK; comprising a copious Veterinary Formulary and Table of Veterinary Materia Medica; Patent and Proprietary Medicines, Druggists' Nostrums, &c.; Perfumery, Skin Cosmetics, Hair Cosmetics, and Teeth Cosmetics; Beverages, Dietetic Articles, and Condiments; Trade Chemicals, Miscellaneous Preparations and Compounds used in the Arts, &c.; with useful Memoranda and Tables. Sixth Edition. 18mo. cloth, 6*s.*

III.

THE POCKET FORMULARY AND SYNOPSIS OF THE BRITISH AND FOREIGN PHARMACOPŒIAS; comprising standard and approved Formulæ for the Preparations and Compounds employed in Medical Practice. Eighth Edition, corrected and enlarged. 18mo. cloth, 6*s.*

DR. HENRY BENNET.

I.

A PRACTICAL TREATISE ON INFLAMMATION AND OTHER DISEASES OF THE UTERUS. Fourth Edition, revised, with Additions. 8vo. cloth, 16*s.*

II.

A REVIEW OF THE PRESENT STATE (1856) OF UTERINE PATHOLOGY. 8vo. cloth, 4*s.*

III.

WINTER IN THE SOUTH OF EUROPE; OR, MENTONE, THE RIVIERA, CORSICA, SICILY, AND BIARRITZ, AS WINTER CLIMATES. Third Edition, with numerous Plates, Maps, and Wood Engravings. Post 8vo. cloth, 10*s.* 6*d.*

PROFESSOR BENTLEY, F.L.S.

A MANUAL OF BOTANY. With nearly 1,200 Engravings on Wood. Fcap. 8vo. cloth, 12*s.* 6*d.*

DR. BERNAYS.

NOTES FOR STUDENTS IN CHEMISTRY; being a Syllabus compiled from the Manuals of Miller, Fownes, Berzelius, Gerhardt, Gorup-Besanez, &c. Fourth Edition. Fscap. 8vo. cloth, 3*s.*

MR. HENRY HEATHER BIGG.

ORTHOPRAXY: the Mechanical Treatment of Deformities, Debilities, and Deficiencies of the Human Frame. With Engravings. Post 8vo. cloth, 10*s*.

DR. BILLING, F.R.S.

ON DISEASES OF THE LUNGS AND HEART. 8vo. cloth, 6*s*.

DR. S. B. BIRCH, M.D.

CONSTIPATED BOWELS: the Various Causes and the Rational Means of Cure. Second Edition. Post 8vo. cloth, 3*s*. 6*d*.

DR. GOLDING BIRD, F.R.S.

URINARY DEPOSITS; THEIR DIAGNOSIS, PATHOLOGY, AND THERAPEUTICAL INDICATIONS. With Engravings. Fifth Edition. Edited by E. Lloyd Birkett, M.D. Post 8vo. cloth, 10*s*. 6*d*.

MR. BISHOP, F.R.S.

I.

ON DEFORMITIES OF THE HUMAN BODY, their Pathology and Treatment. With Engravings on Wood. 8vo. cloth, 10*s*.

II.

ON ARTICULATE SOUNDS, AND ON THE CAUSES AND CURE OF IMPEDIMENTS OF SPEECH. 8vo. cloth, 4*s*.

MR. P. HINCKES BIRD, F.R.C.S.

PRACTICAL TREATISE ON THE DISEASES OF CHILDREN AND INFANTS AT THE BREAST. Translated from the French of M. Bouchut, with Notes and Additions. 8vo. cloth. 20*s*.

MR. BLAINE.

OUTLINES OF THE VETERINARY ART; OR, A TREATISE ON THE ANATOMY, PHYSIOLOGY, AND DISEASES OF THE HORSE, NEAT CATTLE, AND SHEEP. Seventh Edition. By Charles Steel, M.R.C.V.S.L. With Plates. 8vo. cloth, 18*s*.

MR. BLOXAM.

CHEMISTRY, INORGANIC AND ORGANIC; with Experiments and a Comparison of Equivalent and Molecular Formulæ. With 276 Engravings on Wood. 8vo. cloth, 16*s*.

DR. BOURGUIGNON.

ON THE CATTLE PLAGUE; OR, CONTAGIOUS TYPHUS IN HORNED CATTLE: its History, Origin, Description, and Treatment. Post 8vo. 5*s*.

MR. JOHN E. BOWMAN, & MR. C. L. BLOXAM.

I.

PRACTICAL CHEMISTRY, including Analysis. With numerous Illustrations on Wood. Fifth Edition. Foolscap 8vo. cloth, 6*s*. 6*d*.

II.

MEDICAL CHEMISTRY; with Illustrations on Wood. Fourth Edition, carefully revised. Fcap. 8vo. cloth, 6*s*. 6*d*.

DR. JAMES BRIGHT.

ON DISEASES OF THE HEART, LUNGS, & AIR PASSAGES; with a Review of the several Climates recommended in these Affections. Third Edition. Post 8vo. cloth, 9*s*.

DR. BRINTON, F.R.S.

I.

THE DISEASES OF THE STOMACH, with an Introduction on its Anatomy and Physiology; being Lectures delivered at St. Thomas's Hospital. Second Edition. 8vo. cloth, 10*s.* 6*d.*

II.

INTESTINAL OBSTRUCTION. Edited by DR. BUZZARD. Post 8vo. cloth, 5*s.*

MR. BERNARD E. BRODHURST, F.R.C.S.

I.

CURVATURES OF THE SPINE: their Causes, Symptoms, Pathology, and Treatment. Second Edition. Roy. 8vo. cloth, with Engravings, 7*s.* 6*d.*

II.

ON THE NATURE AND TREATMENT OF CLUBFOOT AND ANALOGOUS DISTORTIONS involving the TIBIO-TARSAL ARTICULATION. With Engravings on Wood. 8vo. cloth, 4*s.* 6*d.*

III.

PRACTICAL OBSERVATIONS ON THE DISEASES OF THE JOINTS INVOLVING ANCHYLOSIS, and on the TREATMENT for the RESTORATION of MOTION. Third Edition, much enlarged, 8vo. cloth, 4*s.* 6*d.*

MR. BROOKE, M.A., M.B., F.R.S.

ELEMENTS OF NATURAL PHILOSOPHY. Based on the Work of the late Dr. Golding Bird. Sixth Edition. With 700 Engravings. Fcap. 8vo. cloth, 12*s.* 6*d.*

MR. THOMAS BRYANT, F.R.C.S.

I.

ON THE DISEASES AND INJURIES OF THE JOINTS. CLINICAL AND PATHOLOGICAL OBSERVATIONS. Post 8vo. cloth, 7*s.* 6*d.*

II.

THE SURGICAL DISEASES OF CHILDREN. The Lettsomian Lectures, delivered March, 1863. Post 8vo. cloth, 5*s.*

III.

CLINICAL SURGERY. Parts I. to VII. 8vo., 3*s.* 6*d.* each.

DR. BUCKE, M.D., L.R.C.P.LOND.

VITAL AND ECONOMICAL STATISTICS OF THE HOSPITALS, INFIRMARIES, &c., OF ENGLAND AND WALES. Royal 8vo. 5*s.*

DR. JOHN CHARLES BUCKNILL, F.R.S., & DR. DANIEL H. TUKE.

A MANUAL OF PSYCHOLOGICAL MEDICINE: containing the History, Nosology, Description, Statistics, Diagnosis, Pathology, and Treatment of Insanity. Second Edition. 8vo. cloth, 15*s.*

DR. BUDD, F.R.S.

I.

ON DISEASES OF THE LIVER.

Illustrated with Coloured Plates and Engravings on Wood. Third Edition. 8vo. cloth, 16*s.*

II.

ON THE ORGANIC DISEASES AND FUNCTIONAL DISORDERS OF THE STOMACH. 8vo. cloth, 9*s.*

MR. CALLENDER, F.R.C.S.

FEMORAL RUPTURE: Anatomy of the Parts concerned. With Plates. 8vo. cloth, 4*s.*

DR. JOHN M. CAMPLIN, F.L.S.

ON DIABETES, AND ITS SUCCESSFUL TREATMENT. Third Edition, by Dr. Glover. Fcap. 8vo. cloth, 3*s.* 6*d.*

MR. ROBERT B. CARTER, M.R.C.S.

I.

ON THE INFLUENCE OF EDUCATION AND TRAINING IN PREVENTING DISEASES OF THE NERVOUS SYSTEM. Fcap. 8vo., 6*s.*

II.

THE PATHOLOGY AND TREATMENT OF HYSTERIA. Post 8vo. cloth, 4*s.* 6*d.*

DR. CARPENTER, F.R.S.

I.

PRINCIPLES OF HUMAN PHYSIOLOGY. With numerous Illustrations on Steel and Wood. Sixth Edition. Edited by Mr. HENRY POWER. 8vo. cloth, 26*s.*

II.

A MANUAL OF PHYSIOLOGY. With 252 Illustrations on Steel and Wood. Fourth Edition. Fcap. 8vo. cloth, 12*s.* 6*d.*

III.

THE MICROSCOPE AND ITS REVELATIONS. With numerous Engravings on Steel and Wood. Third Edition. Fcap. 8vo. cloth, 12*s.* 6*d.*

MR. JOSEPH PEE CATLOW, M.R.C.S.

ON THE PRINCIPLES OF ÆSTHETIC MEDICINE; or the Natural Use of Sensation and Desire in the Maintenance of Health and the Treatment of Disease. 8vo. cloth, 9*s.*

DR. CHAMBERS.

I.

LECTURES, CHIEFLY CLINICAL. Fourth Edition. 8vo. cloth, 14*s.*

II.

THE INDIGESTIONS OR DISEASES OF THE DIGESTIVE ORGANS FUNCTIONALLY TREATED. Second Edition. 8vo. cloth, 10*s.* 6*d.*

III.

SOME OF THE EFFECTS OF THE CLIMATE OF ITALY. Crown 8vo. cloth, 4*s.* 6*d.*

DR. CHANCE, M.B.

VIRCHOW'S CELLULAR PATHOLOGY, AS BASED UPON PHYSIOLOGICAL AND PATHOLOGICAL HISTOLOGY. With 144 Engravings on Wood. 8vo. cloth, 16*s.*

MR. H. T. CHAPMAN, F.R.C.S.

I.

THE TREATMENT OF OBSTINATE ULCERS AND CUTANEOUS ERUPTIONS OF THE LEG WITHOUT CONFINEMENT. Third Edition. Post 8vo. cloth, 3*s.* 6*d.*

II.

VARICOSE VEINS: their Nature, Consequences, and Treatment, Palliative and Curative. Second Edition. Post 8vo. cloth, 3*s.* 6*d.*

MR. PYE HENRY CHAVASSE, F.R.C.S.

I.

ADVICE TO A MOTHER ON THE MANAGEMENT OF HER CHILDREN. Eighth Edition. Foolscap 8vo., 2*s.* 6*d.*

II.

ADVICE TO A WIFE ON THE MANAGEMENT OF HER OWN HEALTH. With an Introductory Chapter, especially addressed to a Young Wife. Seventh Edition. Fcap. 8vo., 2*s.* 6*d.*

MR. LE GROS CLARK, F.R.C.S

OUTLINES OF SURGERY; being an Epitome of the Lectures on the Principles and the Practice of Surgery, delivered at St. Thomas's Hospital. Fcap. 8vo. cloth, 5*s.*

MR. JOHN CLAY, M.R.C.S.

KIWISCH ON DISEASES OF THE OVARIES: Translated, by permission, from the last German Edition of his Clinical Lectures on the Special Pathology and Treatment of the Diseases of Women. With Notes, and an Appendix on the Operation of Ovariotomy. Royal 12mo. cloth, 16*s.*

DR. COCKLE, M.D.

ON INTRA-THORACIC CANCER. 8vo. 6*s.* 6*d.*

MR. COLLIS, M.B.DUB., F.R.C.S.I.

THE DIAGNOSIS AND TREATMENT OF CANCER AND THE TUMOURS ANALOGOUS TO IT. With coloured Plates. 8vo. cloth, 14*s.*

DR. CONOLLY.

THE CONSTRUCTION AND GOVERNMENT OF LUNATIC ASYLUMS AND HOSPITALS FOR THE INSANE. With Plans. Post 8vo. cloth, 6*s.*

MR. COOLEY.

COMPREHENSIVE SUPPLEMENT TO THE PHARMACOPŒIAS.

THE CYCLOPÆDIA OF PRACTICAL RECEIPTS, PROCESSES, AND COLLATERAL INFORMATION IN THE ARTS, MANUFACTURES, PROFESSIONS, AND TRADES, INCLUDING MEDICINE, PHARMACY, AND DOMESTIC ECONOMY; designed as a General Book of Reference for the Manufacturer, Tradesman, Amateur, and Heads of Families. Fourth and greatly enlarged Edition, 8vo. cloth, 28*s.*

MR. W. WHITE COOPER.

I.

ON WOUNDS AND INJURIES OF THE EYE. Illustrated by 17 Coloured Figures and 41 Woodcuts. 8vo. cloth, 12*s.*

II.

ON NEAR SIGHT, AGED SIGHT, IMPAIRED VISION, AND THE MEANS OF ASSISTING SIGHT. With 31 Illustrations on Wood. Second Edition. Fcap. 8vo. cloth, 7*s.* 6*d.*

SIR ASTLEY COOPER, BART., F.R.S.

ON THE STRUCTURE AND DISEASES OF THE TESTIS.

With 24 Plates. Second Edition. Royal 4to., 20*s.*

MR. COOPER.

A DICTIONARY OF PRACTICAL SURGERY AND ENCYCLOPÆDIA OF SURGICAL SCIENCE.

New Edition, brought down to the present time. By SAMUEL A. LANE, F.R.C.S., assisted by various eminent Surgeons. Vol. I., 8vo. cloth, £1. 5*s.*

MR. HOLMES COOTE, F.R.C.S.

A REPORT ON SOME IMPORTANT POINTS IN THE TREATMENT OF SYPHILIS.

8vo. cloth, 5*s.*

DR. COTTON.

PHTHISIS AND THE STETHOSCOPE; OR, THE PHYSICAL SIGNS OF CONSUMPTION.

Third Edition. Foolscap 8vo. cloth, 3*s.*

MR. COULSON.

I.

ON DISEASES OF THE BLADDER AND PROSTATE GLAND.

New Edition, revised. *In Preparation.*

II.

ON LITHOTRITY AND LITHOTOMY;

with Engravings on Wood. 8vo. cloth, 8*s.*

MR. WILLIAM CRAIG, L.F.P.S., GLASGOW.

ON THE INFLUENCE OF VARIATIONS OF ELECTRIC TENSION AS THE REMOTE CAUSE OF EPIDEMIC AND OTHER DISEASES.

8vo. cloth, 10*s.*

MR. CURLING, F.R.S.

I.

OBSERVATIONS ON DISEASES OF THE RECTUM.

Third Edition. 8vo. cloth, 7*s.* 6*d.*

II.

A PRACTICAL TREATISE ON DISEASES OF THE TESTIS, SPERMATIC CORD, AND SCROTUM.

Third Edition, with Engravings. 8vo. cloth, 16*s.*

DR. DALRYMPLE, M.R.C.P., F.R.C.S.

THE CLIMATE OF EGYPT: METEOROLOGICAL AND MEDICAL OBSERVATIONS, with Practical Hints for Invalid Travellers.

Post 8vo. cloth, 4*s.*

MR. JOHN DALRYMPLE, F.R.S., F.R.C.S.

PATHOLOGY OF THE HUMAN EYE.

Complete in Nine Fasciculi: imperial 4to., 20*s.* each; half-bound morocco, gilt tops, 9*l.* 15*s.*

DR. HERBERT DAVIES.

ON THE PHYSICAL DIAGNOSIS OF DISEASES OF THE LUNGS AND HEART.

Second Edition. Post 8vo. cloth, 8*s.*

DR. DAVEY.

I.

THE GANGLIONIC NERVOUS SYSTEM: its Structure, Functions, and Diseases. 8vo. cloth, 9*s*.

II.

ON THE NATURE AND PROXIMATE CAUSE OF INSANITY. Post 8vo. cloth, 3*s*.

DR. HENRY DAY, M.D., M.R.C.P.

CLINICAL HISTORIES; with Comments. 8vo. cloth, 7*s*. 6*d*.

MR. DIXON.

A GUIDE TO THE PRACTICAL STUDY OF DISEASES OF THE EYE. Third Edition. Post 8vo. cloth, 9*s*.

DR. DOBELL.

I.

DEMONSTRATIONS OF DISEASES IN THE CHEST, AND THEIR PHYSICAL DIAGNOSIS. With Coloured Plates. 8vo. cloth, 12*s*. 6*d*.

II.

LECTURES ON THE GERMS AND VESTIGES OF DISEASE, and on the Prevention of the Invasion and Fatality of Disease by Periodical Examinations. 8vo. cloth, 6*s*. 6*d*.

III.

ON TUBERCULOSIS: ITS NATURE, CAUSE, AND TREATMENT; with Notes on Pancreatic Juice. Second Edition. Crown 8vo. cloth, 3*s*. 6*d*.

IV.

LECTURES ON WINTER COUGH (CATARRH, BRONCHITIS, EMPHYSEMA, ASTHMA); with an Appendix on some Principles of Diet in Disease. Post 8vo. cloth, 5*s*. 6*d*.

V.

LECTURES ON THE TRUE FIRST STAGE OF CONSUMPTION. Crown 8vo. cloth, 3*s*. 6*d*.

DR. TOOGOOD DOWNING.

NEURALGIA: its various Forms, Pathology, and Treatment. THE JACKSONIAN PRIZE ESSAY FOR 1850. 8vo. cloth, 10*s*. 6*d*.

DR. DRUITT, F.R.C.S.

THE SURGEON'S VADE-MECUM; with numerous Engravings on Wood. Ninth Edition. Foolscap 8vo. cloth, 12*s*. 6*d*.

MR. DUNN, F.R.C.S.

PSYCHOLOGY—PHYSIOLOGICAL, 4*s*.; MEDICAL, 3*s*.

SIR JAMES EYRE, M.D.

I.

THE STOMACH AND ITS DIFFICULTIES. Fifth Edition. Fcap. 8vo. cloth, 2*s*. 6*d*.

II.

PRACTICAL REMARKS ON SOME EXHAUSTING DISEASES. Second Edition. Post 8vo. cloth, 4*s*. 6*d*.

DR. FAYRER, M.D., F.R.C.S.

CLINICAL SURGERY IN INDIA. With Engravings. 8vo. cloth, 16*s*.

DR. FENWICK.

ON SCROFULA AND CONSUMPTION. Clergyman's Sore Throat, Catarrh, Croup, Bronchitis, Asthma. Fcap. 8vo., 2*s.* 6*d.*

SIR WILLIAM FERGUSSON, BART., F.R.S.

I.

A SYSTEM OF PRACTICAL SURGERY; with numerous Illustrations on Wood. Fourth Edition. Fcap. 8vo. cloth, 12*s.* 6*d.*

II.

LECTURES ON THE PROGRESS OF ANATOMY AND SURGERY DURING THE PRESENT CENTURY. With numerous Engravings. 8vo. cloth, 10*s.* 6*d.*

SIR JOHN FIFE, F.R.C.S. AND MR. URQUHART.

MANUAL OF THE TURKISH BATH. Heat a Mode of Cure and a Source of Strength for Men and Animals. With Engravings. Post 8vo. cloth, 5*s.*

MR. FLOWER, F.R.S., F.R.C.S.

DIAGRAMS OF THE NERVES OF THE HUMAN BODY, exhibiting their Origin, Divisions, and Connexions, with their Distribution to the various Regions of the Cutaneous Surface, and to all the Muscles. Folio, containing Six Plates, 14*s.*

DR. BALTHAZAR FOSTER, M.D., M.R.C.P.

THE USE OF THE SPHYGMOGRAPH IN THE INVESTIGATION OF DISEASE. With Engravings. 8vo. cloth, 2*s.* 6*d.*

MR. FOWNES, PH.D., F.R.S.

I.

A MANUAL OF CHEMISTRY; with 187 Illustrations on Wood. Ninth Edition. Fcap. 8vo. cloth, 12*s.* 6*d.*
Edited by H. Bence Jones, M.D., F.R.S., and A. W. Hofmann, Ph.D., F.R.S.

II.

CHEMISTRY, AS EXEMPLIFYING THE WISDOM AND BENEFICENCE OF GOD. Second Edition. Fcap. 8vo. cloth, 4*s.* 6*d.*

III.

INTRODUCTION TO QUALITATIVE ANALYSIS. Post 8vo. cloth, 2*s.*

DR. D. J. T. FRANCIS.

CHANGE OF CLIMATE; considered as a Remedy in Dyspeptic, Pulmonary, and other Chronic Affections; with an Account of the most Eligible Places of Residence for Invalids, at different Seasons of the Year. Post 8vo. cloth, 8*s.* 6*d.*

DR. W. FRAZER.

ELEMENTS OF MATERIA MEDICA; containing the Chemistry and Natural History of Drugs—their Effects, Doses, and Adulterations. Second Edition. 8vo. cloth, 10*s.* 6*d.*

C. REMIGIUS FRESENIUS.

A SYSTEM OF INSTRUCTION IN CHEMICAL ANALYSIS,
Edited by Lloyd Bullock, F.C.S.
Qualitative. Sixth Edition, with Coloured Plate illustrating Spectrum Analysis. 8vo. cloth, 10*s.* 6*d.*——Quantitative. Fourth Edition. 8vo. cloth, 18*s.*

DR. FULLER.

I.

ON DISEASES OF THE LUNGS AND AIR PASSAGES. Second Edition. 8vo. cloth, 12*s.* 6*d.*

II.

ON DISEASES OF THE HEART AND GREAT VESSELS. 8vo. cloth, 7*s.* 6*d.*

III.

ON RHEUMATISM, RHEUMATIC GOUT, AND SCIATICA: their Pathology, Symptoms, and Treatment. Third Edition. 8vo. cloth, 12*s.* 6*d.*

MR. GALLOWAY.

I.

THE FIRST STEP IN CHEMISTRY. Fourth Edition. Fcap. 8vo. cloth.

II.

THE SECOND STEP IN CHEMISTRY; or, the Student's Guide to the Higher Branches of the Science. With Engravings. 8vo. cloth, 10*s.*

III.

A MANUAL OF QUALITATIVE ANALYSIS. Fourth Edition. Post 8vo. cloth, 6*s.* 6*d.*

IV.

CHEMICAL TABLES. On Five Large Sheets, for School and Lecture Rooms. Second Edition. 4*s.* 6*d.*

MR. J. SAMPSON GAMGEE.

HISTORY OF A SUCCESSFUL CASE OF AMPUTATION AT THE HIP-JOINT (the limb 48-in. in circumference, 99 pounds weight). With 4 Photographs. 4to cloth, 10*s.* 6*d.*

MR. F. J. GANT, F.R.C.S.

I.

THE PRINCIPLES OF SURGERY: Clinical, Medical, and Operative. With Engravings. 8vo. cloth, 18*s.*

II.

THE IRRITABLE BLADDER: its Causes and Curative Treatment. Second Edition, enlarged. Crown 8vo. cloth, 5*s.*

SIR DUNCAN GIBB, BART., M.D.

I.

ON DISEASES OF THE THROAT AND WINDPIPE, as reflected by the Laryngoscope. Second Edition. With 116 Engravings. Post 8vo cloth, 10*s.* 6*d.*

II.

THE LARYNGOSCOPE IN DISEASES OF THE THROAT, with a Chapter on RHINOSCOPY. Second Edition, enlarged, with Engravings. Crown 8vo., cloth, 5*s.*

MRS. GODFREY.

ON THE NATURE, PREVENTION, TREATMENT, AND CURE OF SPINAL CURVATURES and DEFORMITIES of the CHEST and LIMBS, without ARTIFICIAL SUPPORTS or any MECHANICAL APPLIANCES. Third Edition, Revised and Enlarged. 8vo. cloth 5*s.*

DR. GORDON, M.D. C.B.

I.

ARMY HYGIENE. 8vo. cloth, 20*s.*

II.

CHINA, FROM A MEDICAL POINT OF VIEW, IN 1860 AND 1861; With a Chapter on Nagasak as a Sanatarium. 8vo. cloth, 10*s.* 6*d.*

DR. GAIRDNER.

ON GOUT; its History, its Causes, and its Cure. Fourth Edition. Post 8vo. cloth, 8*s.* 6*d.*

DR. GRANVILLE, F.R.S.

I.

THE MINERAL SPRINGS OF VICHY: their Efficacy in the Treatment of Gout, Indigestion, Gravel, &c. 8vo. cloth, 3*s.*

II.

ON SUDDEN DEATH. Post 8vo., 2*s.* 6*d.*

DR. GRAVES M.D., F.R.S.

STUDIES IN PHYSIOLOGY AND MEDICINE. Edited by Dr. Stokes. With Portrait and Memoir. 8vo. cloth, 14*s.*

DR. S. C. GRIFFITH, M.D.

ON DERMATOLOGY AND THE TREATMENT OF SKIN DISEASES BY MEANS OF HERBS, IN PLACE OF ARSENIC AND MERCURY. Fcap. 8vo. cloth, 3*s.*

MR. GRIFFITHS.

CHEMISTRY OF THE FOUR SEASONS—Spring, Summer, Autumn, Winter. Illustrated with Engravings on Wood. Second Edition. Foolscap 8vo. cloth, 7*s.* 6*d.*

DR. GULLY.

THE SIMPLE TREATMENT OF DISEASE; deduced from the Methods of Expectancy and Revulsion. 18mo. cloth, 4*s.*

DR. GUY AND DR. JOHN HARLEY.

HOOPER'S PHYSICIAN'S VADE-MECUM; OR, MANUAL OF THE PRINCIPLES AND PRACTICE OF PHYSIC. Seventh Edition, considerably enlarged, and rewritten. Foolscap 8vo. cloth, 12*s.* 6*d.*

GUY'S HOSPITAL REPORTS. Third Series. Vol. XIII., 8vo. 7*s.* 6*d.*

DR. HABERSHON, F.R.C.P.

I.

ON DISEASES OF THE ABDOMEN, comprising those of the Stomach and other Parts of the Alimentary Canal, Œsophagus, Stomach, Cæcum, Intestines, and Peritoneum. Second Edition, with Plates. 8vo. cloth, 14*s.*

II.

ON THE INJURIOUS EFFECTS OF MERCURY IN THE TREATMENT OF DISEASE. Post 8vo. cloth, 3*s.* 6*d.*

DR. C. RADCLYFFE HALL.

TORQUAY IN ITS MEDICAL ASPECT AS A RESORT FOR PULMONARY INVALIDS. Post 8vo. cloth, 5*s.*

DR. MARSHALL HALL, F.R.S.

I.

PRONE AND POSTURAL RESPIRATION IN DROWNING AND OTHER FORMS OF APNŒA OR SUSPENDED RESPIRATION. Post 8vo. cloth. 5*s.*

II.

PRACTICAL OBSERVATIONS AND SUGGESTIONS IN MEDICINE. Second Series. Post 8vo. cloth, 8*s.* 6*d.*

MR. HARDWICH.

A MANUAL OF PHOTOGRAPHIC CHEMISTRY. With Engravings. Seventh Edition. Foolscap 8vo. cloth, 7*s.* 6*d.*

DR. J. BOWER HARRISON, M.D., M.R.C.P.

I.

LETTERS TO A YOUNG PRACTITIONER ON THE DISEASES OF CHILDREN. Foolscap 8vo. cloth, 3*s.*

II.

ON THE CONTAMINATION OF WATER BY THE POISON OF LEAD, and its Effects on the Human Body. Foolscap 8vo. cloth, 3*s.* 6*d.*

DR. HARTWIG.

I.

ON SEA BATHING AND SEA AIR. Second Edition. Fcap. 8vo., 2*s.* 6*d.*

II.

ON THE PHYSICAL EDUCATION OF CHILDREN. Fcap. 8vo., 2*s.* 6*d.*

DR. A. H. HASSALL.

I.

THE URINE, IN HEALTH AND DISEASE; being an Explanation of the Composition of the Urine, and of the Pathology and Treatment of Urinary and Renal Disorders. Second Edition. With 79 Engravings (23 Coloured). Post 8vo. cloth, 12*s.* 6*d.*

II.

THE MICROSCOPIC ANATOMY OF THE HUMAN BODY, IN HEALTH AND DISEASE. Illustrated with Several Hundred Drawings in Colour. Two vols. 8vo. cloth, £1. 10*s.*

MR. ALFRED HAVILAND, M.R.C.S.

CLIMATE, WEATHER, AND DISEASE; being a Sketch of the Opinions of the most celebrated Ancient and Modern Writers with regard to the Influence of Climate and Weather in producing Disease. With Four coloured Engravings. 8vo. cloth, 7*s.*

DR. HEADLAND, M.D., F.R.C.P.

I.

ON THE ACTION OF MEDICINES IN THE SYSTEM. Fourth Edition. 8vo. cloth, 14*s.*

II.

A MEDICAL HANDBOOK; comprehending such Information on Medical and Sanitary Subjects as is desirable in Educated Persons. Second Thousand. Foolscap 8vo. cloth, 5*s.*

DR. HEALE.

I.

A TREATISE ON THE PHYSIOLOGICAL ANATOMY OF THE LUNGS. With Engravings. 8vo. cloth, 8*s.*

II.

A TREATISE ON VITAL CAUSES. 8vo. cloth, 9*s.*

MR. CHRISTOPHER HEATH, F.R.C.S.

I.

PRACTICAL ANATOMY: a Manual of Dissections. With numerous Engravings. Fcap. 8vo. cloth, 10*s.* 6*d.*

II.

A MANUAL OF MINOR SURGERY AND BANDAGING, FOR THE USE OF HOUSE-SURGEONS, DRESSERS, AND JUNIOR PRACTITIONERS. With Illustrations. Third Edition. Fcap. 8vo. cloth, 5*s.*

MR. HIGGINBOTTOM, F.R.S., F.R.C.S.E.

A PRACTICAL ESSAY ON THE USE OF THE NITRATE OF SILVER IN THE TREATMENT OF INFLAMMATION, WOUNDS, AND ULCERS. Third Edition, 8vo. cloth, 6*s.*

DR. HINDS.

THE HARMONIES OF PHYSICAL SCIENCE IN RELATION TO THE HIGHER SENTIMENTS; with Observations on Medical Studies, and on the Moral and Scientific Relations of Medical Life. Post 8vo. cloth, 4*s.*

MR. J. A. HINGESTON, M.R.C.S.

TOPICS OF THE DAY, MEDICAL, SOCIAL, AND SCIENTIFIC. Crown 8vo. cloth, 7*s.* 6*d.*

DR. HODGES.

THE NATURE, PATHOLOGY, AND TREATMENT OF PUERPERAL CONVULSIONS. Crown 8vo. cloth, 3*s.*

DR. DECIMUS HODGSON.

THE PROSTATE GLAND, AND ITS ENLARGEMENT IN OLD AGE. With 12 Plates. Royal 8vo. cloth, 6*s.*

MR. JABEZ HOGG.

A MANUAL OF OPHTHALMOSCOPIC SURGERY; being a Practical Treatise on the Use of the Ophthalmoscope in Diseases of the Eye. Third Edition. With Coloured Plates. 8vo. cloth, 10*s.* 6*d.*

MR. LUTHER HOLDEN, F.R.C.S.

I.

HUMAN OSTEOLOGY: with Plates, showing the Attachments of the Muscles. Third Edition. 8vo. cloth, 16*s.*

II.

A MANUAL OF THE DISSECTION OF THE HUMAN BODY. With Engravings on Wood. Second Edition. 8vo. cloth, 16*s.*

MR BARNARD HOLT, F.R.C.S.

ON THE IMMEDIATE TREATMENT OF STRICTURE OF THE URETHRA. Second Edition, Enlarged. 8vo. cloth, 3*s.*

DR. W. CHARLES HOOD.

SUGGESTIONS FOR THE FUTURE PROVISION OF CRIMINAL LUNATICS. 8vo. cloth, 5*s.* 6*d.*

DR. P. HOOD.

THE SUCCESSFUL TREATMENT OF SCARLET FEVER; also, OBSERVATIONS ON THE PATHOLOGY AND TREATMENT OF CROWING INSPIRATIONS OF INFANTS. Post 8vo. cloth, 5*s.*

MR. JOHN HORSLEY.

A CATECHISM OF CHEMICAL PHILOSOPHY; being a Familiar Exposition of the Principles of Chemistry and Physics. With Engravings on Wood. Designed for the Use of Schools and Private Teachers. Post 8vo. cloth, 6*s.* 6*d.*

DR. JAMES A. HORTON, M.D.

PHYSICAL AND MEDICAL CLIMATE AND METEOROLOGY OF THE WEST COAST OF AFRICA. 8vo. cloth, 10*s.*

MR. LUKE HOWARD, F.R.S.

ESSAY ON THE MODIFICATIONS OF CLOUDS. Third Edition, by W. D. and E. HOWARD. With 6 Lithographic Plates, from Pictures by Kenyon. 4to. cloth, 10*s.* 6*d.*

DR. HAMILTON HOWE, M.D.

A THEORETICAL INQUIRY INTO THE PHYSICAL CAUSE OF EPIDEMIC DISEASES. Accompanied with Tables. 8vo. cloth, 7*s.*

DR. HUFELAND.

THE ART OF PROLONGING LIFE. Second Edition. Edited by ERASMUS WILSON, F.R.S. Foolscap 8vo., 2*s.* 6*d.*

MR. W. CURTIS HUGMAN, F.R.C.S.

ON HIP-JOINT DISEASE; with reference especially to Treatment by Mechanical Means for the Relief of Contraction and Deformity of the Affected Limb. With Plates. Re-issue, enlarged. 8vo. cloth, 3*s.* 6*d.*

MR. HULKE, F.R.C.S.

A PRACTICAL TREATISE ON THE USE OF THE OPHTHALMOSCOPE. Being the Jacksonian Prize Essay for 1859. Royal 8vo. cloth, 8*s.*

DR. HENRY HUNT.

ON HEARTBURN AND INDIGESTION. 8vo. cloth, 5*s.*

MR. G. Y. HUNTER, M.R.C.S.

BOD AND MIND: the Nervous System and its Derangements. Fcap. 8vo. cloth, 3*s.* 6*d.*

PROFESSOR HUXLEY, F.R.S.

LECTURES ON THE ELEMENTS OF COMPARATIVE ANATOMY.—ON CLASSIFICATON AND THE SKULL. With 111 Illustrations. 8vo. cloth, 10*s.* 6*d.*

MR. JONATHAN HUTCHINSON, F.R.C.S.

A CLINICAL MEMOIR ON CERTAIN DISEASES OF THE EYE AND EAR, CONSEQUENT ON INHERITED SYPHILIS; with an appended Chapter of Commentaries on the Transmission of Syphilis from Parent to Offspring, and its more remote Consequences. With Plates and Woodcuts, 8vo. cloth, 9*s*.

DR. INMAN, M.R.C.P.

I.

ON MYALGIA: ITS NATURE, CAUSES, AND TREATMENT; being a Treatise on Painful and other Affections of the Muscular System. Second Edition. 8vo. cloth, 9*s*.

II.

FOUNDATION FOR A NEW THEORY AND PRACTICE OF MEDICINE. Second Edition. Crown 8vo. cloth, 10*s*.

DR. JAGO, M.D.OXON., A.B.CANTAB.

ENTOPTICS, WITH ITS USES IN PHYSIOLOGY AND MEDICINE. With 54 Engravings. Crown 8vo. cloth, 5*s*.

MR. J. H. JAMES, F.R.C.S.

I.

PRACTICAL OBSERVATIONS ON THE OPERATIONS FOR STRANGULATED HERNIA. 8vo. cloth, 5*s*.

II.

ON THE DISTINCTIVE CHARACTERS OF EXTERNAL INFLAMMATIONS, AND ON INFLAMMATORY OR SYMPATHETIC FEVER. 8vo. cloth, 5*s*.

DR. PROSSER JAMES, M.D.

SORE-THROAT: ITS NATURE, VARIETIES, AND TREATMENT; including the Use of the LARYNGOSCOPE as an Aid to Diagnosis. Second Edition, with numerous Engravings. Post 8vo. cloth, 5*s*.

DR. JENCKEN, M.D., M.R.C.P.

THE CHOLERA: ITS ORIGIN, IDIOSYNCRACY, AND TREATMENT. Fcap. 8vo. cloth, 2*s*. 6*d*.

DR. HANDFIELD JONES, M.B., F.R.C.P.

CLINICAL OBSERVATIONS ON FUNCTIONAL NERVOUS DISORDERS. Post 8vo. cloth, 10*s*. 6*d*.

DR. H. BENCE JONES, M.D., F.R.S.

LECTURES ON SOME OF THE APPLICATIONS OF CHEMISTRY AND MECHANICS TO PATHOLOGY AND THERAPEUTICS. 8vo. cloth, 12*s*.

DR. HANDFIELD JONES, F.R.S., & DR. EDWARD H. SIEVEKING.

A MANUAL OF PATHOLOGICAL ANATOMY. Illustrated with numerous Engravings on Wood. Foolscap 8vo. cloth, 12*s*. 6*d*.

DR. JAMES JONES, M.D., M.R.C.P.

ON THE USE OF PERCHLORIDE OF IRON AND OTHER CHALYBEATE SALTS IN THE TREATMENT OF CONSUMPTION. Crown 8vo. cloth, 3*s*. 6*d*.

MR. WHARTON JONES, F.R.S.

I.

A MANUAL OF THE PRINCIPLES AND PRACTICE OF OPHTHALMIC MEDICINE AND SURGERY; with Nine Coloured Plates and 173 Wood Engravings. Third Edition, thoroughly revised. Foolscap 8vo. cloth, 12*s.* 6*d.*

II.

THE WISDOM AND BENEFICENCE OF THE ALMIGHTY, AS DISPLAYED IN THE SENSE OF VISION. Actonian Prize Essay. With Illustrations on Steel and Wood. Foolscap 8vo. cloth, 4*s.* 6*d.*

III.

DEFECTS OF SIGHT AND HEARING: their Nature, Causes, Prevention, and General Management. Second Edition, with Engravings. Fcap. 8vo. 2*s.* 6*d.*

IV.

A CATECHISM OF THE MEDICINE AND SURGERY OF THE EYE AND EAR. For the Clinical Use of Hospital Students. Fcap. 8vo. 2*s.* 6*d.*

V.

A CATECHISM OF THE PHYSIOLOGY AND PHILOSOPHY OF BODY, SENSE, AND MIND. For Use in Schools and Colleges. Fcap. 8vo., 2*s.* 6*d.*

MR. FURNEAUX JORDAN, M.R.C.S.

AN INTRODUCTION TO CLINICAL SURGERY; WITH A Method of Investigating and Reporting Surgical Cases. Fcap. 8vo. cloth, 5*s.*

MR. JUDD.

A PRACTICAL TREATISE ON URETHRITIS AND SYPHILIS: including Observations on the Power of the Menstruous Fluid, and of the Discharge from Leucorrhœa and Sores to produce Urethritis: with a variety of Examples, Experiments, Remedies, and Cures. 8vo. cloth, £1. 5*s.*

DR. LAENNEC.

A MANUAL OF AUSCULTATION AND PERCUSSION. Translated and Edited by J. B. Sharpe, M.R.C.S. 3*s.*

DR. LANE, M.A.

HYDROPATHY; OR, HYGIENIC MEDICINE. An Explanatory Essay. Second Edition. Post 8vo. cloth, 5*s.*

SIR WM. LAWRENCE, BART., F.R.S.

I.

LECTURES ON SURGERY. 8vo. cloth, 16*s.*

II.

A TREATISE ON RUPTURES. The Fifth Edition, considerably enlarged. 8vo. cloth, 16*s.*

DR. LEARED, M.R.C.P.

IMPERFECT DIGESTION: ITS CAUSES AND TREATMENT. Fourth Edition. Foolscap 8vo. cloth, 4*s.*

DR. EDWIN LEE.

I.

THE EFFECT OF CLIMATE ON TUBERCULOUS DISEASE, with Notices of the chief Foreign Places of Winter Resort. Small 8vo. cloth, 4*s.* 6*d.*

II.

THE WATERING PLACES OF ENGLAND, CONSIDERED with Reference to their Medical Topography. Fourth Edition. Fcap. 8vo. cloth, 7*s.* 6*d.*

III.

THE PRINCIPAL BATHS OF FRANCE. Fourth Edition. Fcap. 8vo. cloth, 3*s.* 6*d.*

IV.

THE BATHS OF GERMANY. Fourth Edition. Post 8vo. cloth, 7*s.*

V.

THE BATHS OF SWITZERLAND. 12mo. cloth, 3*s.* 6*d.*

VI.

HOMŒOPATHY AND HYDROPATHY IMPARTIALLY APPRECIATED. Fourth Edition. Post 8vo. cloth, 3*s.*

MR. HENRY LEE, F.R.C.S.

I.

ON SYPHILIS. Second Edition. With Coloured Plates. 8vo. cloth, 10*s.*

II.

ON DISEASES OF THE VEINS, HÆMORRHOIDAL TUMOURS, AND OTHER AFFECTIONS OF THE RECTUM. Second Edition. 8vo. cloth, 8*s.*

DR. ROBERT LEE, F.R.S.

I.

CONSULTATIONS IN MIDWIFERY. Foolscap 8vo. cloth, 4*s.* 6*d.*

II.

A TREATISE ON THE SPECULUM; with Three Hundred Cases. 8vo. cloth, 4*s.* 6*d.*

III.

CLINICAL REPORTS OF OVARIAN AND UTERINE DISEASES, with Commentaries. Foolscap 8vo. cloth, 6*s.* 6*d.*

IV.

CLINICAL MIDWIFERY: comprising the Histories of 545 Cases of Difficult, Preternatural, and Complicated Labour, with Commentaries. Second Edition. Foolscap 8vo. cloth, 5*s.*

DR. LEISHMAN, M.D., F.F.P.S.

THE MECHANISM OF PARTURITION: An Essay, Historical and Critical. With Engravings. 8vo. cloth, 5*s.*

MR. LISTON, F.R.S.

PRACTICAL SURGERY. Fourth Edition. 8vo. cloth, 22*s.*

MR. H. W. LOBB, L.S.A., M.R.C.S.E.

ON SOME OF THE MORE OBSCURE FORMS OF NERVOUS AFFECTIONS, THEIR PATHOLOGY AND TREATMENT. Re-issue, with the Chapter on Galvanism entirely Re-written. With Engravings. 8vo. cloth, 8*s.*

DR. LOGAN, M.D., M.R.C.P.LOND.

ON OBSTINATE DISEASES OF THE SKIN. Fcap. 8vo. cloth, 2*s.* 6*d.*

LONDON HOSPITAL.

CLINICAL LECTURES AND REPORTS BY THE MEDICAL AND SURGICAL STAFF. With Illustrations. Vols. I. to IV. 8vo. cloth, 7*s.* 6*d.*

LONDON MEDICAL SOCIETY OF OBSERVATION.

WHAT TO OBSERVE AT THE BED-SIDE, AND AFTER DEATH. Published by Authority. Second Edition. Foolscap 8vo. cloth, 4*s.* 6*d.*

MR. HENRY LOWNDES, M.R.C.S.

AN ESSAY ON THE AINTENANCE OF HEALTH. Fcap. 8vo. cloth, 2*s.* 6*d.*

MR. M'CLELLAND, F.L.S., F.G.S.

THE MEDICAL TOPOGRAPHY, OR CLIMATE AND SOILS, OF BENGAL AND THE N. W. PROVINCES. Post 8vo. cloth, 4*s.* 6*d.*

DR. MACLACHLAN, M.D., F.R.C.P.L.

THE DISEASES AND INFIRMITIES OF ADVANCED LIFE. 8vo. cloth, 16*s.*

DR. A. C. MACLEOD, M.R.C.P.LOND.

ACHOLIC DISEASES; comprising Jaundice, Diarrhœa, Dysentery, and Cholera. Post 8vo. cloth, 5*s.* 6*d.*

DR. GEORGE H. B. MACLEOD, F.R.C.S.E.

I.

OUTLINES OF SURGICAL DIAGNOSIS. 8vo. cloth, 12*s.* 6*d.*

II.

NOTES ON THE SURGERY OF THE CRIMEAN WAR; with REMARKS on GUN-SHOT WOUNDS. 8vo. cloth, 10*s.* 6*d.*

MR. JOSEPH MACLISE, F.R.C.S.

I.

SURGICAL ANATOMY. A Series of Dissections, illustrating the Principal Regions of the Human Body.
The Second Edition, imperial folio, cloth, £3. 12*s.*; half-morocco, £4. 4*s.*

II.

ON DISLOCATIONS AND FRACTURES. This Work is Uniform with the Author's "Surgical Anatomy;" each Fasciculus contains Four beautifully executed Lithographic Drawings. Imperial folio, cloth, £2. 10*s.*; half-morocco, £2. 17*s.*

MR. MACNAMARA.

ON DISEASES OF THE EYE; referring principally to those Affections requiring the aid of the Ophthalmoscope for their Diagnosis. With coloured plates. 8vo. cloth, 10*s.* 6*d.*

DR. McNICOLL, M.R.C.P.

A HAND-BOOK FOR SOUTHPORT, MEDICAL & GENERAL; with Copious Notices of the Natural History of the District. Second Edition. Post 8vo. cloth, 3*s.* 6*d.*

DR. MARCET, F.R.S.

I.

ON THE COMPOSITION OF FOOD, AND HOW IT IS ADULTERATED; with Practical Directions for its Analysis. 8vo. cloth, 6*s.* 6*d.*

II.

ON CHRONIC ALCOHOLIC INTOXICATION; with an INQUIRY INTO THE INFLUENCE OF THE ABUSE OF ALCOHOL AS A PREDISPOSING CAUSE OF DISEASE. Second Edition, much enlarged. Foolscap 8vo. cloth, 4*s.* 6*d.*

DR. J. MACPHERSON, M.D.

CHOLERA IN ITS HOME; with a Sketch of the Pathology and Treatment of the Disease. Crown vo. cloth, 5*s*.

DR. MARKHAM.

I.

DISEASES OF THE HEART: THEIR PATHOLOGY, DIAGNOSIS, AND TREATMENT. Second Edition. Post 8vo. cloth, 6*s*.

II.

SKODA ON AUSCULTATION AND PERCUSSION. Post 8vo. cloth, 6*s*.

III.

BLEEDING AND CHANGE IN TYPE OF DISEASES. Gulstonian Lectures for 1864. Crown 8vo. 2*s*. 6*d*.

SIR RANALD MARTIN, K.C.B., F.R.S.

INFLUENCE OF TROPICAL CLIMATES IN PRODUCING THE ACUTE ENDEMIC DISEASES OF EUROPEANS; including Practical Observations on their Chronic Sequelæ under the Influences of the Climate of Europe. Second Edition, much enlarged. 8vo. cloth, 20*s*.

MR. C. F. MAUNDER, F.R.C.S.

OPERATIVE SURGERY. With 158 Engravings. Post 8vo. 6*s*.

DR. MAYNE, M.D., LL.D.

I.

AN EXPOSITORY LEXICON OF THE TERMS, ANCIENT AND MODERN, IN MEDICAL AND GENERAL SCIENCE. 8vo. cloth, £2. 10*s*.

II.

A MEDICAL VOCABULARY; or, an Explanation of all Names, Synonymes, Terms, and Phrases used in Medicine and the relative branches of Medical Science. Second Edition. Fcap. 8vo. cloth, 8*s*. 6*d*.

DR. MERYON, M.D., F.R.C.P.

PATHOLOGICAL AND PRACTICAL RESEARCHES ON THE VARIOUS FORMS OF PARALYSIS. 8vo. cloth, 6*s*.

DR. MILLINGEN.

ON THE TREATMENT AND MANAGEMENT OF THE INSANE; with Considerations on Public and Private Lunatic Asylums. 18mo. cloth, 4*s*. 6*d*.

DR. W. J. MOORE, M.D.

I.

HEALTH IN THE TROPICS; or, Sanitary Art applied to Europeans in India. 8vo. cloth, 9*s*.

II.

A MANUAL OF THE DISEASES OF INDIA. Fcap. 8vo. cloth, 5*s*.

DR. JAMES MORRIS, M.D.LOND.

GERMINAL MATTER AND THE CONTACT THEORY: An Essay on the Morbid Poisons. Second Edition. Crown 8vo. cloth, 4*s*. 6*d*.

PROFESSOR MULDER, UTRECHT.

THE CHEMISTRY OF WINE. Edited by H. Bence Jones, M.D., F.R.S. Fcap. 8vo. cloth, 6*s*.

DR. W. MURRAY, M.D., M.R.C.P.

EMOTIONAL DISORDERS OF THE SYMPATHETIC SYSTEM OF NERVES. Crown 8vo. cloth, 3*s*. 6*d*.

DR. MUSHET, M.B., M.R.C.P.

ON APOPLEXY, AND ALLIED AFFECTIONS OF THE BRAIN. 8vo. cloth, 7*s*.

MR. NAYLER, F.R.C.S.

ON THE DISEASES OF THE SKIN. With Plates. 8vo. cloth, 10*s*. 6*d*.

DR. BIRKBECK NEVINS.

THE PRESCRIBER'S ANALYSIS OF THE BRITISH PHARMACOPEIA of 1867. 32mo. cloth, 3*s*. 6*d*.

DR. THOS. NICHOLSON, M.D.

ON YELLOW FEVER; comprising the History of that Disease as it appeared in the Island of Antigua. Fcap. 8vo. cloth, 2*s*. 6*d*.

DR. NOAD, PH.D., F.R.S.

THE INDUCTION COIL, being a Popular Explanation of the Electrical Principles on which it is constructed. Second Edition. With Engravings. Fcap. 8vo. cloth, 3*s*.

DR. NOBLE.

THE HUMAN MIND IN ITS RELATIONS WITH THE BRAIN AND NERVOUS SYSTEM. Post 8vo. cloth, 4*s*. 6*d*.

MR. NUNNELEY, F.R.C.S.E.

I.

ON THE ORGANS OF VISION: THEIR ANATOMY AND PHYSIOLOGY. With Plates, 8vo. cloth, 15*s*.

II.

A TREATISE ON THE NATURE, CAUSES, AND TREATMENT OF ERYSIPELAS. 8vo. cloth, 10*s*. 6*d*.

DR. OPPERT, M.D.

HOSPITALS, INFIRMARIES, AND DISPENSARIES; their Construction, Interior Arrangement, and Management, with Descriptions of existing Institutions. With 58 Engravings. Royal 8vo. cloth, 10*s*. 6*d*.

MR. LANGSTON PARKER.

THE MODERN TREATMENT OF SYPHILITIC DISEASES, both Primary and Secondary; comprising the Treatment of Constitutional and Confirmed Syphilis, by a safe and successful Method. Fourth Edition, 8vo. cloth, 10*s*.

DR. PARKES, F.R.S., F.R.C.P.

I.

A MANUAL OF PRACTICAL HYGIENE; intended especially for the Medical Officers of the Army. With Plates and Woodcuts. 2nd Edition, 8vo. cloth, 16*s*.

II.

THE URINE: ITS COMPOSITION IN HEALTH AND DISEASE, AND UNDER THE ACTION OF REMEDIES. 8vo. cloth, 12*s*.

DR. PARKIN, M.D., F.R.C.S.

I.

THE ANTIDOTAL TREATMENT AND PREVENTION OF THE EPIDEMIC CHOLERA. Third Edition. 8vo. cloth, 7*s.* 6*d.*

II.

THE CAUSATION AND PREVENTION OF DISEASE; with the Laws regulating the Extrication of Malaria from the Surface, and its Diffusion in the surrounding Air. 8vo. cloth, 5*s.*

MR. JAMES PART, F.R.C.S.

THE MEDICAL AND SURGICAL POCKET CASE BOOK, for the Registration of important Cases in Private Practice, and to assist the Student of Hospital Practice. Second Edition. 2*s.* 6*d.*

DR. PATTERSON, M.D.

EGYPT AND THE NILE AS A WINTER RESORT FOR PULMONARY AND OTHER INVALIDS. Fcap. 8vo. cloth, 3*s.*

DR. PAVY, M.D., F.R.S., F.R.C.P.

I.

DIABETES: RESEARCHES ON ITS NATURE AND TREATMENT. 8vo. cloth, 8*s.* 6*d.*

II.

DIGESTION: ITS DISORDERS AND THEIR TREATMENT. 8vo. cloth, 8*s.* 6*d.*

DR. PEACOCK, M.D., F.R.C.P.

I.

ON MALFORMATIONS OF THE HUMAN HEART. With Original Cases and Illustrations. Second Edition. With 8 Plates. 8vo. cloth, 10*s.*

II.

ON SOME OF THE CAUSES AND EFFECTS OF VALVULAR DISEASE OF THE HEART. With Engravings. 8vo. cloth, 5*s.*

DR. W. H. PEARSE, M.D.EDIN.

NOTES ON HEALTH IN CALCUTTA AND BRITISH EMIGRANT SHIPS, including Ventilation, Diet, and Disease. Fcap. 8vo. 2*s.*

DR. PEET, M.D., F.R.C.P.

THE PRINCIPLES AND PRACTICE OF MEDICINE; Designed chiefly for Students of Indian Medical Colleges. 8vo. cloth, 16*s.*

DR. PEREIRA, F.R.S.

SELECTA E PRÆSCRIPTIS. Fourteenth Edition. 24mo. cloth, 5*s.*

DR. PICKFORD.

HYGIENE; or, Health as Depending upon the Conditions of the Atmosphere, Food and Drinks, Motion and Rest, Sleep and Wakefulness, Secretions, Excretions, and Retentions, Mental Emotions, Clothing, Bathing, &c. Vol. I. 8vo. cloth, 9*s.*

PROFESSOR PIRRIE, F.R.S.E.

THE PRINCIPLES AND PRACTICE OF SURGERY. With numerous Engravings on Wood. Second Edition. 8vo. cloth, 24*s.*

PROFESSOR PIRRIE & DR. KEITH.

ACUPRESSURE: an excellent Method of arresting Surgical Hæmorrhage and of accelerating the healing of Wounds. With Engravings. 8vo. cloth, 5*s.*

DR. PIRRIE, M.D.

ON HAY ASTHMA, AND THE AFFECTION TERMED HAY FEVER. Fcap. 8vo. cloth, 2*s.* 6*d.*

PROFESSORS PLATTNER & MUSPRATT.

THE USE OF THE BLOWPIPE IN THE EXAMINATION OF MINERALS, ORES, AND OTHER METALLIC COMBINATIONS. Illustrated by numerous Engravings on Wood. Third Edition. 8vo. cloth, 10*s.* 6*d.*

MR. HENRY POWER, F.R.C.S., M.B.LOND.

ILLUSTRATIONS OF SOME OF THE PRINCIPAL DISEASES OF THE EYE: With an Account of their Symptoms, Pathology and Treatment. Twelve Coloured Plates. 8vo. cloth, 20*s.*

DR. HENRY F. A. PRATT, M.D., M.R.C.P.

I.

THE GENEALOGY OF CREATION, newly Translated from the Unpointed Hebrew Text of the Book of Genesis, showing the General Scientific Accuracy of the Cosmogony of Moses and the Philosophy of Creation. 8vo. cloth, 14*s.*

II.

ON ECCENTRIC AND CENTRIC FORCE: A New Theory of Projection. With Engravings. 8vo. cloth, 10*s.*

III.

ON ORBITAL MOTION: The Outlines of a System of Physical Astronomy. With Diagrams. 8vo. cloth, 7*s.* 6*d.*

IV.

ASTRONOMICAL INVESTIGATIONS. The Cosmical Relations of the Revolution of the Lunar Apsides. Oceanic Tides. With Engravings. 8vo. cloth, 5*s.*

V.

THE ORACLES OF GOD: An Attempt at a Re-interpretation. Part I. The Revealed Cosmos. 8vo. cloth, 10*s.*

THE PRESCRIBER'S PHARMACOPŒIA; containing all the Medicines in the British Pharmacopœia, arranged in Classes according to their Action, with their Composition and Doses. By a Practising Physician. Fifth Edition. 32mo. cloth, 2*s.* 6*d.*; roan rock (for the pocket), 3*s.* 6*d.*

DR. JOHN ROWLISON PRETTY.

AIDS DURING LABOUR, including the Administration of Chloroform, the Management of Placenta and Post-partum Hæmorrhage. Fcap. 8vo. cloth, 4*s.* 6*d.*

MR. P. C. PRICE, F.R.C.S.

AN ESSAY ON EXCISION OF THE KNEE-JOINT. With Coloured Plates. With Memoir of the Author and Notes by Henry Smith, F.R.C.S. Royal 8vo. cloth, 14*s.*

DR. PRIESTLEY.

LECTURES ON THE DEVELOPMENT OF THE GRAVID UTERUS. 8vo. cloth, 5*s.* 6*d.*

DR. RADCLIFFE, F.R.C.P.L.

LECTURES ON EPILEPTIC, SPASMODIC, NEURALGIC, AND PARALYTIC DISORDERS OF THE NERVOUS SYSTEM, delivered at the Royal College of Physicians in London. Post 8vo. cloth, 7*s.* 6*d.*

MR. RAINEY.

ON THE MODE OF FORMATION OF SHELLS OF ANIMALS, OF BONE, AND OF SEVERAL OTHER STRUCTURES, by a Process of Molecular Coalescence, Demonstrable in certain Artificially-formed Products. Fcap. 8vo. cloth, 4*s.* 6*d.*

DR. F. H. RAMSBOTHAM.

THE PRINCIPLES AND PRACTICE OF OBSTETRIC MEDICINE AND SURGERY. Illustrated with One Hundred and Twenty Plates on Steel and Wood; forming one thick handsome volume. Fifth Edition. 8vo. cloth, 22*s.*

DR. RAMSBOTHAM.

PRACTICAL OBSERVATIONS ON MIDWIFERY, with a Selection of Cases. Second Edition. 8vo. cloth, 12*s.*

DR. READE, M.B.T.C.D., L.R.C.S.I.

SYPHILITIC AFFECTIONS OF THE NERVOUS SYSTEM, AND A CASE OF SYMMETRICAL MUSCULAR ATROPHY; with other Contributions to the Pathology of the Spinal Marrow.

PROFESSOR REDWOOD, PH.D.

A SUPPLEMENT TO THE PHARMACOPŒIA: A concise but comprehensive Dispensatory, and Manual of Facts and Formulæ, for the use of Practitioners in Medicine and Pharmacy. Third Edition. 8vo. cloth, 22*s.*

DR. DU BOIS REYMOND.

ANIMAL ELECTRICITY; Edited by H. Bence Jones, M.D., F.R.S. With Fifty Engravings on Wood. Foolscap 8vo. cloth, 6*s.*

DR. REYNOLDS, M.D.LOND.

I.

EPILEPSY: ITS SYMPTOMS, TREATMENT, AND RELATION TO OTHER CHRONIC CONVULSIVE DISEASES. 8vo. cloth, 10*s.*

II.

THE DIAGNOSIS OF DISEASES OF THE BRAIN, SPINAL CORD, AND THEIR APPENDAGES. 8vo. cloth, 8*s.*

DR. B. W. RICHARDSON.

ON THE CAUSE OF THE COAGULATION OF THE BLOOD. Being the Astley Cooper Prize Essay for 1856. With a Practical Appendix. 8vo. cloth, 16*s.*

DR. RITCHIE, M.D.

ON OVARIAN PHYSIOLOGY AND PATHOLOGY. With Engravings. 8vo. cloth, 6*s*.

DR. WILLIAM ROBERTS, M.D., F.R.C.P.

AN ESSAY ON WASTING PALSY; being a Systematic Treatise on the Disease hitherto described as ATROPHIE MUSCULAIRE PROGRESSIVE. With Four Plates. 8vo. cloth, 5*s*.

DR. ROUTH.

INFANT FEEDING, AND ITS INFLUENCE ON LIFE; Or, the Causes and Prevention of Infant Mortality. Second Edition. Fcap. 8vo. cloth, 6*s*.

DR. W. H. ROBERTSON.

I.

THE NATURE AND TREATMENT OF GOUT. 8vo. cloth, 10*s*. 6*d*.

II.

A TREATISE ON DIET AND REGIMEN. Fourth Edition. 2 vols. 12*s*. post 8vo. cloth.

DR. ROWE.

NERVOUS DISEASES, LIVER AND STOMACH COMPLAINTS, LOW SPIRITS, INDIGESTION, GOUT, ASTHMA, AND DISORDERS PRODUCED BY TROPICAL CLIMATES. With Cases. Sixteenth Edition. Fcap. 8vo. 2*s*. 6*d*.

DR. ROYLE, F.R.S., AND DR. HEADLAND, M.D.

A MANUAL OF MATERIA MEDICA AND THERAPEUTICS. With numerous Engravings on Wood. Fourth Edition. Fcap. 8vo. cloth, 12*s*. 6*d*.

DR. RYAN, M.D.

INFANTICIDE: ITS LAW, PREVALENCE, PREVENTION, AND HISTORY. 8vo. cloth, 5*s*.

ST. BARTHOLOMEW'S HOSPITAL.

A DESCRIPTIVE CATALOGUE OF THE ANATOMICAL MUSEUM. Vol. I. (1846), Vol. II. (1851), Vol. III. (1862), 8vo. cloth, 5*s*. each.

ST. GEORGE'S HOSPITAL REPORTS. Vols. I. & II. 8vo. 7*s*. 6*d*.

MR. T. P. SALT, BIRMINGHAM.

I.

ON DEFORMITIES AND DEBILITIES OF THE LOWER EXTREMITIES, AND THE MECHANICAL TREATMENT EMPLOYED IN THE PROMOTION OF THEIR CURE. With numerous Plates. 8vo. cloth, 15*s*.

II.

ON RUPTURE: ITS CAUSES, MANAGEMENT, AND CURE, and the various Mechanical Contrivances employed for its Relief. With Engravings. Post 8vo. cloth, 3*s*.

DR. SALTER, F.R.S.

ON ASTHMA: its Pathology, Causes, Consequences, and Treatment. 8vo. cloth, 10*s*.

DR. SANKEY, M.D.LOND.

LECTURES ON MENTAL DISEASES. 8vo. cloth, 8*s*.

DR. SANSOM M.D.LOND.

I.

CHLOROFORM: ITS ACTION AND ADMINISTRATION. A Handbook. With Engravings. Crown 8vo. cloth, 5*s*.

II.

THE ARREST AND PREVENTION OF CHOLERA; being a Guide to the Antiseptic Treatment. Fcap. 8vo. cloth, 2*s*. 6*d*.

MR. SAVORY.

A COMPENDIUM OF DOMESTIC MEDICINE, AND COMPANION TO THE MEDICINE CHEST; intended as a Source of Easy Reference for Clergymen, and for Families residing at a Distance from Professional Assistance. Seventh Edition. 12mo. cloth, 5*s*.

DR. SCHACHT.

THE MICROSCOPE, AND ITS APPLICATION TO VEGETABLE ANATOMY AND PHYSIOLOGY. Edited by FREDERICK CURREY, M.A. Fcap. 8vo. cloth, 6*s*.

DR. SCORESBY-JACKSON, M.D., F.R.S.E.

MEDICAL CLIMATOLOGY; or, a Topographical and Meteorological Description of the Localities resorted to in Winter and Summer by Invalids of various classes both at Home and Abroad. With an Isothermal Chart. Post 8vo. cloth, 12*s*.

DR. SEMPLE.

ON COUGH: its Causes, Varieties, and Treatment. With some practical Remarks on the Use of the Stethoscope as an aid to Diagnosis. Post 8vo. cloth, 4*s*. 6*d*.

DR. SEYMOUR.

I.

ILLUSTRATIONS OF SOME OF THE PRINCIPAL DISEASES OF THE OVARIA: their Symptoms and Treatment; to which are prefixed Observations on the Structure and Functions of those parts in the Human Being and in Animals. On India paper. Folio, 16*s*.

II.

THE NATURE AND TREATMENT OF DROPSY; considered especially in reference to the Diseases of the Internal Organs of the Body, which most commonly produce it. 8vo. 5*s*.

DR. SHAPTER, M.D., F.R.C.P.

THE CLIMATE OF THE SOUTH OF DEVON, AND ITS INFLUENCE UPON HEALTH. Second Edition, with Maps. 8vo. cloth, 10*s*. 6*d*.

MR. SHAW, M.R.C.S.

THE MEDICAL REMEMBRANCER; OR, BOOK OF EMERGENCIES. Fifth Edition. Edited, with Additions, by JONATHAN HUTCHINSON, F.R.C.S. 32mo. cloth, 2*s*. 6*d*.

DR. SHEA, M.D., B.A.

A MANUAL OF ANIMAL PHYSIOLOGY. With an Appendix of Questions for the B.A. London and other Examinations. With Engravings. Foolscap 8vo. cloth, 5*s*. 6*d*.

DR. SHRIMPTON.

CHOLERA: ITS SEAT, NATURE, AND TREATMENT. With Engravings. 8vo. cloth, 4*s*. 6*d*.

MR. U. J. KAY-SHUTTLEWORTH.

FIRST PRINCIPLES OF MODERN CHEMISTRY: a Manual of Inorganic Chemistry. Crown 8vo. cloth, 4*s*. 6*d*.

DR. SIBSON, F.R.S.

MEDICAL ANATOMY. With coloured Plates. Imperial folio. Fasciculi I. to VI. 5*s.* each.

DR. E. H. SIEVEKING.

ON EPILEPSY AND EPILEPTIFORM SEIZURES: their Causes, Pathology, and Treatment. Second Edition. Post 8vo. cloth, 10*s.* 6*d.*

DR. SIMMS.

A WINTER IN PARIS: being a few Experiences and Observations of French Medical and Sanitary Matters. Fcap. 8vo. cloth, 4*s.*

MR. SINCLAIR AND DR JOHNSTON.

PRACTICAL MIDWIFERY: Comprising an Account of 13,748 Deliveries, which occurred in the Dublin Lying-in Hospital, during a period of Seven Years. 8vo. cloth, 10*s.*

DR. SIORDET, M.B.LOND., M.R.C.P.

MENTONE IN ITS MEDICAL ASPECT. Foolscap 8vo. cloth, 2*s.* 6*d.*

MR. ALFRED SMEE, F.R.S.

GENERAL DEBILITY AND DEFECTIVE NUTRITION; their Causes, Consequences, and Treatment. Second Edition. Fcap. 8vo. cloth, 3*s.* 6*d.*

DR. SMELLIE.

OBSTETRIC PLATES: being a Selection from the more Important and Practical Illustrations contained in the Original Work. With Anatomical and Practical Directions. 8vo. cloth, 5*s.*

MR. HENRY SMITH, F.R.C.S.

I.

ON STRICTURE OF THE URETHRA. 8vo. cloth, 7*s.* 6*d.*

II.

HÆMORRHOIDS AND PROLAPSUS OF THE RECTUM: Their Pathology and Treatment, with especial reference to the use of Nitric Acid. Third Edition. Fcap. 8vo. cloth, 3*s.*

III.

THE SURGERY OF THE RECTUM. Lettsomian Lectures. Second Edition. Fcap. 8vo. 3*s.* 6*d.*

DR. J. SMITH, M.D., F.R.C.S.EDIN.

HANDBOOK OF DENTAL ANATOMY AND SURGERY, FOR THE USE OF STUDENTS AND PRACTITIONERS. Fcap. 3vo. cloth, 3*s.* 6*d.*

DR. W. TYLER SMITH.

A MANUAL OF OBSTETRICS, THEORETICAL AND PRACTICAL. Illustrated with 186 Engravings. Fcap. 8vo. cloth, 12*s.* 6*d.*

DR. SNOW.

ON CHLOROFORM AND OTHER ANÆSTHETICS: THEIR ACTION AND ADMINISTRATION. Edited, with a Memoir of the Author, by Benjamin W. Richardson, M.D. 8vo. cloth, 10*s.* 6*d.*

MR. J. VOSE SOLOMON, F.R.C.S.

TENSION OF THE EYEBALL; GLAUCOMA: some Account of the Operations practised in the 19th Century. 8vo. cloth, 4*s.*

DR. STANHOPE TEMPLEMAN SPEER.

PATHOLOGICAL CHEMISTRY, IN ITS APPLICATION TO THE PRACTICE OF MEDICINE. Translated from the French of MM. BECQUEREL and RODIER. 8vo. cloth, reduced to 8*s*.

MR. BALMANNO SQUIRE, M.B.LOND.

I.

COLOURED PHOTOGRAPHS OF SKIN DISEASES. With Descriptive Letterpress. Series I. (12 Parts), 42*s*.; Series II. (6 Parts), 22*s*. 6*d*.; Series III. (6 Parts), 21*s*.

II.

A STUDENT'S ATLAS OF SKIN DISEASES. (A Series of Chromolithographs, with Descriptive Letterpress). With cloth portfolio, 25*s*.

MR. PETER SQUIRE.

I.

A COMPANION TO THE BRITISH PHARMACOPÆIA. Fifth Edition. 8vo. cloth, 8*s*. 6*d*.

II.

THE PHARMACOPÆIAS OF THIRTEEN OF THE LONDON HOSPITALS, arranged in Groups for easy Reference and Comparison. 18mo. cloth, 3*s*. 6*d*.

DR. STEGGALL.

STUDENTS' BOOKS FOR EXAMINATION.

I.

A MEDICAL MANUAL FOR APOTHECARIES' HALL AND OTHER MEDICAL BOARDS. Twelfth Edition. 12mo. cloth, 10*s*.

II.

A MANUAL FOR THE COLLEGE OF SURGEONS; intended for the Use of Candidates for Examination and Practitioners. Second Edition. 12mo. cloth, 10*s*.

III.

GREGORY'S CONSPECTUS MEDICINÆ THEORETICÆ. The First Part, containing the Original Text, with an Ordo Verborum, and Literal Translation. 12mo. cloth, 10*s*.

IV.

THE FIRST FOUR BOOKS OF CELSUS; containing the Text, Ordo Verborum, and Translation. Second Edition. 12mo. cloth, 8*s*.

V.

FIRST LINES FOR CHEMISTS AND DRUGGISTS PREPARING FOR EXAMINATION AT THE PHARMACEUTICAL SOCIETY. Second Edition. 18mo. cloth, 3*s*. 6*d*.

MR. STOWE, M.R.C.S.

A TOXICOLOGICAL CHART, exhibiting at one view the Symptoms, Treatment, and Mode of Detecting the various Poisons, Mineral, Vegetable, and Animal. To which are added, concise Directions for the Treatment of Suspended Animation. Twelfth Edition, revised. On Sheet, 2*s*.; mounted on Roller, 5*s*.

MR. FRANCIS SUTTON, F.C.S.

A SYSTEMATIC HANDBOOK OF VOLUMETRIC ANALYSIS; or, the Quantitative Estimation of Chemical Substances by Measure. With Engravings. Post 8vo. cloth, 7*s*. 6*d*.

DR. SWAYNE.

OBSTETRIC APHORISMS FOR THE USE OF STUDENTS COMMENCING MIDWIFERY PRACTICE. With Engravings on Wood. Fourth Edition. Fcap. 8vo. cloth, 3*s*. 6*d*.

MR. TAMPLIN, F.R.C.S.E.

LATERAL CURVATURE OF THE SPINE: its Causes, Nature, and Treatment. 8vo. cloth, 4*s*.

SIR ALEXANDER TAYLOR, M.D., F.R.S.E.

THE CLIMATE OF PAU; with a Description of the Watering Places of the Pyrenees, and of the Virtues of their respective Mineral Sources in Disease. Third Edition. Post 8vo. cloth, 7*s*.

DR. ALFRED S. TAYLOR, F.R.S.

I.

THE PRINCIPLES AND PRACTICE OF MEDICAL JURISPRUDENCE. With 176 Wood Engravings. 8vo. cloth, 28*s*.

II.

A MANUAL OF MEDICAL JURISPRUDENCE. Eighth Edition. With Engravings. Fcap. 8vo. cloth, 12*s*. 6*d*.

III.

ON POISONS, in relation to MEDICAL JURISPRUDENCE AND MEDICINE. Second Edition. Fcap. 8vo. cloth, 12*s*. 6*d*.

MR. TEALE.

ON AMPUTATION BY A LONG AND A SHORT RECTANGULAR FLAP. With Engravings on Wood. 8vo. cloth, 5*s*.

DR. THEOPHILUS THOMPSON, F.R.S.

CLINICAL LECTURES ON PULMONARY CONSUMPTION; with additional Chapters by E. Symes Thompson, M.D. With Plates. 8vo. cloth, 7*s*. 6*d*.

DR. THOMAS.

THE MODERN PRACTICE OF PHYSIC; exhibiting the Symptoms, Causes, Morbid Appearances, and Treatment of the Diseases of all Climates. Eleventh Edition. Revised by Algernon Frampton, M.D. 2 vols. 8vo. cloth, 28*s*.

SIR HENRY THOMPSON, F.R.C.S.

I.

STRICTURE OF THE URETHRA; its Pathology and Treatment. The Jacksonian Prize Essay for 1852. With Plates. Second Edition. 8vo. cloth, 10*s*.

II.

THE DISEASES OF THE PROSTATE; their Pathology and Treatment. Comprising a Dissertation "On the Healthy and Morbid Anatomy of the Prostate Gland;" being the Jacksonian Prize Essay for 1860. With Plates. Second Edition. 8vo. cloth, 10*s*.

III.

PRACTICAL LITHOTOMY AND LITHOTRITY; or, An Inquiry into the best Modes of removing Stone from the Bladder. With numerous Engravings, 8vo. cloth, 9*s*.

DR. THUDICHUM.

I.

A TREATISE ON THE PATHOLOGY OF THE URINE, Including a complete Guide to its Analysis. With Plates, 8vo. cloth, 14*s*.

II.

A TREATISE ON GALL STONES: their Chemistry, Pathology, and Treatment. With Coloured Plates. 8vo. cloth, 10*s*.

DR. TILT.

I.

ON UTERINE AND OVARIAN INFLAMMATION, AND ON THE PHYSIOLOGY AND DISEASES OF MENSTRUATION. Third Edition. 8vo. cloth, 12*s*.

II.

A HANDBOOK OF UTERINE THERAPEUTICS, AND OF MODERN PATHOLOGY OF DISEASES OF WOMEN. Second Edition. Post 8vo. cloth, 6*s*.

III.

THE CHANGE OF LIFE IN HEALTH AND DISEASE: a Practical Treatise on the Nervous and other Affections incidental to Women at the Decline of Life. Second Edition. 8vo. cloth, 6*s*.

DR. GODWIN TIMMS.

CONSUMPTION: its True Nature and Successful Treatment. Re-issue, enlarged. Crown 8vo. cloth, 10*s*.

DR. ROBERT B. TODD, F.R.S.

I.

CLINICAL LECTURES ON THE PRACTICE OF MEDICINE. *New Edition, in one Volume, Edited by* Dr. Beale, *8vo. cloth*, 18*s*.

II.

ON CERTAIN DISEASES OF THE URINARY ORGANS, AND ON DROPSIES. Fcap. 8vo. cloth, 6*s*.

MR. TOMES, F.R.S.

A MANUAL OF DENTAL SURGERY. With 208 Engravings on Wood. Fcap. 8vo. cloth, 12*s*. 6*d*.

DR. TUNSTALL, M.D., M.R.C.P.

THE BATH WATERS: their Uses and Effects in the Cure and Relief of various Chronic Diseases. Fourth Edition, revised. Crown 8vo. cloth, 2*s*.

DR. TURNBULL.

I.

AN INQUIRY INTO THE CURABILITY OF CONSUMPTION, ITS PREVENTION, AND THE PROGRESS OF IMPROVEMENT IN THE TREATMENT. Third Edition. 8vo. cloth, 6*s*.

II.

A PRACTICAL TREATISE ON DISORDERS OF THE STOMACH with FERMENTATION; and on the Causes and Treatment of Indigestion, &c. 8vo. cloth, 6*s*.

DR. TWEEDIE, F.R.S.

CONTINUED FEVERS: THEIR DISTINCTIVE CHARACTERS, PATHOLOGY, AND TREATMENT. With Coloured Plates. 8vo. cloth, 12*s*.

VESTIGES OF THE NATURAL HISTORY OF CREATION. Eleventh Edition. Illustrated with 106 Engravings on Wood. 8vo. cloth, 7*s*. 6*d*.

DR. UNDERWOOD.

TREATISE ON THE DISEASES OF CHILDREN. Tenth Edition, with Additions and Corrections by HENRY DAVIES, M.D. 8vo. cloth, 15*s.*

DR. UNGER.

BOTANICAL LETTERS. Translated by Dr. B. PAUL. Numerous Woodcuts. Post 8vo., 2*s.* 6*d.*

MR. WADE, F.R.C.S.

STRICTURE OF THE URETHRA, ITS COMPLICATIONS AND EFFECTS; a Practical Treatise on the Nature and Treatment of those Affections. Fourth Edition. 8vo. cloth, 7*s.* 6*d.*

DR. WALKER, M.B.LOND.

ON DIPHTHERIA AND DIPHTHERITIC DISEASES. Fcap. 8vo. cloth, 3*s.*

DR. WALLER.

ELEMENTS OF PRACTICAL MIDWIFERY; or, Companion to the Lying-in Room. Fourth Edition, with Plates. Fcap. cloth, 4*s.* 6*d.*

MR. HAYNES WALTON, F.R.C.S.

SURGICAL DISEASES OF THE EYE. With Engravings on Wood. Second Edition. 8vo. cloth, 14*s.*

DR. WARING, M.D., M.R.C.P.LOND.

I.

A MANUAL OF PRACTICAL THERAPEUTICS. Second Edition, Revised and Enlarged. Fcap. 8vo. cloth, 12*s.* 6*d.*

II.

THE TROPICAL RESIDENT AT HOME. Letters addressed to Europeans returning from India and the Colonies on Subjects connected with their Health and General Welfare. Crown 8vo. cloth, 5*s.*

DR. WATERS, M.R.C.P.

I.

THE ANATOMY OF THE HUMAN LUNG. The Prize Essay to which the Fothergillian Gold Medal was awarded by the Medical Society of London. Post 8vo. cloth, 6*s.* 6*d.*

II.

RESEARCHES ON THE NATURE, PATHOLOGY, AND TREATMENT OF EMPHYSEMA OF THE LUNGS, AND ITS RELATIONS WITH OTHER DISEASES OF THE CHEST. With Engravings. 8vo. cloth, 5*s.*

DR. ALLAN WEBB, F.R.C.S.L.

THE SURGEON'S READY RULES FOR OPERATIONS IN SURGERY. Royal 8vo. cloth, 10*s.* 6*d.*

DR. WEBER.

A CLINICAL HAND-BOOK OF AUSCULTATION AND PERCUSSION. Translated by JOHN COCKLE, M.D. *5s.*

MR. SOELBERG WELLS, M.D., M.R.C.S.

ON LONG, SHORT, AND WEAK SIGHT, and their Treatment by the Scientific Use of Spectacles. Second Edition. With Plates. 8vo. cloth, *6s.*

MR. T. SPENCER WELLS, F.R.C.S.

I.

DISEASES OF THE OVARIES: THEIR DIAGNOSIS AND TREATMENT. Vol. I. 8vo. cloth, *9s.*

II.

SCALE OF MEDICINES WITH WHICH MERCHANT VESSELS ARE TO BE FURNISHED, by command of the Privy Council for Trade; With Observations on the Means of Preserving the Health of Seamen, &c. &c. Seventh Thousand. Fcap. 8vo. cloth, *3s. 6d.*

DR. WEST.

LECTURES ON THE DISEASES OF WOMEN. Third Edition. 8vo. cloth, *16s.*

DR. UVEDALE WEST.

ILLUSTRATIONS OF PUERPERAL DISEASES. Second Edition, enlarged. Post 8vo. cloth, *5s.*

MR. WHEELER.

HAND-BOOK OF ANATOMY FOR STUDENTS OF THE FINE ARTS. With Engravings on Wood. Fcap. 8vo., *2s. 6d.*

DR. WHITEHEAD, F.R.C.S.

ON THE TRANSMISSION FROM PARENT TO OFFSPRING OF SOME FORMS OF DISEASE, AND OF MORBID TAINTS AND TENDENCIES. Second Edition. 8vo. cloth, *10s. 6d.*

DR. WILLIAMS, F.R.S.

PRINCIPLES OF MEDICINE: An Elementary View of the Causes, Nature, Treatment, Diagnosis, and Prognosis, of Disease. With brief Remarks on Hygienics, or the Preservation of Health. The Third Edition. 8vo. cloth, *15s.*

DR. CHARLES T. WILLIAMS, M.B.OXON.

THE CLIMATE OF THE SOUTH OF FRANCE, AND ITS VARIETIES, MOST SUITABLE FOR INVALIDS; with Remarks on Italian and other Winter Stations. Crown 8vo. cloth, *3s. 6d.*

THE WIFE'S DOMAIN: the YOUNG COUPLE—the MOTHER—the NURSE—the NURSLING. Post 8vo. cloth, *3s. 6d.*

DR. J. HUME WILLIAMS.

UNSOUNDNESS OF MIND, IN ITS MEDICAL AND LEGAL CONSIDERATIONS. 8vo. cloth, *7s. 6d.*

MR. ERASMUS WILSON, F.R.S.

I.

THE ANATOMIST'S VADE-MECUM: A SYSTEM OF HUMAN ANATOMY. With numerous Illustrations on Wood. Eighth Edition. Foolscap 8vo. cloth, 12*s.* 6*d.*

II.

ON DISEASES OF THE SKIN: A SYSTEM OF CUTANEOUS MEDICINE. Sixth Edition. 8vo. cloth, 18*s.*

THE SAME WORK; illustrated with finely executed Engravings on Steel, accurately coloured. 8vo. cloth, 36*s.*

III.

HEALTHY SKIN: A Treatise on the Management of the Skin and Hair in relation to Health. Seventh Edition. Foolscap 8vo. 2*s.* 6*d.*

IV.

PORTRAITS OF DISEASES OF THE SKIN. Folio. Fasciculi I. to XII., completing the Work. 20*s.* each. The Entire Work, half morocco, £13.

V.

THE STUDENT'S BOOK OF CUTANEOUS MEDICINE AND DISEASES OF THE SKIN. Post 8vo. cloth, 8*s.* 6*d.*

VI.

ON SYPHILIS, CONSTITUTIONAL AND HEREDITARY; AND ON SYPHILITIC ERUPTIONS. With Four Coloured Plates. 8vo. cloth, 16*s.*

VII.

A THREE WEEKS' SCAMPER THROUGH THE SPAS OF GERMANY AND BELGIUM, with an Appendix on the Nature and Uses of Mineral Waters. Post 8vo. cloth, 6*s.* 6*d.*

VIII.

THE EASTERN OR TURKISH BATH: its History, Revival in Britain, and Application to the Purposes of Health. Foolscap 8vo., 2*s.*

DR. G. C. WITTSTEIN.

PRACTICAL PHARMACEUTICAL CHEMISTRY: An Explanation of Chemical and Pharmaceutical Processes, with the Methods of Testing the Purity of the Preparations, deduced from Original Experiments. Translated from the Second German Edition, by STEPHEN DARBY. 18mo. cloth, 6*s.*

DR. HENRY G. WRIGHT.

I.

UTERINE DISORDERS: their Constitutional Influence and Treatment. 8vo. cloth, 7*s.* 6*d.*

II.

HEADACHES; their Causes and their Cure. Fourth Edition. Fcap. 8vo. 2*s.* 6*d.*

DR. YEARSLEY, M.D., M.R.C.S.

I.

DEAFNESS PRACTICALLY ILLUSTRATED; being an Exposition as to the Causes and Treatment of Diseases of the Ear. Sixth Edition. 8vo. cloth, 6*s.*

II.

ON THROAT AILMENTS, MORE ESPECIALLY IN THE ENLARGED TONSIL AND ELONGATED UVULA. Eighth Edition. 8vo. cloth, 5*s.*

CHURCHILL'S SERIES OF MANUALS.

Fcap. 8vo. cloth, 12*s.* 6*d.* each.

"We here give Mr. Churchill public thanks for the positive benefit conferred on the Medical Profession, by the series of beautiful and cheap Manuals which bear his imprint."—*British and Foreign Medical Review.*

AGGREGATE SALE, 150,000 COPIES.

ANATOMY. With numerous Engravings. Eighth Edition. By Erasmus Wilson, F.R.C.S., F.R.S.

BOTANY. With numerous Engravings. By Robert Bentley, F.L.S., Professor of Botany, King's College. and to the Pharmaceutical Society.

CHEMISTRY. With numerous Engravings. Ninth Edition. By George Fownes, F.R.S., H. Bence Jones, M.D., F.R.S., and A. W. Hofmann, F.R.S.

DENTAL SURGERY. With numerous Engravings. By John Tomes, F.R.S.

MATERIA MEDICA. With numerous Engravings. Fourth Edition. By J. Forbes Royle, M.D., F.R.S., and Frederick W. Headland, M.D., F.L.S.

MEDICAL JURISPRUDENCE. With numerous Engravings. Eighth Edition. By Alfred Swaine Taylor, M.D., F.R.S.

PRACTICE OF MEDICINE. Second Edition. By G. Hilaro Barlow, M.D., M.A.

The **MICROSCOPE** and its **REVELATIONS.** With numerous Plates and Engravings. Third Edition. By W. B. Carpenter, M.D., F.R.S.

NATURAL PHILOSOPHY. With numerous Engravings. Sixth Edition. By Charles Brooke, M.B., M.A., F.R.S. *Based on the Work of the late Dr. Golding Bird.*

OBSTETRICS. With numerous Engravings. By W. Tyler Smith, M.D., F.R.C.P.

OPHTHALMIC MEDICINE and SURGERY. With coloured Plates and Engravings on Wood. Third Edition. By T. Wharton Jones, F.R.C.S., F.R.S.

PATHOLOGICAL ANATOMY. With numerous Engravings. By C. Handfield Jones, M.B., F.R.S., and E. H. Sieveking, M.D., F.R.C.P.

PHYSIOLOGY. With numerous Engravings. Fourth Edition. By William B. Carpenter, M.D., F.R.S.

POISONS. Second Edition. By Alfred Swaine Taylor, M.D., F.R.S.

PRACTICAL ANATOMY. With numerous Engravings. (10*s.* 6*d.*) By Christopher Heath, F.R.C.S.

PRACTICAL SURGERY. With numerous Engravings. Fourth Edition. By Sir William Fergusson, Bart., F.R.C.S., F.R.S.

THERAPEUTICS. Second Edition. By E. J. Waring, M.D., M.R.C.P.

Printed by W. Blanchard & Sons, 62, Millbank Street, Westminster.