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LITHOTOMY
AND
LITHOTRITY.

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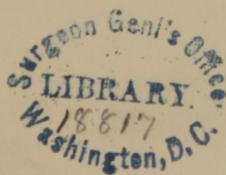
LITHOTOMY AND LITHOTRITY.

ILLUSTRATED BY CASES IN THE PRACTICE

OF

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LITHOTOMY AND LITHOTRITY.

Lithotomy and lithotripsy are the two principal methods of treatment upon which surgeons rely for the removal of calculus from the urinary bladder. Other methods have only a special and very limited application, and are scarcely taken into account in deciding the question of the choice of methods. Lithotomy boasts a venerable history, running far back to the early records of surgical science. In the course of its development a variety of operative methods have been devised, for each of which special advantages are claimed. Lithotripsy, on the other hand, can make no pretensions to antiquity; fifty years have not yet elapsed since it first asserted its claim to be ranked among the acknowledged resources of surgical art.

In the infancy of the operation the aim was first to diminish the resistance of the calculus by perforating its substance in different directions, and afterward to apply a crushing force. Straight instruments alone could be employed for this purpose, and, hence, considerable difficulty was encountered in their introduction into the bladder. These instruments, moreover, were complicated in their construction, and required a varied manipulation; hence they were the frequent occasion of injury to the bladder, and of accidents which soon led to the abandonment of the perforating part of the process, and the substitution of the crushing process alone. The instruments for this latter purpose being curved, and resembling more nearly in form the catheters and sounds in common use, can be more easily inserted into the bladder and manipulated with greater safety within its cavity. In the course of time these instruments have been perfected in their construction, and experience has taught us how to discriminate with greater accuracy the cases where this method is applicable, so that lithotripsy may be considered as having now won an honorable rank among the resources of surgery, and to have fully verified, after a test of more than forty years' experience, the report of a commission of the Academy of Medicine in Paris, made on the 22d March, 1824, which is as follows: "Desirous

of avoiding on the one hand the enthusiasm which exaggerates every thing, and on the other that prejudice which seeks to depreciate every thing, we consider the new method proposed by Dr Civiale, for destroying stone in the bladder without the use of lithotomy, as alike creditable to French surgery, honorable to the author, and consolatory to humanity; that, notwithstanding its insufficiency in some particular cases, and the difficulty of its application in others, it cannot fail to establish an epoch in the healing art, and to be regarded as one of its most ingenious and salutary resources." *

Lithotomy and lithotrixy are not to be regarded as rival methods, one of which is destined to supersede the other, but they are rather to be viewed as supplementing each other, each having its special application to particular conditions which should be carefully discriminated. Lithotomy may indeed claim to have a more universal application than lithotrixy, and we can scarcely say, under any circumstances, that it is not admissible in some one of its various methods of application. In early life it has met with such successful results that no need is felt of a substitute, especially as we now possess the immense advantage of anæsthesia. The immediate and entire removal of the foreign contents of the bladder effected by lithotomy, and the condition of repose consequent thereupon, promoted as it is by the subsequent drainage of the urinary secretion, are conditions of incalculable advantage which lithotrixy cannot claim to possess. On the other hand, lithotrixy, divested as it is of the terrors of a bloody operation, is available at the earliest period of the existence of a calculus, when the employment of it is almost entirely unattended with danger. By the aid of the lithotrite, moreover, we are sometimes able to obtain proof of the existence of a calculus in the bladder, when the use of the sound in the ordinary method of exploration would fail to reveal the fact. Patients afflicted with stone are rarely willing, in the early stage of its existence, to undergo the operation of lithotomy, nor do they finally consent to the operation until, after long delay, they have exhausted all the vaunted remedies that promise a cure. Let it become universally known that there is another resource for their relief besides a cutting operation, and sufferers will be disposed to avail themselves of it, and thereby avoid the acknowledged dangers of the knife.

* *La Lithotritie et la Taille.* Paris, 1870, *Introd.*, p. 6.

Though the author's experience does not embrace a very large number of cases, he believes that the variety he has encountered affords many instructive, practical lessons, and possesses sufficient interest to warrant him in asking the attention of the profession to his communication. In the classification of his cases he has aimed to group them in such a manner as to illustrate certain practical questions relating to the choice and application of the two methods of treatment.

GROUP I.

Comprises cases in which the moderate size of the calculus, and a favorable condition of the urethra and bladder, as also of the general system, indicated lithotripsy as preferable to lithotomy.

Case I.—Capt. L., aged 64. Patient first became aware of the presence of a stone in his bladder from sudden inability to urinate, caused by the stone getting engaged at the neck of the bladder and obstructing the outlet. About five years previously he had voided, per urethram, a calculus of the size of a pea, but had remained entirely exempt from bladder symptoms subsequently. In March, 1853, six operations, occupying a period of one month, sufficed to complete a cure, unattended with any complications in the progress of the treatment.

Wt. 30 grains; composition, uric acid.

Case II.—Mekin, aged 26; resident of New York city; patient at the New York Hospital in October, 1846; symptoms of two years' duration; all conditions favorable for lithotripsy are present; entire relief, after two operations performed, within the space of six weeks. Two rigors occurred during treatment.

Wt. 25 grains; composition, phosphate of lime and ammoniaco-magnesian phosphate.

Case III.—Mr. T. C. T., aged 55, resident of New York city, had for years a very narrow stricture at the membranous portion of the urethra, which was recently cured by progressive gradual dilatation with bougies. Patient continuing after the cure of his stricture to suffer from bladder trouble, the existence of a stone was suspected, but could not be verified by the use of an ordinary steel sound. On one occasion, after a fruitless sounding, patient noticed, for the first time, a gravelly deposit in his urine, which, on close inspection, was found to consist of scaly particles like pieces of egg-shell. Though no contact had been perceptible, it was inferred from this sediment

that a calculus had been encountered by the sound, and its surface abraded. Patient now consented to the use of the lithotrite. The instrument having been introduced, a small calculus was promptly seized and crushed. Three operations, during the space of three weeks, completed the cure. A single rigor occurred during the treatment.

Wt. 12 grains ; composition, small nucleus of oxalate of lime, with an incrustation of phosphate of lime and triple phosphate.

Case IV.—Mr. J. N. P., aged 43, of New York city, had suffered from bladder symptoms for several years, and had, on several occasions, passed small concretions.

First operation, Dec. 1854.—It was not until after the third attempt that the calculus was at last seized and crushed. Eleven operations, during a period of six weeks, were required to rid the bladder of its foreign contents. The operations being performed at evening, patient lost but a single day from his business during the whole treatment. The largest grasp measured one inch and a quarter. The stone was not hard.

Wt. 130 grains ; composition, small nucleus of oxalate of lime, with an incrustation of phosphate of lime and triple phosphate.

First relapse.—In 1863, nine years later, patient had a return of his old symptoms. Two operations sufficed to relieve him.

Wt. 20 grains ; composition, urate of ammonia.

In 1864, a *second relapse* was cured by three operations.

Wt. 15 grains ; composition, mixture of carbonate and phosphate of lime.

In 1865 and 1866, a *third relapse* required five operations.

Wt. 71 grains ; composition, phosphate of lime and ammoniaco-magnesian phosphates.

Fourth relapse, in 1868, 1869, and Jan., 1870. Return of old symptoms ; no stone, however, could be felt with the lithotrite.

Feb. 27. Repeated the exploration and made two seizures, one of which measured two-thirds of an inch.

March 14. Attempted an exploration but could not pass the neck of the bladder with the lithotrite, owing, probably, to spasmodic contraction.

24. Entered the bladder and explored but made no seizure ; patient's symptoms, however, clearly indicate the presence of a calculus.

April 10. Made two seizures of one-quarter and three-quarters of an inch grasp and brought away detritus.

19. Entered the bladder three separate times, and each time made a seizure and brought away a large charge of detritus.

25. Made four seizures and brought away as many charges of detritus in the jaws of the instrument.

May 7. Though patient is much relieved and is less disturbed at night, he has still some remaining symptoms of calculus. As he experienced considerable irritation after the repeated introduction of the instrument on the occasion of the last operation, I made but one introduction this time, and effected three seizures of small diameter.

June 12. Three seizures of small grasp and soft consistency.

June 30. No result ; patient's condition is much improved.

Wt. 130 grains ; composition, nucleus of uric acid surrounded by a thick investment of mixed phosphates.

Case V.—J. P. B., aged 68, resident of Columbia county, N. Y., had for a long time suffered from bladder trouble, and had passed several calculi per urethram. Two of these which were shown to me were of the size of a flattened cherry pit, with smooth, polished surfaces.

On Jan. 26 and 29, and on Feb. 1, 1855, three successful operations were performed ; the largest grasp measuring three-quarters of an inch. May 11 and June 23, two operations. On June 18, 1856, and July 9, 17 and 25, and August 1, there were five operations with good results. On August 8 and November 18, two thorough explorations were made with the lithotrite, but nothing was found. In 1858, May 17 and 20, June 3 and 10, July 5, five successful operations. No grasp exceeded half an inch. August 27, October 8 and November 25 of the same year, three fruitless searches were made ; the last occasioned a good deal of nervous disturbance, followed by prostration of strength.

Nov. 24, 1860. Since the last operation patient has suspected the presence of a remaining fragment. On inserting the lithotrite four seizures were promptly made, the largest grasp measuring one-half of an inch.

April 16, 1861. The twenty-second and last operation was performed at his home in the country, and two or three seizures were made. A few weeks later patient died suddenly of apoplexy.

Wt. 3 drachms ; composition, nucleus of uric acid, incrustated with, 1st, urate of ammonia ; 2d, triple phosphate.

Case VI.—Dr. A. B., aged 40, a practitioner on Long Island. In Nov., 1856, after a severe attack of nephritic colic, in which a calculus descended from the kidney to the bladder, patient

began to suffer with bladder symptoms of such severity that he was anxious to be relieved by an operation. Thinking he might still expel the stone in urinating, I advised him to wait. At the end of two weeks the doctor returned, still suffering, and urgent for an operation.

The lithotrite was introduced and a small calculus soon seized and crushed, and the most of it brought away in the jaws of the lithotrite. Two subsequent explorative operations completed the treatment. Patient, up to the present date (1870), enjoys exemption from any return of calculus.

Wt. 2 grains; composition, animal matter and phosphate of lime.

Case VII.—Dr. J. M., aged 49, a practitioner of New York city. Patient had for many years been a great sufferer from renal calculi, several of which had been discharged at varying intervals of time through an existing fistulous track which opens externally in the left lumbar region. On different occasions calculi had also descended along the ureter into the bladder, and had been expelled soon after per urethram.

In 1856, about four months prior to the doctor's first application to me, a calculus had again descended into the bladder and had remained there since, causing him much suffering. He had been sounded by a surgeon in his neighborhood, but, nothing having been felt, it was concluded that his symptoms depended on some other cause.

I repeated myself the exploration with an ordinary steel sound, but could not feel any thing. The antecedent history, however, and his present symptoms, so clearly pointed to the presence of a stone that I urged the doctor to permit an examination with a lithotrite. He consented, and I promptly seized the calculus and crushed it two or three times, bringing away a charge of debris in the jaws of the instrument. Three operations relieved the bladder entirely.

Relapses. In 1857, another calculus descended from the kidney and was followed by the same symptoms as described above. Seven operations were required to relieve the bladder.

In 1858, the same trouble recurred, and was this time relieved by a single operation.

In 1859, a fourth relapse required five operations for the relief of the bladder. These operations in every instance being performed in the evening, the doctor scarcely lost a day from his ordinary business. He survived till January 13, 1863, and,

as his son writes me, had no return of symptoms of calculus in the bladder.

Case VIII. — Mr. J. F. E., aged 62. Previous symptoms of eighteen months' duration.

In June, 1860, the lithotrite was used six times within four weeks, the largest grasp measuring one inch. These operations were followed by apparently complete relief. In six months, however, the bladder symptoms having returned with progressively increasing severity, lithotrity was again resorted to, and the operation repeated three times with good effect.

Wt. 45 grains; composition, nucleus of uric acid with incrustation of mixed phosphates.

Relapse. In March, 1864, three years later, patient again applied for relief, having suffered from bladder symptoms for several months previously. Three operations within one week (the largest grasp measuring five-eighths of an inch) sufficed to complete the cure.

Wt. 90 grains; composition, uric acid nucleus, incrustation of phosphate of lime and triple phosphate.

Case IX. — Mr. H. V., aged 65, a farmer, resident of Columbia county, N. Y. He has had symptoms of stone three years. The condition of the bladder as well as his general health seemed favorable for the operation of lithotrity. Operations were performed on the 13th, 15th and 19th of September, 1860, and 4th and 8th of October. The largest grasp did not exceed three-fourths of an inch; the discharge of debris was satisfactory. The manipulation of the lithotrite during the seizure and crushing of the fragments caused the patient more than usual pain. It subsided soon after the operation, however, and the bladder did not evince any increased irritability. Patient being anxious to look after his affairs at home, no further attempts were made until January 26, 1861, when he returned to the city and a sixth operation was performed. Although the stone was seized and crushed without any difficulty, the patient complained of severe suffering after the operation. He was unwilling to submit to any further repetitions, and passed out of my notice.

Wt. 12 grains; composition, nucleus of uric acid with incrustation of mixed phosphates.

Case X. — Mr. H., aged 71, resident in New York city, had suffered from bladder symptoms two years. In August, 1860, he became a patient of the late Prof. Alban Goldsmith, who performed lithotrity on him about thirty times in the space of eight weeks. On the 20th of October he returned home

entirely cured, as he supposed, of his trouble. In February, 1861, the symptoms recurred rather suddenly, and have persisted since, with varying severity, until my first operation, April 10th, 1861. Between this date and June 22d, eight operations were performed, five of which, however, failed to accomplish any seizure, owing to the extreme irritability of the bladder. On the 1st of July Mr. H. was free from bladder symptoms, and much improved in general health.

Wt. 9 grains ; composition, phosphate of lime and ammoniaco-magnesian phosphates.

Case XI. — Dr. J. McC., aged 74, a practitioner of medicine in Oneida county, N. Y., had suffered about two years with symptoms of urinary calculus. He had never had an attack of nephritic colic, though he had several times passed concretions of small globular form, varying in size from a pin's head to a small pea, and resembling the concretions which are met with in the ducts of the prostate gland. In this case the nucleus of the existing stone was probably a prostatic concretion. All the conditions of this case concurred to make it favorable for lithotripsy. Between the 11th and 26th June, 1861, six operations were performed. They were accompanied by a single rigor. On the 2d July, Dr. McC. returned home, free from symptoms of stone in the bladder, and highly gratified by the result of his case.

Wt. 70 grains ; composition, uric acid.

Case XII. — Mr. C., aged 45, a resident of Peekskill, had had symptoms of stone for one year. Two explorations of the bladder with an ordinary steel sound failed to detect the presence of the stone. At the first operation with the lithotrite, in November, 1861, three or four seizures were promptly made, the largest grasp being three-quarters of an inch. The second operation was fruitless. The third effected two seizures of small grasp. The fourth and fifth were explorative, and ascertained that nothing remained in the bladder. The treatment occupied from the 22d November to the 16th December, when the patient returned home cured.

Wt. 15 grains ; composition, a little oxalate of lime, with mixed phosphates.

Case XIII. — Arthur Bell, aged 63, a patient in the New York Hospital, had symptoms of stone for several years, also suffering from a prolapsus ani, forming a tomato-shaped tumor, which is in a sloughy condition from constriction of the sphincter ani. Under appropriate treatment the parts regained a healthy con-

dition, and the prolapsus shrank back within the sphincter. Between the 23d February and 9th March, 1863, five operations were performed, and three to seven seizures promptly made at each; the largest grasp measured one inch. On the 31st March, patient being free from bladder symptoms, he was transferred to Bellevue Hospital, on account of his demented condition.

Wt. 70 grains; composition, uric acid, nucleus invested by urates.

Case XIV.—Hotmer, aged 55, a resident of New York city, had suffered many years from bladder symptoms. Between August 28 and January 5, 1864, a period of over four months, twenty-two operations were performed. So slight was the disturbance following the operation in his case, that in seven instances the patient stopped at my office in the evening after his day's work, and after submitting to an operation continued on his way homeward. In this case the bladder was rid of the calculus to a great degree by the use of the urethral lithoclast. This instrument was on several occasions introduced into the urethra, and large fragments were brought away, which had become impacted at the neck of the bladder. The ample dimensions of the prostatic portion of the urethra facilitated the manipulation.

Four months after the last operation, during which interval of time he was exempt from all bladder symptoms, patient had an acute attack of nephritis from exposure to cold and died. The pelvis of one of the kidneys was found to be filled with a dendritic calculus of phosphatic formation. Both pelves and ureters were filled with pus.

Wt. 290 grains; composition, phosphate of lime and ammoniaco-magnesian phosphate.

Case XV. — J. Flagler, aged 52, a patient at St. Luke's Hospital, had symptoms of stone for one year.

Between Jan. 20th and Feb. 29th, 1864, eight operations, the last explorative; the largest grasp measured scarcely one inch. Slight rigors occurred twice. March 1st, discharged cured.

Wt. 35 grains; composition, uric acid, incrustated with mixed phosphates.

Case XVI. — J. W. C., aged 45, a (deaf-mute) patient at St. Luke's Hospital, had symptoms of stone in the bladder for six or eight months.

Between June 17th, and July 6th, 1864, four operations, the largest grasp measuring nearly one inch. One rigor occurred. A large sized fragment arrested in the fossa navicularis urethræ

required to be dislodged and extracted by the aid of forceps. Discharged cured, on 14th July.

Wt. 90 grains; composition, phosphate of lime and triple phosphates.

Case XVII.—Mr. C. B., aged 45, a resident of New York city. The history of this case, owing to the scantiness of my notes, is very incomplete. The symptoms were of recent date and the calculus consequently of small size. His excellent general health, and the good condition of the urethra and bladder, rendered patient's case a very favorable one for lithotripsy.

On the 21st of March, 1865, the first operation was performed. A single seizure was made with a grasp of five-eighths of an inch, and the major part of the detritus was brought away in the jaws of the lithotrite. Patient complained more than usual on the following days, and, notwithstanding the persevering use of soothing measures, such as poultices to the hypogastrium, anodyne enemata, etc., he obtained no relief.

March 31st, an explorative operation was performed, with the view of ascertaining if any fragments still remained in the bladder. This was done with the utmost care and gentleness, but yet not without causing the patient much suffering. Nothing was found. Patient died about the twelfth day, as I suspect, from pericystitis. No post-mortem examination was made.

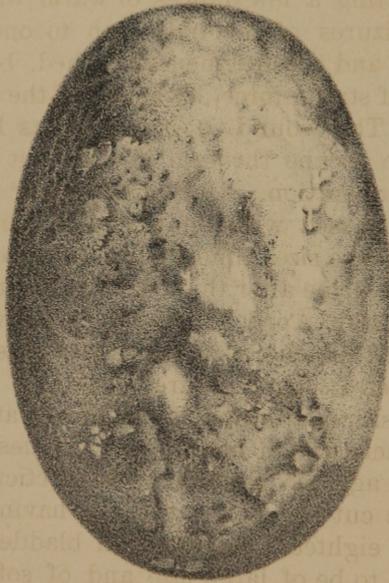
Wt. 5 grains; composition, oxalate and phosphate of lime.

Case XVIII.—Bernard Lang, aged 23, patient at St. Luke's Hospital. Symptoms have existed about five years. On the 2d and 9th March, 1866, two operations, with seizures of one inch and one inch and a half grasp, proved that the calculus was very hard.

March 21. Patient suffered much pain in urinating, from the presence of a very large fragment in the urethra, lodged at the posterior limit of the scrotum; nevertheless he can void his urine sufficiently to relieve the bladder of its contents.

March 23d. Patient continued to suffer severely from the impacted fragment. Both on this and on the day before, persevering efforts were made with urethral forceps and other instruments to dislodge the fragment, and also, if possible, to reduce its size, but they were without success. The only alternative left was to extract it through an incision from the surface. Ether having been administered, a full-sized steel sound was passed down to the fragment, and made to crowd the stone toward the perineum, while the scrotum was drawn forward in an opposite direction. An incision was then made along the

Fig. 1.



Calculus of natural size.

raphe with the point of the knife kept in contact with the fragment. The end of the sound, being turned toward the surface, was thrust through the wound, and by means of it the urethra was held on the stretch lengthwise, while the wound was enlarged upon the fragment toward the anus; the fragment was thus brought into view and its removal effected. It proved to be three-quarters of an inch long, five-eighths of an inch broad, and one-half of an inch thick, of irregular shape and very hard. (See Fig. 1.) The opportunity was then taken advantage of to insert the lithotrite per meatum urinarium, and repeat the crushing of what still remained in the bladder. This was done after previously injecting a few ounces of warm water into the bladder. Several seizures of one-half inch to one inch grasp were promptly made and the fragments crushed, but not without the application of strong force, by means of the screw power, to overcome them. The wound *in perinæo* was left open and the urine allowed to escape through it. Patient was afforded great relief by this operation. During the six or seven following days fragments passed with the urine exclusively through the wound, some of large size, almost equal to the one extracted by the incision. The urine after this began to resume its natural course, and, on the 18th April, it passed exclusively per vias naturales, the wound in the perinæum being nearly healed. Patient was soon after discharged cured.

Wt. 3 iiss; composition, alternate layers of oxalate of lime and uric acid, with an incrustation of ammon. magnes. phosphate.

Case XIX.—J. H., aged 45, resident of Connecticut. On Sept. 22, 1866, patient was cut for stone at home, having previously suffered more than eighteen months with bladder symptoms. The stone was found to be of large size and of soft phosphatic composition. It broke under the forceps into numerous fragments. All of them could not be removed at the time of the operation. Many were taken out through the open wound on three different occasions; others of considerable size passed out through the urethra after the wound had closed.

In December, 1866, it was discovered that two fragments still remained which were too large to pass away of themselves. For these the lithotrite was resorted to. After several unsuccessful attempts, it was first introduced with the aid of chloroform in January, 1867; during the subsequent four weeks it was introduced some ten or twelve times. Two searches in March failed to discover any fragments of stone.

In June of 1867, patient resorted to Dr. Maron Warren, of Boston, for relief, his symptoms of bladder trouble having persisted without intermission. From 18th to 28th of June, Dr. Warren operated five times with the lithotrite; the last time he found no trace of stone remaining in the bladder.

In August patient first came under my care, Dr. Warren having died in the mean time. Though in good general health, he still continued to have symptoms of bladder difficulty, and was impressed with the belief that a calculus still remained in his bladder. On the 27th August, 1867, my first operation was performed and four or five seizures promptly made.

August 29. *Second operation.* — A single seizure of a small fragment was the only result.

September 2. *Third operation.* — Nothing found. Patient returned home and has remained well since.

Wt. 20 grains; composition, phosphate of lime and triple phosphates.

Case XX. — Mr. W. H. G., aged 36, resident in New York; patient at St. Luke's Hospital; had suffered decided symptoms of stone for three or four months. After a preparatory regimen during eighteen days, the first operation was performed on Sept. 2, 1868, without anæsthesia. Four seizures were made in quick succession, the largest grasp measuring an inch and a half.

September 7. *Second operation.* — Ten seizures.

September 14. *Third operation.* — Six seizures.

September 16. *Fourth operation.* — Nothing found after a thorough exploration. Bladder has become retentive. Discharged cured after thirty-four days' sojourn in the Hospital. Enjoys good health at present time.

Wt. 76 grains; composition, nucleus of oxalate of lime, incrustated with phosphate of lime.

The remaining cases of this group are female patients, to whom the operation of lithotripsy is especially applicable; we might, perhaps, say that it should always be preferred to lithotomy. The shortness of the urethral canal, and its great dilatability in the female, very much facilitate the expulsion of fragments, even of a large size, and hence a less frequent repetition of the operation suffices to rid the bladder of its foreign contents.

Case XXI. — Mrs. S., aged 25, resident of Long Island, had had the characteristic symptoms of vesical calculus for five years

past. August 23d, 1853, I made a first attempt to grasp the stone with a lithotrite, to ascertain its size, but the slightest motion of the instrument in the bladder caused so much pain that I desisted, and postponed further proceedings until the next day.

August 24th. After patient was fully etherized, I injected three or four ounces of tepid water into the bladder, and introduced the lithotrite. A stone of an inch and a quarter grasp was soon caught, but on attempting to crush it, it escaped from the jaws of the instrument. These imperfect seizures were repeated a few times, and the lithotrite was then withdrawn, heavily charged with detritus. A fresh instrument was inserted, the pecking process repeated, and another charge of debris brought away. To my agreeable surprise, more had been accomplished by this first operation than I supposed. Besides a large quantity of detritus, two very large-sized fragments came away, which patient was obliged herself to disengage from the meatus.

No hemorrhage or increase of muco-pus in the urine followed the operation.

August 27. *Second operation.* — Again obliged to administer ether, on account of the extreme sensitiveness of the bladder. A portion of the stone in close proximity to the neck of the bladder was this time a source of much embarrassment. As in the first operation, I was again unable fairly to seize the stone and crush it, and had to content myself with pecking at and grazing its surface. As before, considerable detritus was brought away in the jaws of the instrument. No aggravation of symptoms followed.

August 30. *Third operation.* — After etherization caught the stone by a grasp of one inch and a half, but it escaped. Could only graze and peck at its surface.

September 1. *Fourth operation.* — Two hours of urinary secretion having accumulated, I proceeded without injecting the bladder and without the aid of ether. Made a seizure of one inch and a half grasp and fairly crushed the stone; afterward two small fragments were caught and crushed. An abundant discharge of detritus, with one large fragment, followed this operation.

September 5. *Fifth operation.* — But little was accomplished, the jaws of the instrument only grazing the stone.

September 7. *Sixth operation.* — Failed to seize the stone, as it was probably deeply lodged in the bas-fonds of the bladder.

September 9. *Seventh operation.* — Resumed the use of ether. Made three seizures and brought away three charges of detritus. Afterward considerable detritus, besides one large fragment, came away with the urine.

September 12. An exploration detected nothing remaining in the bladder ; patient can assume any position without pain.

September 17. Patient is now entirely free from bladder symptoms and will return home.

Wt. $\frac{3}{4}$ iijss ; composition, mixed phosphate with a small nucleus of oxalate of lime.

Case XXII. — Mrs. E., aged 49, resident of New York, patient at New York Hospital. Symptoms of calculus have existed about nine months.

On January 3d, 1857, the first operation was performed and several seizures and crushings effected. On the 6th, 10th, 15th and 23d it was repeated successfully. Seizures of one and one-quarter inch grasp were several times made. By the aid of an ordinary dressing forceps the fragments at the neck of the bladder were seized and broken into smaller fragments, or else they were brought away entire. The detritus consisted chiefly of large-sized fragments of laminated shape, with convex and concave surfaces, and about two lines in thickness.

February 11. Patient having now, for a fortnight, been free from symptoms of foreign substance in the bladder, she was discharged cured.

Wt. $\frac{3}{4}$ iv ; composition, mixed phosphates.

Case XXIII. — Mrs. M., aged 56, resident of Long Island. The history of this case is incomplete. When first visited, in 1858, Mrs. M. was suffering severely from bladder symptoms, caused by the presence of a stone. The operation of lithotrity was performed a few times ; a moderate amount of detritus was discharged. The acuteness of the bladder symptoms abated ; but, on the 20th April, four days after the last repetition, patient was taken very ill with an attack of pleuro-pneumonia. Further surgical treatment was necessarily suspended. Patient continued under medical treatment, but with only partial relief ; she died on the 26th of May following.

Wt. 47 grains ; composition, mixed phosphates.

Case XXIV. — Mrs. Mary Klippstein, aged 28, resident of Flushing, L. I., a patient at St. Luke's Hospital. Her symptoms have existed for five years, commencing with a discharge of small concretions, attended with severe pain, etc., etc. Between August 13th and September 3d, five operations were performed,

the largest grasp being nearly one inch and a half. The calculus was of soft consistency. In reducing and extracting the fragments, as much was accomplished with a curved polypus forceps and an ordinary dressing forceps as with the lithotrite.

On the 16th September, patient being free from any symptoms of her old ailment, and anxious to return to her family, was discharged cured, having been in the hospital thirty-four days.

Wt. 102 grains; composition mixed phosphates.

GROUP II.

Comprises cases where the stone was large, though soft; the bladder healthy, and the urethra capacious—a concurrence of circumstances permitting the successful employment of lithotripsy.

Case XXV.—Master J. L., aged 17, resident of New York, had suffered from symptoms of stone for seven years, without its existence having been ascertained by sounding. His growth had evidently been retarded by his protracted sufferings and sedentary life. Though the treatment of this case by lithotripsy was conducted to a happy issue, it may be questioned whether, all things considered, lithotomy would not have been preferable. The stone proved to be of large size, and the urethra was found to be abnormal, terminating in a scanty orifice three-quarters of an inch posterior to the meatus, thereby constituting a condition of hypospadias.

July 6th, 1849. A first operation was performed after the inhalation of ether; preparatory to it the orifice of the urethra was slit to allow the introduction of a full-sized lithotrite. A single seizure by a large grasp was made, while the bladder, which had been injected with tepid water, was emptying itself by the side of the instrument.

The stone was crushed, and a charge of detritus brought away in the jaws of the lithotrite. Two days after this operation, a fragment became arrested in the urethra, not far from its outer orifice, and was removed by the aid of dressing forceps.

July 17. *Second operation.*—Three seizures of one and a quarter inch and one inch grasp were made, and fragments crushed. After this, a considerable discharge of detritus followed, and afforded great relief.

July 19. *Third operation.*—The bladder behaved intractably, ejecting the fluid as fast as injected, and retaining but a small quantity. The lithotrite was, notwithstanding, inserted, and manipulated with extreme caution. A single seizure of

three-quarter inch grasp was made, and the fragment crushed. July 26th, a large, irregularly shaped fragment was arrested near the orifice of the urethra, where it could be distinctly seen. Its shape permitted the urine to escape by the side of it. It was seized with slender dressing forceps, and extracted without violence to the parts.

An attack of illness compelled me now to postpone further proceedings until August 21st, when the fourth operation was performed. Six fragments were seized in quick succession, the largest, to my surprise, measuring one inch and a quarter, the smallest one-half inch.

August 28. *Fifth operation.*—Five or six fragments seized and crushed. They measured from one-half inch to one inch in diameter.

August 30. A large fragment is arrested in the urethra at the anterior limit of the scrotum. Though firmly impacted, it does not prevent the passage of urine. Its removal required careful and persevering efforts, and was accomplished by the following expedient: The end of a steel wire, six inches in length, and blunt at the point, was bent up toward the handle in which it was set at an inclination of somewhat less than a right angle; the hook part measured three-eighths of an inch.

This instrument was passed along the urethra flatwise beyond the fragment, and then traction made, by engaging the point against the distal side of the fragment. In this way the fragment was brought forward within reach of the dressing forceps, with which it was reduced to smaller pieces, and removed.

September 10. In attempting to repeat the operation of lithotrity, a contraction of the urethra was encountered at the point where the large fragment had been arrested, and had caused abrasion of the lining membrane of the urethra. Any attempt to advance the instrument beyond this point causes such severe pain that it was thought best to defer any further operation till the soreness had disappeared.

September 18. *Sixth operation.*—Two seizures of one inch and three-quarters of an inch severally.

September 22. *Seventh operation.*—Performed without ether. Patient complained of very severe pain.

September 25, October 3, October 9. Three operations.

October 16. *Eleventh operation.*—Two fragments, each of one inch grasp, and several smaller fragments were seized and crushed.

October 19, October 24 and October 29. Three operations.

November 2. *Fifteenth operation.*—The discharge of detritus has been very abundant of late. One very large fragment was expelled without the assistance of instruments; from its shape it appeared to be the flattened blunt end of the original calculus. November 4, I was obliged to dislodge a very large fragment which had become arrested at the anterior limit of the scrotum; it had been lodged there since the previous evening and was causing severe pain. After the administration of chloroform, the fragment was removed with a slender-bladed dressing forceps. November 8. Removed another very irregularly shaped fragment which had become lodged in the urethra. After this the patient felt free from foreign bodies in the urethra.

November 13. *Sixteenth operation.*—A most careful search was made, but nothing could be found. On November 21, patient commenced work as a book-binder. The detritus discharged weighed altogether one ounce, and filled at the same time an ounce bottle.

In March, 1852, patient reported himself in good health and free from bladder trouble. January, 1870. No return of trouble.

Case XXVI.—Mr. J. V. D., aged 73, resident of Columbia county, N. Y., a man of vigorous constitution and previously accustomed to active habits of life. Patient has now for a long time been restricted to an in-door life, by the severity of his bladder symptoms. The late Dr. J. Kearney Rodgers had sounded him and advised the operation of lithotomy, but so averse was he to incur the risks of the operation that he had decided to submit to his lot and live on as comfortably as he could under the circumstances. At length, however, the urgent solicitations of his family induced him to entertain the proposition of lithotrity.

On the 22d May, 1854, after some preparatory regimen, the first operation was performed at his daughter's residence in this city, with good results. On the 25th and 28th of May, and on the 1st and 3d of June, the operation was repeated. At the last of these a seizure of one inch and a half grasp was effected and the fragment crushed.

June 6. *Sixth operation* was performed. Patient, suffering from the extreme hot weather, now returned to the country, and on the 13th a seventh operation was performed at his own residence; one seizure of an inch and a quarter grasp.

- June 17. *Eighth operation.* — With the aid of etherization.
- June 21. *Ninth operation.* — No seizure effected. A large fragment, however, was removed from the urethra, where it had become lodged.
- June 27. *Tenth operation.* — Without ether; several fragments crushed.
- July 1. *Eleventh operation.* — Accomplished nothing.
- July 6. *Twelfth operation.* — Several fragments crushed.
- July 11. *Thirteenth operation.* — Extracted fragments from the urethra and made several seizures and crushings.
- July 29. *Fourteenth operation.*
- August 3. *Fifteenth operation.*
- August 8. *Sixteenth operation.* — A seizure of one inch grasp; fragment crushed.
- August 10. *Seventeenth operation.* — A seizure of one inch grasp. Patient has incontinence of urine.
- August 15 and 17. *Eighteenth and nineteenth operations.* — I was now obliged to suspend operations. The prostrating effects of the extremely hot weather, the complete loss of appetite, together with the condition of the bladder itself, rendered patient's condition very critical. Under careful management, however, he gradually recovered his strength, and, on the 19th of September, the twentieth operation was performed.
- September 28. *Twenty-first operation.*
- October 7. *Twenty-second operation.* — A seizure of one inch grasp.
- October 14. *Twenty-third operation.*
- October 25. *Twenty-fourth operation.* — Several seizures. Some fragments extracted from cervix.
- October 31. *Twenty-fifth operation.* — Some fragments extracted. No seizure with the lithotrite.
- November 2. *Twenty-sixth operation.* — Two seizures of one inch grasp each.
- November 15. *Twenty-seventh operation.* — One seizure of one inch and one of three-quarter inch grasp.
- November 17. *Twenty-eighth operation.* — Two seizures of three-quarter inch grasp. Extracted several fragments from cervix.
- November 20. *Twenty-ninth operation.* — One seizure of one inch grasp, besides several smaller ones.
- November 22. *Thirtieth operation.* — Only small grasps.
- November 24. *Thirty-first operation.* — Three or four small fragments crushed.

November 27. *Thirty-second operation.* — Crushed two small fragments.

November 28. Symptoms of foreign substance in the bladder have all disappeared. Patient returned home and soon resumed his accustomed active occupations. He survived until September 14, 1859, without any return of his old complaint. Died, aged 80 years, 8 months.

Wt. 3 vi, 3 j; composition, nucleus of uric acid, with incrustation of urates.

Case XXVII. — Mr. O. K., aged 60, resident of Catskill, N. Y. About twelve years previously, patient had a first attack of nephritic colic, affecting the left side, which was followed in a year or two by a second and more severe attack. A few days after the second attack he expelled a small calculus per urethram. Subsequently he has had no recurrence of the acute attacks, but has, on several occasions, passed small concretions. For three years past he has, from his sensations, been aware of something existing in the bladder which he has been unable to expel, and has been compelled to give up riding in vehicles on account of the irritation of the bladder produced by it. The urethra is capacious, the prostate gland normal, and the bladder in good condition.

On the 5th and 7th of May, 1856, attempts were made with the lithotrite, but no seizure was effected, although the stone had been readily felt with the ordinary steel sound. A few hours after the second attempt, a rigor occurred, followed by a smart attack of catarrhal cystitis. This improved under appropriate treatment, and, on the 27th of June, the first successful crushing was performed, and a seizure made of one and three-quarter inches grasp.

June 29, July 1, 4, 6, 11, 16 and 21. Seven operations with good results.

July 22. Removed fragments from urethra.

July 24, 29, August 9, 12, 15 and 19. Six operations.

August 21. Extracted fragments from urethra.

August 22. *Fifteenth operation.*

August 24. Removed fragments.

August 26. *Sixteenth and final operation.* — Nothing found.

August 28. Patient returned home cured.

Wt. 3 iv; composition, nucleus of uric acid, with incrustation of phosphate of lime and ammoniaco-magnesian phosphate.

Case XXVII. — Dr. A. S. M., aged 62, a resident of Connecticut. About eighteen months previously (1857) the patient had been cut

for stone by the late Prof. Knight, of New Haven, and a large calculus was removed in fragments. He recovered favorably, and regained all the functions of the bladder, after having been previously dependent upon the daily use of the catheter for several years (since 1851). Some sedimentary mucus continued to appear in the urine after the operation, but gradually diminished, and at length almost disappeared. After the healing of the wound, two fragments of considerable size were expelled per urethram. Thirteen months elapsed after the operation before patient began to suspect a return of his old ailment. His suspicion was corroborated by the sound encountering a stone in the bladder. In other respects patient's general health was good; he was free from kidney complaint; the bladder was quite retentive, and the urethra of ample capacity, admitting a No. 13 bougie. The first operation was performed on the 3d September, 1858, and repeated on the 6th, 8th, 14th, 17th, 19th, 22d, 23d, 24th, 26th, 27th, 28th, 29th and 30th insts. Except on one occasion, fragments were seized and crushed at every operation. In one instance two seizures were made by a grasp of one and a half inches. Notwithstanding the ample dimensions of the urethra, and the facility of entering the bladder with the lithotrite, the discharge of fragments was, to my great disappointment, very scanty. With every repetition of the operation my solicitude on this account increased. The accumulation of detritus at the neck of the bladder, by its irritation, increased patient's sufferings.

Something was accomplished by introducing the urethral lithoclast, and bringing away some of the fragments. On the 30th September the urine began to be bloody and loaded with viscid, heavy secretion; the suffering from micturition increased. The urgent necessity of ridding the bladder as expeditiously as possible of the accumulated detritus, made me anxious to repeat the operation often, although each repetition would aggravate, more or less, the irritation. The operation with the lithoclast was repeated on the 1st, 2d, 4th and 5th of October, and a number of fragments brought away. His suffering was alleviated by opium suppositories and frequent hip baths. On the 6th of October, finding no abatement of the irritation, but rather an increase, the question urged itself whether it was safe to let this state of the bladder continue any longer unrelieved, and whether lithotomy should not be performed to rid the bladder of its contents and afford it rest. The doctor himself also had become

concerned about his condition, and desired additional counsel. Accordingly, Profs. Alfred C. Post and Willard Parker were called in consultation. After a thorough examination of the case, it was decided to postpone lithotomy until a further trial had been made of palliative means. Ordered, continued fomentations to the pubes, and an injection twice daily into the bladder of R plumbi acetat. gr. xxx; extr. opii. aq. ℥ iss; aquæ, Oj. Digital exploration of the prostate ascertained that there was no enlargement or induration, but tenderness on pressure.

October 7. Complete inability to urinate—constant pain. Introduced lithoclast and brought away several fragments, two of which were of large size.

October 8. Again used the lithoclast successfully in removing fragments. Micturition is still very painful; the urine is loaded with viscid and bloody secretion. The doctor is not so well, is less hopeful and has a poor appetite.

October 9. At our consultation to-day, it was agreed that lithotomy should not be deferred much longer. The doctor consented, but wished first to visit his home before submitting to the operation. On the 11th, the doctor wrote me from home, stating that the ride to the steamboat over the rough pavement had shaken him in the most torturing manner; that on reaching his state-room he was obliged to urinate in the greatest haste, and to his great delight expelled a shower of fragments. His appetite at once began to return and his strength to improve. Daily more or less detritus continued to escape in urinating. The urine lost its bloody stain, and the viscid secretion diminished. This favorable turn in his condition decided us to resume the operations of lithotripsy. Accordingly, I visited the doctor at his home, and, on the 28th of October, performed the eighteenth operation, at which time five or six seizures were made of fragments, varying in size from half an inch to an inch and a quarter grasp. The quantity of detritus discharged since leaving the city exceeded all that he had gotten rid of previously; the whole amounting to half a fluid ounce by measure.

October 30. *Nineteenth operation.*—Failed to make any seizure.

November 2. *Twentieth operation.*—Again fruitless. The stone could only be grazed by grasps of an inch to an inch and a quarter, but not fairly seized. Being provided with only a duck-bill lithotrite, I desisted from further attempts. The condition of the bladder has very much improved.

November 11. *Twenty-first operation.* — Three hours of urinary secretion having accumulated in the bladder, I explored with the duck-bill lithotrite, but could detect nothing. I then drew off six or eight ounces of urine and again explored. I felt a fragment on the left side, but could only graze it and effect a partial grasp of one inch diameter, but without holding on to it so as to fairly crush it. Is it possible that the stone is impocketed and projects into the bladder only superficially? Patient thinks he feels the motion of the stone in certain positions. His general condition continues to improve.

February 3, 1859. Patient has passed no fragments since last note. There has been no aggravation of bladder symptoms for a few weeks past. Dr. Knight has recently touched the stone with the sound on the left side, and patient has encountered it himself in using the catheter.

Twenty-second operation. — After grazing the stone three or four times with the lithotrite, as before on the left side, I seized and crushed it by a seven-eighth inch grasp, and in rapid succession effected five or six seizures of the same and smaller diameters, and brought away a large charge of detritus in the instrument. Before I left the house, patient voided a quantity of detritus, to his great delight.

February 18. *Twenty-third operation.* — There has been a free discharge of fragments since the last operation. Seized and crushed three or four small fragments.

March 5. *Twenty-fourth operation.* — Made two seizures and crushings after a protracted search; the largest grasp was three-quarters of an inch.

March 8. *Twenty-fifth operation.* — Five or six seizures, the largest, three-quarters of an inch in diameter.

March 10, 14, 16 and 18, four operations.

March 21. *Thirty-first and final operation.* — After which all symptoms disappeared, and the bladder could retain its contents five or six hours. The doctor now returned home much gratified with the result of his case.

November 2, 1859. The doctor's old complaint having returned, lithotrity was repeated three times — October 28th and 30th, and November 2d. The largest grasp was nearly one inch in diameter, and the concretion soft.

November 5. A thorough exploration ascertained that nothing remained in the bladder. The doctor returned home.

In September, 1865, another relapse of his old complaint obliged the doctor to submit again to an operation. At the

first operation, on the 12th inst., a seizure of one and a quarter inch grasp was made. On the 14th, fragments were extracted with the lithoclast from the neck of the bladder.

September 16. *Second operation* — Two seizures of one inch grasp each.

September 19 and 22. *Third and fourth operations.* — Several small seizures.

September 24, 25 and 26. Extracted fragments, one of them of large size.

September 29. *Fifth operation.* — Several small grasps.

September 30. Extracted another large fragment. The bladder now seems to be relieved of all foreign substances.

The doctor writes, under date December, 1869, that, though still suffering more or less from vesical irritation, he has no suspicion of the existence of any calculus in the bladder, and is comparatively comfortable. In this case we have four distinct attacks within a period of about eight years; the first relieved by lithotomy, the subsequent ones by lithotrity.

Wt. 3 viii, gr. x; phosphate of lime and triple phosphate, with incrustations of earthy phosphates. Second relapse — Wt. gr. xxxvi; mixed phosphates. Third relapse — Wt. 3 iij; mixed phosphates.

Case XXIX. — Mr. J. P., aged 54, whose uncle and father had been the subjects of vesical calculus, is a resident of New York. For more than a year Mr. P. has been obliged to relinquish riding, on account of the suffering caused by it, and to observe the utmost care in walking. The bladder is quite retentive, so that he often passes the night without rising to urinate. The first attempt with the duck-bill lithotrite failed to grasp the stone. It could only be felt and grazed, owing to its large size.

In inserting the lithotrite, it was found necessary to depress the handle far toward the coccyx, and in this position to push the instrument with some force to arrive in the cavity of the bladder.

October 30, 1858. *First operation.* — In this attempt the fenestrated lithotrite was used, and several seizures effected. The first grasp measured a full inch; the others were smaller. A rigor followed this operation.

November 9. *Third operation.* — Though the fragments were felt in inserting the catheter for the purpose of injecting the bladder, no seizure could be effected by the lithotrite. The manipulation of the instrument caused severe pain.

November 11. *Fourth operation.*—Two seizures of one inch and seven-eighths inch grasp.

November 15. *Fifth operation.*—A single seizure only could be effected, of seven-eighths of an inch grasp. Considerable tenderness on pressure over the hypogastrium rendered it prudent to defer for a time any further repetitions. Ordered leeches and fomentations to the pubes.

November 22. *Sixth operation.*—Condition of the bladder much improved. Made three seizures of one inch grasp, besides three or four smaller ones.

November 27. *Seventh operation.*—Four or five small seizures; grazed a large fragment, too large to seize with my instrument.

November 30. *Eighth operation.*—With fenestrated lithotrite; one seizure of one inch grasp.

December 6 and 9, two operations; several seizures of small fragments.

December 13. *Eleventh operation.*—With fenestrated lithotrite; two seizures of one inch diameter, besides four or five seizures of small fragments.

December 16th. *Twelfth operation.*—Six seizures of three-quarters inch grasp and less.

December 20. *Thirteenth operation.*—Only one seizure of three-quarters of an inch.

December 23. *Fourteenth operation.*—Six or seven seizures of small fragments.

December 27. *Fifteenth operation.*—After several slips, made a seizure of more than one inch grasp, and found the fragment the hardest I had yet encountered, requiring all the power that could be applied with the screw to overcome it.

December 30. *Sixteenth operation.*—Six seizures of three-quarters inch and less.

January 4, 1859. *Seventeenth operation.*—Five or six grasps five-eighths of an inch.

January 7, 1859. *Eighteenth operation.*—Three or four seizures of small fragments.

January 11. *Nineteenth operation.*—Seized and crushed a large fragment of more than one inch grasp. Also crushed several small fragments.

January 14. *Twentieth operation.*—Crushed three large fragments three-quarters inch to one inch, and two or three small ones.

January 18. *Twenty-first operation*.—Seized with the fenestrated lithotrite a fragment which, to my surprise, measured one and one-quarter inch, and could not be broken by the screw power. Letting go my hold, I seized it by a smaller diameter, and then succeeded in crushing it.

January 21. *Twenty-second operation*.—One seizure of nearly one and one-half inch grasp; fragment very hard, and requiring the utmost power to overcome it. Two or three small seizures.

January 25, 31, February 2, 7, 12, 15, 18 and 22. Eight operations, all successful. Urine less viscid and no longer tinged with blood. Free discharge of fragments.

February 25, March 1, 4, 8 and 22. Five operations. Total number 35.

At the last two a thorough search was made, but nothing could be found. Patient retains his urine from four to six hours. He has now returned to his accustomed occupations.

Wt. 3 vj; composition, uric acid, with incrustation of mixed phosphates.

Case XXX.—Mr. C. C., aged 71, resident of New York. About fifteen years ago patient suffered from occasional attacks of nephritic colic, and since then has complained more or less of bladder trouble. Five months ago the presence of a calculus in the bladder was first ascertained by sounding. With the exception of some falling off of appetite, patient's general health has been good. Micturition takes place at intervals of one hour; the prostate is normal, and the urethra of ample capacity.

May 2, 1861. *First operation*—with the aid of ether. Scarcely two ounces of water could be injected, and much of this escaped during the manipulation with the fenestrated lithotrite. Three or four seizures of one and one-half inch grasp were made. The stone not very hard.

May 6. *Second operation*—without ether. The scanty space in the bladder rendered it difficult to effect a seizure; only two or three grasps could be made.

May 11. *Third operation*.

May 14. *Fourth operation*.—Three seizures of large grasps.

May 21. *Fifth operation*.—Bladder more retentive. Several seizures, but none of large grasps.

May 25. *Sixth operation*.—Failed to make any seizure with the lithotrite. With the lithoclast, however, I seized a frag-

ment at the neck of the bladder, and, finding it too large to be brought away entire, I crushed it. A larger discharge of detritus followed than after previous operations.

May 30, June 8 and 9. Three operations.

June 10. *Tenth operation*.—A large fragment is lodged in the membranous portion of the urethra, which obstructs the insertion of an instrument, but not the flow of urine. All my efforts with the forceps and lithoclast only availed to fritter away small fragments.

June 12. *Eleventh operation*.—No increased urethral or bladder irritation followed the protracted efforts of the last operation. The impacted fragment was, after renewed and protracted manipulation, crushed and brought away in small fragments.

June 15. *Twelfth operation*.—Another flat shaped fragment, of the size of a cherry stone, which had been arrested in the membranous portion of the urethra, was removed. Immediately afterward several other fragments, one of large size, were ejected.

Up to June 29, six operations were performed, making eighteen in all. On each occasion fragments were seized and crushed with the lithoclast.

August 12. *Nineteenth operation*.—Having been quite free from symptoms for three or four weeks, Mr. C. supposed he was entirely rid of his old trouble. Lately, however, his symptoms have again returned with their former characteristics and with increasing severity. I therefore searched the bladder and succeeded in seizing a soft fragment, most of which came away in the jaws of the lithotrite.

August 16. *Twentieth operation*.—A final exploration detected nothing. Patient soon regained his accustomed activity.

Wt. 3 iij, gr. x; composition, mixed phosphates.

Case XXXI.—Mr. J. D. F., aged 55, a resident of Long Island, had suffered for a long time with bladder symptoms. General health excellent; urinary organs in a favorable condition for lithotripsy; the calculus of large size.

On the 6th and 25th May, 6th and 27th June, 5th and 27th July, 1864, six successive visits were made to Mr. F. at his residence in the country, and each time an operation was performed with good results, and unaccompanied by any complication. At the last of these operations eighteen or twenty seizures were made in rapid succession, and without protracting the operation beyond the prescribed limits. From the outset, the expulsion of detritus in this case has been easy and abundant. At the

seventh operation, August 15, a seizure of one and one-eighth of an inch was made.

September 1. *Eighth operation.*—Twenty prompt seizures made.

September 21. *Ninth operation.*—Two thorough explorations; although I detected nothing, yet patient from his feelings thinks there is still something remaining in the bladder.

October 5. *Tenth operation.*—Visited Mr. F. in town, explored his bladder and found nothing.

December 13, 1864, March 30 and April 25, 1865, three fruitless searches. Since then patient has continued well.

Wt. 3vj, gr. x; composition, uric acid and mixed phosphates.

GROUP III

Comprises cases in which, from the unfavorable condition of the bladder or urethra, or from the large size and hard composition of the calculus, lithotomy should be resorted to in preference to lithotrixy.

Case XXXII.—Capt. B., aged 72, of hardy constitution, has followed the occupation of pilot in the harbor of Savannah since his boyhood. For five years past has suffered from bladder symptoms, varying in severity with the changing seasons, and has submitted to every variety of treatment. At the present time he is dependent on the use of the catheter, which he inserts himself about every two hours. Digital exploration per anum detects no abnormal condition of the prostate. The stone is readily encountered by the catheter. Anxious for relief, patient willingly consented to the operation of lithotrixy.

July 23, 1850. *First operation.*—The patient being under the influence of ether, an unsuccessful attempt was made to inject a few ounces of tepid water into the bladder. Inasmuch as alarming congestive phenomena threatening apoplexy were produced by the inhalation of ether, we were obliged to desist from its further administration, and allow patient to recover from its effects. A cautious effort was then made to insert the lithotrite, but it was found impossible to pass the neck of the bladder; further efforts had therefore to be abandoned. A slight hemorrhage followed, but no other aggravated symptoms resulted.

July 27. *Second operation.*—Without ether. Patient having retained his urine for an hour and a half, the lithotrite was introduced, but could not be made to pass the neck of the bladder, even though the handle of the instrument was depressed far toward the coccyx. After further fruitless efforts the lithotrite was removed and the urine drawn off with the catheter, which

entered the bladder readily. On this occasion the stone was distinctly felt. Less hemorrhage followed than after the previous operation.

July 29. *Third operation.*—Another effort to pass the lithotrite through the neck of the bladder was followed by no better success. The attempts were varied by placing the patient in different attitudes, but all to no purpose. As he complained of spasm at the neck of the bladder after the operation, a suppository of opium was inserted per anum.

August 1. *Fourth operation.*—A final effort was made after a No. 10 catheter had been left in the bladder for two hours preceding, in the hope thereby of facilitating the passage of the lithotrite. As in the previous operations, patient complained of spasm at the neck of the bladder; opium suppositories again afforded relief. The appearance of the urine did not indicate any increase of catarrhal cystitis from the manipulation to which he had already been subjected. It was now evident that the operation of lithotrixy was inadmissible, and patient was advised to submit to lithotomy. Preferring to postpone any further operation until the return of cool weather, he passed from observation. In the month of November following a notice of Capt. B.'s decease appeared in one of the southern newspapers.

Case 33.—S. Coughlin, aged 66, resident of Carbondale, Pennsylvania, entered New York Hospital, June, 1854. From patient's account, which is rather confused, he had suffered from symptoms of stone for about six months, commencing with pain in the region of the left kidney; had passed gravel, and, for the last three months, more or less blood; micturition is frequent and painful, and the urine is charged with viscid, brownish slime. Pressure over the kidneys is painful, especially over the left. The urethra terminates half an inch posterior to the meatus. Its orifice being scanty, and admitting only a No. 5 bougie, was incised so as to allow the entrance of a No. 12.

June 9. *First operation.*—After injecting the bladder, a search with the lithotrite failed to seize the stone, though it was felt.

June 13. *Second operation.*—Two seizures were made, but without fairly crushing the stone; a large charge of detritus was brought away in the jaws of the lithotrite.

June 16. *Third operation.*—Several partial seizures grazed the stone, and a large charge was brought away as before.

June 19. *Fourth operation.*—With much the same result as before.

June 25. *Fifth operation.*—Several seizures made. A fragment arrested in the urethra near its outer orifice had to be removed with a dressing forceps. Patient had, for several days past, appeared languid. Although the bladder symptoms have diminished in severity, and micturition has become less frequent and less painful, still the tongue is red and dry, and the pulse weak and slightly irregular. He is much annoyed by hiccup, and seems to be despondent.

June 26. No improvement; pulse weaker, intellect confused.

June 27. Patient grows weaker; extremities cool, urinary secretion abundant. He continued to sink, and died at 7 P. M., June 28.

Post-mortem examination.—The bladder in situ of the size of an ordinary lemon. The urinary apparatus, consisting of bladder, penis, kidneys and ureters, were removed in mass. The bladder contained about an ounce of greyish mucu-purulent fluid, mixed with urine, and a large teaspoonful of fragments, uniform in size, and all too large to pass away per urethram. The coats of the bladder were much thickened, the muscular coat being developed into ridges separated by furrows. The mucous surface was of a uniform slate color, except at the trigone and prostatic portion. No abrasion or ulceration of the surface was found. The prostate was of moderately large size; its middle lobe was developed into a tumor of half the size of a hazlenut, occupying the floor of the prostatic portion of the urethra. The summit of this tumor was denuded of mucous membrane, and roughened by the presence of a gritty calcareous matter coating its surface. The ureters were dilated to three or four times their normal size, and their coats much hypertrophied; those of the right more than those of the left. The kidneys were much enlarged: the left to more than twice its normal size, the right about one-half larger than normal. The left presented, posteriorly and near its lower extremity, an extensive softened spot, larger than could be covered by the end of the thumb; another similar spot was found in the middle portion near the periphery. These spots were well defined, the renal substance being soft and pulpy to the depth of three-fourths of an inch. The investing capsule was thickened. The cavities of both kidneys were distended with pus-like fluid, similar to that in the bladder. The right presented an uneven surface, with depressions over which the capsule was

thickened and opaque, the renal substance underneath being also abnormally dense. There were no softened spots in the right kidney. Its cavity contained a few small concretions. No other organs were examined.

Wt. 3 i; composition, nucleus of oleate and margarate of lime, with incrustations of phosphate of lime and triple phosphate.

Case 34.—F. Donohue, aged 24; entered New York Hospital October, 1856; symptoms of stone have existed about ten months. Patient sustained a severe injury from a railroad accident about fourteen months ago, which occasioned retention of urine, and necessitated the use of the catheter for a period of two months.

A fistulous communication formed between the urethra and rectum, opening into the latter one inch above the verge of the anus by an orifice that permits the passage of a No. 3 bougie. The sphincter ani has lost its power to a considerable degree, and defecation is faulty, especially when there is any looseness of the bowels. Patient is obliged to urinate every hour, not to mention a certain amount of leakage per rectum. The urethra is of normal capacity, and a full-sized catheter, passed into the bladder, readily encountered the calculus. Flatus escapes into the bladder, but never any fæcal fluid. About six months ago a calculus, of the size of a large pea, was passed in urinating. General health good.

October 14, 17, 24, 28, Nov. 4 and 7. Six successive operations were performed; the largest grasp three-fourths of an inch; the stone of soft consistency, and the detritus easily gotten rid of.

November 14. Patient has no longer any sensation of a foreign body in the bladder, and can retain his urine three or four hours.

November 19. Has fever, and suffers from pain in the region of the right kidney.

November 27. Continued to have fever at intervals; no cessation of lumbar pains.

December 8. Patient has improved, and was able to go out to-day.

December 22. Micturition has again become more frequent, and is accompanied by pain in the bladder; urine bloody and charged with viscid mucus.

February 8, 1857. Has continued to suffer from pain in the bladder and penis; urine bloody and charged with viscid mucus. Yesterday, had a severe attack of pain in right kidney.

March 2. Has great tenderness on the right side below the ribs and toward the spine, accompanied by fever.

March 14. Has had irregular chills and sweats; urine has improved in quality, and pain in the bladder is much less.

March 16. Patient is evidently falling off; pulse frequent and very weak; persistent chills and sweating.

March 25. Continues to fail; stomach rejects stimulants; delirium. Died at 1 o'clock P. M.

Post-mortem examination.—The right kidney is more than double its normal size; its cortical substance paler than natural, and increased in thickness proportionately to the greater size of the organ. The lining membrane of the pelvis and calices very much thickened, vascular and coated in spots, with diphtheritic exudation, and containing several fine concretions that could only be distinguished by the finger when passed over the surface. Two or three abscesses, of the capacity of one drachm, opened into the pelvis. The pelvis itself, and about six inches of the ureter proceeding from it, were dilated and their coats very much thickened by an interstitial deposit of yellowish material. A calculus one inch long, half an inch thick, and pointed at both ends, was found impacted in this portion of the ureter. Left kidney somewhat enlarged; nodulated exteriorly. An incision into its substance displayed pus in small quantity. The lining membrane of the pelvis was thickened and vascular; the ureter hypertrophied. The coats of the bladder were also very much hypertrophied; its inner surface greatly congested, and its cavity free from any remains of calculus, and capable of containing one ounce of fluid. At the anterior extremity of the veru montanum a probe could be passed obliquely forward and backward along a small sinus into the rectum, coming out through its anterior wall one and a half inches above the verge of the anus. Near the urethral opening of the sinus there was a dilation capable of lodging two peas.

Wt. 3j; composition, mixed phosphates.

Case 35.—Mr. S. L., aged 59; resident of Brooklyn, L. I.; of very nervous temperament. During the preceding three years has had attacks of nephritic colic, and passed several small calculi. Within the past year has suffered from bladder symptoms, which have gradually increased in severity, and assumed the characteristics indicative of the presence of a stone.

January 10, 1857. Mr. L. having retained his urine three hours, the lithotrite was inserted into the bladder, and a seizure

promptly made by a grasp measuring one inch and a quarter. On applying the screw power the stone escaped, but was easily caught again and crushed, but only after the utmost power of the screw had been exerted. The whole operation occupied scarcely three minutes, but was accompanied by severe pain. Ordered hot poultices to the hypogastrium.

January 13. *Second operation.*—After injecting six ounces of tepid water, I made two or three seizures, which slipped on applying the screw power. One fragment was finally held and crushed. Patient again complained of severe pain during the manipulation, but it soon after subsided.

January 16. Since the last operation patient has suffered severely from pain at the neck of the bladder, but not so severely as he often did prior to the first operation. For several nights past he has had but very little sleep; has been chilly at times, and thinks he has had fever at night. The urine deposits a thin coating of slime at the bottom of the vessel, but is not bloody. Only a few small fragments have passed. Patient now consents to take anodynes; hitherto he has refused them. Ordered suppositories, of a grain and a half each, of opium and camphor, to be used after sitting over the fumes of an infusion of catnip.

January 17. Summoned early this morning to see Mr. L., who, I found, had been much distressed during the night by retention of his urine. Toward morning he had succeeded in voiding it, but with only partial relief to his sufferings. After ascertaining, by the introduction of a catheter, that no fragment was arrested in the urethra, I introduced a fenestrated lithotrite (having previously injected the bladder), and readily seized and crushed three fragments, the largest measuring one inch in diameter. The operation occupied about two minutes. In this, as in the preceding operations, the utmost gentleness was used in the manipulation of the instrument.

Repeated the suppository, and advised a continuance of the herb fumigations.

January 18. To my surprise, I found Mr. L. extremely ill to-day. On inquiry, I ascertained that after my visit he had passed the remainder of the day comfortably. His friend, Dr. N., had proposed to pass the night with him, but he declined, and was also unwilling that any of his family should sit up with him. The fire in his room had been allowed to go out by his own direction. In getting up in the night he had fallen on the

floor, and how long he had remained there before assistance came could not be determined. From that time he complained of excruciating pain in the right side of the epigastrium, behind the costal cartilages, which greatly restricted respiration and seemed to have the character of a neuralgic seizure. (Mr. L. had been subject to facial neuralgia and had suffered considerably from an attack since the first operation.) The pain had been unremitting since its onset, was fixed in its seat, unattended with cough and not affected by pressure. Its severity was so great as to extort groans at every act of his accelerated respiration. Patient no longer complained of bladder symptoms, and passed his urine in the usual quantity. The abdomen was supple and pressure over the hypogastrium caused no pain. His countenance was very much changed; his pulse, ordinarily under 60, was now frequent and very feeble; temperature apparently natural, intellect confused, talk incoherent. In addition to the opium suppositories, elixir opii was given at intervals. Scarified and dry cups were applied over the seat of pain. External rubefacients, as mustard and chloroform liniment, were also applied, but without material relief. On the contrary, patient steadily advanced to a state of stupor, accompanied by inability to swallow. Surface relaxed. At 9 o'clock P. M. he died.

Post-mortem examination. Thorax. Lungs of both sides healthy in aspect. The anterior surface of the lower lobe of the right lung adherent to the parieties, over a moderate extent of surface by adhesions easily broken up. No effusion in the pleural cavities. The middle and lower lobe of right moderately engorged, but still pervious to air. Heart of normal size, firm texture, and contracted. Abdomen. Liver rather large but in other respects normal. Gall-bladder distended with dark bile. Stomach and intestines not opened; their appearance presented nothing noticeable. Kidneys, the right larger than the left; both healthy in their substance and also in their cavities, which were found empty. Ureters normal in size.

The bladder which was of the size of a medium orange, and contained four or five ounces of turbid urine, was surrounded by a rather abundant layer of adipose tissue, and thickened, somewhat indurated connective tissue, which could be separated from the bladder only with difficulty. This layer did not, however, present any appearance of increased vascularity or of deposits of inflammatory products. The coats of the bladder were thickened;

on its inner surface was a patch two or three inches in diameter, occupying the left side and involving the bas-fond toward the neck. This patch was of a bright red color, with scattered spots around it of the appearance of ecchymosis. No abrasion of the surface was observable. At one point there was a group of mammelated eminences, the summits of which were of a yellowish color, and contained when split open a semi-solid substance. The mucous membrane elsewhere presented no increased vascularity. (At each operation I had observed that the stone was uniformly seized when the jaws of the lithotrite were directed toward the patient's left side.) The prostate was of normal size and consistency, but when incised a thick viscid fluid of the color of pus exuded from its ducts; no abscess, however, was found. The remains of the calculus found in the bladder consisted of several small fragments, capable of passing the urethra, and two large ones, the largest of which constituted about one-half of the entire original stone. These two adjusted together enabled me to estimate pretty accurately the original size of the calculus. Its form was elongated and flattened; its length one inch and a quarter; its breadth nearly one inch; its thickness three-fourths of an inch. Its flat surfaces were studded with rough mammelated eminences, while the edges were smooth. An outer shell of the thickness of orange peel had detached itself, leaving a flattened nucleus in the center.

Wt. 3 iiss; composition, concentric layers of uric acid.

Case XXXVI.—Mr. F., aged 66, resident of Syracuse, N. Y., has suffered from symptoms of stone for four years, and has passed gravel in considerable quantity. Urine turbid; urethra and prostate in normal condition.

March 18, 1864. *First operation.*—After injecting eight ounces of tepid water into the bladder, three seizures were made with a fenestrated lithotrite, the largest grasp measuring one inch and one-eighth. The stone proved to be very hard.

March 19. Patient has had two rigors.

March 22. *Second operation.*—One seizure of one inch grasp could not be overcome, owing to the extreme hardness of the stone; another seizure of five-eighths of an inch was crushed.

March 26. *Third operation.*—Inserted the largest sized fenestrated lithotrite, and with it made a seizure of one inch and a quarter grasp, which yielded only by applying the utmost power of the screw action. Its giving way was accompanied by a loud snap. A second seizure of five-eighths of an inch yielded readily.

March 24. *Fourth operation.*—Another seizure of one inch and a quarter grasp required the same powerful action of the screw to overcome it.

March 30. No repetition of rigors. The discharge of detritus has been considerable. The fragments are hard and angular, and have sharp edges.

April 2. *Fifth operation.*—Several seizures and crushings of small fragments made. A rigor occurred the same afternoon.

April 9. *Sixth operation.*—Crushed a very hard fragment, measuring one inch and a quarter.

April 14. Patient complains of pain in the bladder.

April 15. *Seventh operation.*—Crushed several small fragments with a duck-bill lithotrite, and brought away a large charge of detritus. A rigor occurred the same evening, followed by fever, delirium, and a restless night. Pulse feeble; patient has an air of prostration. Ordered stimulants.

April 19. *Eighth operation.*—Several small fragments were crushed. A large fragment was grasped, but proved too large to be seized by the instrument. A restless, delirious night followed, and patient complained of more pain than previously.

April 22. *Ninth operation.*—Several fragments of moderate size were crushed.

April 28. *Tenth operation.*—Again several moderate sized fragments were crushed. A free discharge of detritus is going on. Patient, however, is feeble.

May 1. *Eleventh operation.*—Two seizures of one inch grasp were crushed; both proved to be very hard. For more than a week past Mr. F. steadily failed, and died comatose May 5th.

To my regret, I can find no record of the post-mortem examination of this case. My recollection of it, however, is that the inner surface of the bladder bore no mark of abrasion or other lesion; but that pericystitis, advanced to incipient suppuration, was found in the connective tissues surrounding the bladder.

Wt. 3 ss; composition, uric acid, with a little phosphate of lime.

Case XXXVII.—Mr. R. S., aged 65, a deaf mute, resident of New Jersey, has suffered from symptoms of stone for four years, with a gradual deterioration of health and strength. His present condition is only fair. Micturition is frequent and painful; urine turbid; has tenderness on pressure over the hypogastrium.

March 16, 1865. *First operation.*—A single seizure and crushing, which was followed by an appearance of blood in the urine, and an increase of muco-pus.

March 17. Patient has fever; pulse frequent; surface hot. Ordered warm hip bath twice daily.

March 19. Fever has abated; urine still loaded with sediment.

March 20. *Second operation.*—Five successful seizures were made and detritus brought away.

March 26. Some improvement; urine is quite clear.

March 27 and 31. *Third and fourth operations.*—Four seizures and crushings on each occasion.

April 5. Patient's strength is falling off; cystitis increased.

April 8. Is growing weaker; urine very turbid; complains of pain in left side. Ordered bladder to be syringed out with tepid water.

April 9. Nausea and vomiting have supervened upon his other symptoms; his strength is steadily failing. At 11 o'clock P. M., he died.

Post-mortem examination.—Urinary organs alone examined. Both kidneys enlarged; the right more than the left. Both contained small abscesses in the cortical structure and beneath the capsule. Ureters thickened and dilated unequally. Bladder enlarged beyond its normal volume; contained a thick, chocolate-colored fluid, and several fragments of calculus. At the fundus the walls were thinned, and easily lacerated. At the bas-fond, and near the neck, the walls were thickened. From the left lobe of the prostate there projected a growth of the size of the last phalanx of the little finger, salient and encroaching upon the channel. Careful inspection of the inner surface of the bladder detected no trace of injury from the instruments.

Wt. gr. lxx; uric acid.

Case XXXVIII.—Mr. M., aged 85, resident of this city, weighing over 200 pounds, has uniformly enjoyed good health. Bladder trouble has existed more than two years. Symptoms have increased in severity for several months past. Micturition frequent and painful; walking, and especially riding in a jolting vehicle, gives pain; urine is clear and never bloody. Prostate large-sized and of firm consistency.

April 28, 1866. *First operation.*—After injecting six ounces of tepid water into the bladder, I inserted a fenestrated lithotrite and accomplished two crushings, each of three-fourths of an inch grasp. The stone was pretty hard. At 6 o'clock the same evening vomiting of bilious matter came on, and the urine was found to be bloody.

April 29. Some detritus has come away; micturition is painful; patient is annoyed by hiccup.

May 2. Micturition is still painful and frequent; urine is charged with viscid matter; pulse is rather accelerated, but there is no appreciable heat of skin.

May 4. I found this morning that Mr. M. had passed a distressing night, with frequent fruitless attempts at micturition, accompanied by excruciating pain. The discharge of urine had been scanty. At 2 P. M. pulse became extremely feeble, and patient was affected with tremors, which continued during the remainder of the afternoon. At 4:30 P. M. he died in a state of unconsciousness.

Post-mortem examination — twenty-eight hours after death. Bladder of the size of a large orange, of a livid hue externally. Its peritoneal covering smooth and shining; no exudation of lymph or adhesion to neighboring viscera. One or two ounces of brownish serum in the bottom of the pelvic cavity. The bladder after removal was found to contain a brownish turbid fluid and several calculi, three of which were entire, a fourth having been reduced to fragments. One of the three whole ones was globular and of the size of a cherry, the other two were larger, oblong and flattened. The prostate was quadruple its normal volume, its lateral lobes were symmetrically enlarged, and formed on the opposite sides of the channel a salient projection of the size of the last phalanx of the little finger. The middle lobe was less developed, and formed a slight elevation above the flow of the prostate portion of the urethra. The inner surface of the bladder was everywhere of a deep livid, red color, and its mucous membrane swollen. There was no appearance of abrasion or other injury from the jaws of the lithotrite.

Wt. 3 iijss; composition, concentric layers of uric acid with an incrustation of triple phosphates.

Case XXXIX.—Mr. J. P., aged 65, having been successfully rid of a large calculus by lithotomy ten years ago, as already reported under case twenty-nine, again became my patient in February, 1869. For more than three years Mr. P. has suffered from a return of symptoms of his old complaint. His urine, however, continues clear, and his bladder is retentive to the extent of supporting four hours of accumulation of secretion. The prostate is uniformly and moderately enlarged.

February 20. Urine having accumulated for three hours, I proceeded to insert the lithotrite without preliminary sounding, but could not advance it through the neck of the bladder, notwith-

standing the handle was depressed far toward the coccyx, and a moderate pushing force applied at the same time.

February 25. *Second operation.*—The lithotrite was now fairly passed into the cavity of the bladder, and a careful search was made, but without coming in contact with the stone.

February 26. *Third operation.*—I first explored with the ordinary steel sound, which entered the bladder readily and came promptly in contact with the stone, imparting the sensation of a hard calculus. Immediately afterward I introduced the lithotrite, but met with no better success than in my previous attempts.

March 3. *Fourth operation.*—Again, I failed to encounter the stone with the lithotrite.

March 6. *Fifth operation.*—Having again failed to seize or even to encounter the stone with the lithotrite, I expressed to Mr. P. my fears that I should be obliged to abandon further attempts and resort to lithotomy. Thus far the bladder had borne the manipulations without any sensible increase of irritability. Patient wished to confer with his family in reference to the proposed operation, and begged me to make one more trial.

February 9. *Sixth operation.*—In this attempt I first emptied the bladder with a catheter and injected six ounces of tepid water; I then inserted a large sized fenestrated lithotrite with which I seized the stone for the first time, by a grasp of one inch and a half, but was unable to overcome it by the action of the screw-power. Two subsequent seizures of smaller grasp were successful.

March 16. *Eighth operation.*—Made two seizures of three-quarters of an inch grasp with a duck-bill lithotrite, crushed them, and brought away detritus.

March 19. *Ninth operation.*—I failed this time to make any seizure. There has been no discharge of detritus. Patient complains of severe pain at the neck of the bladder, and of frequent, painful micturition. Urine is loaded with heavy viscid brownish secretion.

March 23. *Tenth operation.*—Complains of fragments at the neck of the bladder. Instead of inserting the lithotrite, I contented myself with introducing the urethral lithoclast and bringing away three fragments, which was accomplished without causing severe pain. The same evening patient had a severe rigor followed by fever and sweating.

March 24. Another rigor morning and evening with vomiting. Still no discharge of detritus.

March 25. Complains of involuntary flow of urine. Surface moist; pulse weak and irregular; respiration labored. I now urged Mr. P. to submit to lithotomy as of imperative necessity, and proposed a consultation to sustain my decision.

March 26. Patient has had fever through the night; surface relaxed and moist, pulse weak, countenance shrunken. Incontinence of urine persists. Percussion and palpation detect no distension of the bladder. Tenderness on pressure in hypogastrium is marked. Patient's general condition portends evil. Prof. A. C. Post in consultation concurred in advising lithotomy without delay.

March 26. At 12 o'clock lithotomy. Present, Drs. Post, R. F. Weir, C. M. Bell, J. N. Beekman. After etherization, which was promptly accomplished and sustained with a moderate expenditure of ether, the lateral method was executed. Two entire calculi of large size, and several broken fragments of a third calculus, originally as large as the others, were removed; they were of a cuboid shape with smooth, polished surfaces, and very hard. At the moment of incising the neck of the bladder, a quantity of urine gushed through the wound, carrying with it all the small fragments, showing a very considerable accumulation of urine in the bladder that had escaped detection. The pulse grew weaker before the effect of the ether passed off, but gradually grew stronger again under the use of stimulants. Hemorrhage was moderate. At evening, Mr. P. was quite comfortable, and expressed himself as much relieved by the operation. Pulse still irregular and weak. Respiration heavy and labored. Ordered brandy milk punch every hour, and poultices to the pubes; also sol. s. morph. Magendie gutt. xv., aq. camphor \bar{z} ss.

March 28. Patient has taken stimulants only sparingly during the night, and this morning is weaker. Hands are cold and clammy; pulse is failing, respiration is heavy, accompanied with moist râles; is somnolent and flighty. Very little urine escapes through the wound. Introduced catheter and drew off about two pints of brownish bloody urine. Urged stimulants as freely as could be borne. Patient did not rally; on the contrary he gradually sank, and died at 2 o'clock p. m. No post-mortem examination was allowed.

Case XL.—Mr. J. D.; aged 65; resident of New York city. Symptoms of stone; originated about ten years previously, after a severe attack of nephritic colic, from which he suffered in 1849, during the prevalence of cholera and dysentery, and

which, at the time, was regarded as an attack of ordinary colic. Patient has since voided small concretions at different times, and his bladder symptoms have persisted with varying degrees of severity. Mr. D. has never been sounded, and has until now withstood the urgent importunities of his family and friends to submit to an operation. The increasing severity of his symptoms has at length overcome his repugnance. The urethra is of full capacity; the prostate is moderately and symmetrically enlarged, and of firm consistency; micturition frequent and urgent. General condition is good.

January 23, 1860. *First operation.* — After etherization. On injecting three or four ounces of tepid water, the bladder immediately contracted with great energy to expel its contents. I introduced, nevertheless, a fenestrated lithotrite, which passed the neck of the bladder only after depressing the handle far toward the coccyx. The utmost care was required in manipulating the instrument, owing to the extreme irritability of the bladder.

The jaws of the instrument could only be made to graze the surface of the stone. The pain of the operation was not very severe, and ceased on the withdrawal of the instrument. At four o'clock the same afternoon a smart rigor, with fever and sweating, followed.

January 27. *Second operation.* — Mr. D., after retaining his urine for two hours preparatory to the operation, was obliged to void a portion of it. In attempting to inject the bladder, it again resented the slightest pressure upon the piston of the syringe. After the lithotrite had been introduced, I encountered the same difficulty as before, from want of space to manipulate the instrument, and could only graze the surface of the stone. No chill or aggravation of bladder symptoms followed this attempt.

January 30. *Third operation.* — The urine having accumulated for three hours, I inserted the lithotrite, but found the same difficulty as before. The stone was encountered on entering the bladder, and could only be grazed, but not grasped. Withdrawing the instrument, another, with shorter jaws, was tried, but with no better success. It was now decided to postpone further attempts, and endeavor to allay the extreme irritability of the bladder so as to enable it to tolerate a larger quantity of fluid, and thus afford room for manipulating within its cavity. About an hour after the operation patient had a rigor, followed by fever and sweating, not so severe, however, as after

the first operation Anodyne, enemata, poultices to the pubes, and warm hip baths were perseveringly employed, but without benefit. Mr. D. could seldom go beyond three-quarters of an hour without urinating, and often was obliged to relieve himself every quarter of an hour. His sufferings became extreme, but were not accompanied with fever or acceleration of the pulse. It soon became evident that lithotripsy could not be resumed, owing to the extreme irritability of the bladder, and the large size of the stone. Lithotomy was therefore advised, and urged to be resorted to without delay. Notwithstanding the severity of the bladder symptoms, the urine continued clear, and deposited only a slight layer of slime at the bottom of the vessel.

Lithotomy.

February 23. At 10 o'clock A. M. the operation of lithotomy was performed in the presence of Dr. Hyslop, Mr. D.'s attending physician, and several other medical gentlemen. After etherization, the lateral method was executed. Patient being corpulent, the perineum was found very deep, so that the cavity of the bladder could barely be reached with the end of the forefinger passed into the wound. The stone proved to be of formidable size, and when seized and brought with its long axis into a line with the blades of the forceps, it was necessary twice to enlarge the incision of the prostate before it could be extracted, and then not without employing powerful traction. It was found to have been grasped by its edges with its long axis in a line with the blades of the forceps. It weighed four ounces, three drachms and fifteen grains. The ether acted kindly, and maintained complete insensibility throughout the operation. Considerable hemorrhage accompanied the operation, and one ligature was applied. On regaining consciousness, patient complained of very severe pain and distress in the region of the wound, and became very restless. Sol. sulph. morph. Magendie gutt. xxx were given, and he soon became quiet.

In the evening Mr. D. had recovered from the shock of the operation. Pulse 88; free escape of urine from the wound; no bleeding. Ordered hot poultices to the pubes, and sol. s. morph. gutt. x every three hours. Mr. D. made an excellent and rapid recovery, without any serious drawback. On the fifteenth day he left his bed and walked across his room. On the twenty-ninth day he dined with his family down stairs. On the thirty-fifth day he rode out to Central park, the wound

being reduced to the size of a finger nail. The calculus was of an ovoidal, flattened shape, and its surface smooth. Its measurements were as follows: Length, $2\frac{1}{8}$ of an inch; breadth, $2\frac{1}{8}$ of an inch; thickness, $1\frac{1}{2}$ of an inch; circumference, lengthwise over its edge, $8\frac{1}{8}$ of an inch; over its surfaces, $7\frac{1}{8}$ of an inch; transversely across its middle, $5\frac{5}{8}$ of an inch.

April 7. The wound is entirely healed, and his general health is steadily improving. [Fig. I represents the calculus of actual size.]

Case 41.—Thos O., aged 35, a resident of this city, and a patient of St. Luke's hospital, has suffered for two years from bladder symptoms. About twelve years ago, passed some small concretions.

August 28, 1863. After injecting four or five ounces of water into the bladder, the lithotrite was inserted, but not without considerable difficulty in passing the prostate. The stone was readily felt, but could not be seized. The manipulation of the instrument caused very severe pain.

September 3. Patient has suffered from severe pain in the region of the bladder, and the urine is charged with muco-pus. This condition of the bladder, and the difficulty encountered in manipulating the lithotrite within its cavity, determined me to abandon lithotripsy and resort to lithotomy, which was performed according to the median method, with the aid of ether anæsthesia. The stone extracted was of the size of a pullet's egg, and very much flattened. Considerable hemorrhage persisted after the operation, causing prostration. On the eighth day it recurred twice, with a discharge of clots from the wound. Ice applied to the pubes and perineum arrested the hemorrhage permanently. After this, patient's recovery progressed without any hemorrhage or other complication.

Case 42.—Pat. Doolan, aged 30, a resident of this city and patient at St. Luke's hospital, has had bladder symptoms about fourteen months. After appropriate preparatory treatment during eighteen days, two unsuccessful attempts were made to crush the stone, on the 29th April and 6th May, 1864. In both cases the patient was under the influence of ether. Further treatment with the view of improving patient's general condition was continued until June 3; when it was thought best to rid the bladder at once of its contents by lithotomy. The lateral method was employed and a calculus extracted, measuring two and a half inches by one and a half. Patient made a

good recovery, and was discharged cured, on the 16th of June, the wound having entirely healed.

Case 43.—Mr. W., aged 64, a resident of West Point, on Hudson. In February, 1867, was operated on for stone, by the lateral method, after suffering from symptoms of the disease for about eighteen months. Lithotripsy had been previously attempted and abandoned, in consequence of inability to seize the stone. Though the wound of the operation healed in due time, patient only experienced partial relief from his symptoms, and they, after a certain time, again began to increase in severity, and continued to do so till March of 1868, when lateral lithotomy was a second time resorted to, after lithotripsy had been tried and again abandoned for the same reason as before. From the size of the calculus removed by the second operation (equivalent to a large sized olive), and from the fact that the first operation had been followed by only a temporary alleviation of symptoms, it was inferred that the second calculus may have been present in the bladder at the time of the first operation but had escaped detection. The relief from the second operation was not complete till after the expulsion per urethram of a small calculus, which patient discharged six weeks after the operation, the wound having already healed. It was of the size of the end of the little finger, and appeared to be made up of an agglomeration of small concretions.

Cases 44, 45.—Were both boys about five or six years old, who were operated on by the lateral method, and who both made a rapid recovery, one in three weeks, the other in five.

REMARKS.

Of the forty-five patients whose cases are herein reported, forty-one were males and four females. The ages of the males varied from 5 years to 85; of the females, from 25 to 56 years. Of those subjected to the operation of lithotripsy the youngest was 17 years old, the oldest 85 years. The ages of those subjected to lithotomy varied from 5 years to 65.

Their residences were as follows: New York city, 25; Long Island, 7; Columbia county, N. Y., 3; Greene county, N. Y., 1; Oneida county, N. Y., 1; Putnam county, N. Y., 1; West Point, N. Y., 1; Syracuse, N. Y., 1; Connecticut, 2; New Jersey, 1; Pennsylvania, 1; Georgia, 1; total, 45.

Though an aggregate of only forty-five patients is embraced in the foregoing narrative, it should be taken into account, that

five of the forty-five, had relapses which occurred after such long intervals of time and after so long an exemption from bladder symptoms, that they might fairly be regarded as the result of new formations and not of fragments left behind in the bladder. Of these five patients, two had four relapses each ; one, two ; and two, each one relapse ; in all, twelve relapses, making a total of fifty-seven cases. Fifty-five of these cases, leaving out the two boys, who were lithotomized, were subject to the operation of lithotripsy and with the following results.

Six after a trial of lithotripsy were abandoned to lithotomy, of whom one declined the operation, and five submitted to it ; of these four recovered and one died. Two were relieved and passed out of notice (cases 5 and 9). Thirty-nine recovered. Eight died, seven males, one female.

The only fatal case after lithotomy (39) more properly belongs to the account of lithotripsy ; inasmuch as after several repetitions of lithotripsy the patient's condition became such as already to portend a fatal issue, when the operation of lithotomy was resorted to, as a desperate alternative.

The mortality after lithotripsy in the aggregate cases may then be reckoned as nine in fifty-five, or in the proportion of one in six and one-ninth cases. If we now consider the mortality in reference to the cases to which the operation of lithotripsy is specially adapted, and to which it should be restricted, we find in Groups I and II, comprising thirty-one cases of this description (excluding cases 5 and 9 as incomplete), the proportion of deaths reduced to two in twenty-nine, or one in fourteen and a half cases. If to this we add the twelve relapses, the aggregate of cases is increased to forty-one, and the rate of mortality further reduced to one in twenty and a half.

If we review the causes of death in the fatal cases, of which there were nine, we shall observe that in cases 33, 34, 37, abscesses and other inflammatory products were found in the kidneys and their appendages. This condition may have co-existed with the presence of vesical calculus at the time of the operation, and its existence may not have been manifested or even suspected, but its development may have been accelerated to a fatal issue by the operation.

In cases 35, 36 and 39 the large size and extreme hardness of the stone were the causes of a fatal result, and the author does not hesitate to acknowledge that he believes a different result might have reasonably been expected had lithotripsy been abandoned and lithotomy resorted to on the first discovery of these

properties of the calculus. In the only fatal case of a female patient (23), an attack of pleuro-pneumonia supervened in the progress of treatment, and proved fatal. In case 38, of a patient 85 years old, violent symptoms manifested themselves early after the first and only operation, notwithstanding it was performed easily and expeditiously. The result of case 17 was, however, a great disappointment. The patient's good general condition, the small size of the stone, as inferred from its recent origin, and confirmed by measurement with the lithotrite, together with the favorable condition of the urethra and bladder, all concurred to encourage the anticipation of a speedy favorable result. A single crushing, easily and promptly performed, was, nevertheless, followed by unusually severe bladder symptoms, which persisted in spite of persevering antiphlogistic treatment, and proved fatal in about twelve days after the operation. In none of the cases examined after death was any abrasion of the lining mucous membrane of the bladder detected, though in all more or less congestion of that membrane was observed.

Number of Operations.

This must vary according to the size of the calculus, the facility with which the bladder rids itself of the detritus, and other conditions. In the above cases the number of repetitions of the operation varied from one to thirty-five. The intervals between the operations are determined by the behavior of the bladder and the toleration of the patient. It was only in rare, exceptional instances that the operation was repeated at a less interval than forty-eight hours. Where every thing was favorable, twice a week, and occasionally three times, was the maximum of frequency. The number of seizures and crushings at each operation should depend upon the facility with which they can be effected. They may vary from a single seizure to nineteen or twenty, as in case 31. It was, however, a rule I never departed from, to limit each operation to five minutes, that is, the time occupied with the lithotrite in the cavity of the bladder. In a large majority of my cases the time did not exceed three minutes. When difficulty was encountered in making seizures, I abandoned the attempt rather than exceed the limits of my rule. Not to attempt too much at any one operation, I regard as an important condition of success. The duration of treatment must necessarily depend on a variety of conditions, and cannot be defined by any fixed rules. In a few of the above

cases, viz: 4, 7, 14, the patients were scarcely interrupted in their daily avocations during the progress of the treatment.

Instruments.

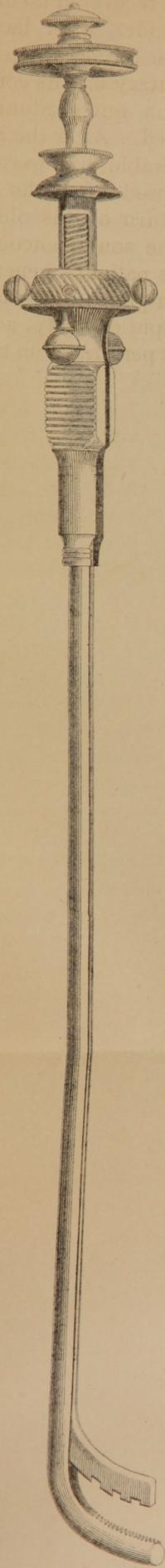
The author has made use in his operations of the fenestrated and duck-bill lithotrites of Paris manufacture, with the screw power attached. (Fig. II and III.) This power he prefers decidedly to the others in use. Its action can be applied more steadily and with less shock to the bladder. In case 10, the patient's own experience of both methods led him decidedly to prefer the screw action to percussion with the hammer, as less painful. For the dislodgment of fragments arrested in the urethra, or clustered at the neck of the bladder, the urethral lithoclast (Fig. IV) has proved a most useful instrument. The urethral forceps (Fig. V), with flattened jaws and slender blades, is also a useful auxiliary. The blunt hook (Fig. VI) may sometimes render good service, but it should be used with the utmost circumspection. In no instance has it happened to the author to have an instrument break or bend in the patient's bladder. On one occasion, while practicing on the cadaver, the jaw of the distal or female blade of a duck-bill lithotrite broke off at the bend. With a smaller sized similar instrument it was promptly caught and brought away.

Operation.

The operation of lithotripsy may be considered in its two stages: first, of introducing the lithotrite into the bladder; second, of seizing and crushing the stone.

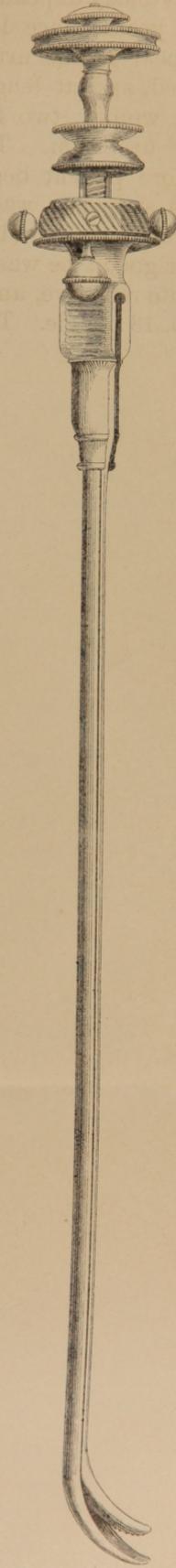
1. *The introduction of the lithotrite.* The patient being recumbent with the pelvis elevated above the shoulders, the surgeon places himself at his right side. Taking hold of the penis behind the glans, between the thumb and fingers, with its dorsum toward the abdomen and its axis in a line with poupart's ligament of the same side, he inserts the instrument into the meatus and advances it along the urethra, gliding the penis at the same time in an opposite direction upon the instrument and keeping the point of the instrument as exactly as possible in the axis of the urethral canal. When the point has reached the pubes and has advanced as far as it will in this direction under moderate pressure, the instrument and penis are to be brought into the median line, but without raising them from the abdomen.

Fig. II.



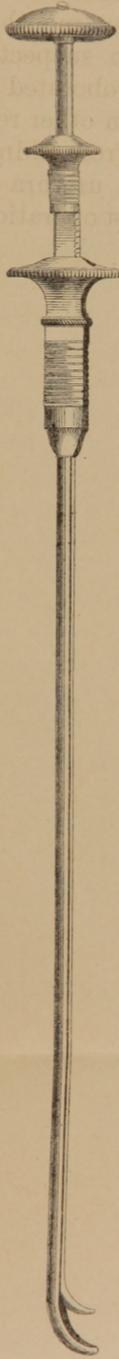
Fenestrated Lithoclast.

Fig. III.



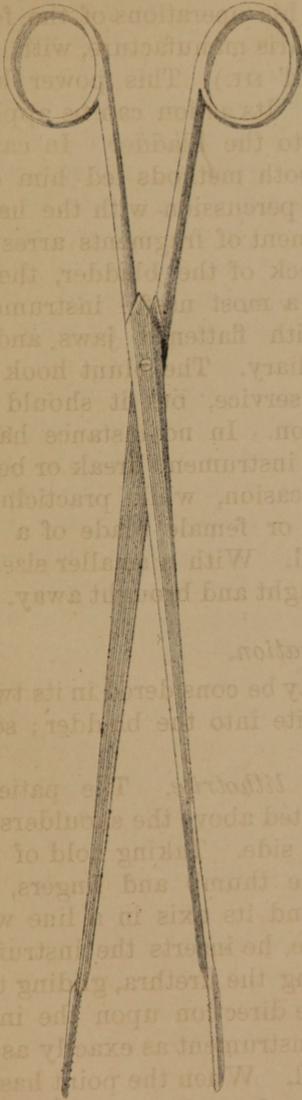
Duckbill Lithoclast

Fig. IV.



Urethral Lithoclast.

Fig. V.



Urethral Forceps

Fig. VI.



Urethral Blunt Hook

The instrument may now again be advanced a little further, until it is arrested, when it should be gradually raised with the penis from the abdomen toward a vertical position, at which moment the point of the instrument passes under the symphysis through the triangular ligament and arrives in the membranous part of the urethra. While the handle of the instrument moves gradually beyond the vertical position, descending toward the coccyx, the point advancing at the same time through the prostate, arrives in the cavity of the bladder. This is appreciated by the freedom with which it continues to advance and can be rotated on its axis. When there is enlargement of the prostate it is sometimes necessary, in order to pass through the neck of the bladder, to depress the handle of the lithotrite far toward the coccyx, and employ a moderate pushing force, under which it will advance as it were with a bound into the cavity of the bladder.

2. *Seizing and crushing the stone.* Once within the cavity of the bladder, proceed to seize the stone, without first sounding for it, as follows: Elevate the handle of the instrument toward a vertical position, whereby at the same time the jaws, with their concavity looking forward, will be depressed to the most dependent part of the bladder to which the stone gravitates. Opening the jaws freely, close them again and repeat the movement without changing their position. Then do the same, first on the right side then on the left, the jaws being directed accordingly, so as to describe a quarter of a circle on either side. These manipulations failing, the jaws may then be directed downward toward the floor of the bladder. The stone once seized, take notice of the diameter of the grasp, as indicated on the scale at the handle. With the stone held securely rotate the instrument so as to make sure that no part of the bladder has been seized with it, and at the same time use it to ascertain if another stone be present. Proceed then to apply the pressure of the hand to the crushing of the stone. If this is insufficient put on the screw power and bring it into action. The same proceeding may be repeated as often as the prescribed limits of time, say three to five minutes, will permit.

Discharge of Detritus.

The accomplishment of this part of the process is watched with great solicitude. It is chiefly effected by the spontaneous expulsive action of the bladder itself. It is a matter of surprise what large sized fragments are sometimes got rid of, without

any interference on the part of the surgeon. An arrested fragment does not always obstruct entirely the passage of urine; its irregular shape often permits a sufficient discharge to relieve the bladder of accumulation and the patient of the suffering consequent on retention. When the arrest has taken place at the membranous or prostatic portion of the urethra, the fragment may be pushed back into the bladder with a full-sized catheter or sound. When arrested further forward, the flat jaws of the urethral forceps may be glided astraddle of the fragment, so as to seize and dislodge it. The urethral lithoclast may also render valuable service in such a case. The irregular shape of the fragment will often permit the jaw of the distal or female blade to glide past it, so that, by advancing the proximal or male blade, the fragment will be caught between the jaws of the two blades and may then either be brought away entire or crushed. In only a single instance was it necessary to resort to the alternative of an external incision into the urethra, for the purpose of extracting an arrested fragment. In this case (18) the large size and flattened, irregular shape of the fragment had thwarted the most persevering efforts to dislodge it, and its extreme hardness had resisted every attempt to crush it. (Fig. VII.)

Doubtless, the most important question to be considered in connection with this subject is the choice of methods in their application to any given case of vesical calculus. The conclusions to which the author's own experience has led him may be stated as follows:

1. For patients under 17 years of age lithotomy should be preferred. Its results heretofore in such cases have been so favorable as scarcely to leave any other resource to be desired, especially now that we possess the inestimable auxiliary advantage afforded by anæsthesia. The only exception admissible to this rule might be a case not under 10 years of age, in which a stone was ascertained, by measurement with a lithotrite, not to exceed one-half to three-fourths of an inch in diameter; and which might therefore very probably be gotten rid of by a single operation.

2. For adults, lithotrity is most advantageously employed when the patient's condition is such as existed in the cases comprised in Groups I and II of this article, to wit: A moderate size calculus co-existing with a favorable condition of the urinary organs and general system; also where a like favorable condition of the local organs and general system co-exists with a calculus of large size, but not of hard consistency.

3. If a calculus be found by the lithotrite to be very hard, and to measure one inch or more in diameter, though at the same time other favorable conditions may co-exist, lithotomy should be preferred, as affording the patient the best chance of a good result.

4. Great difficulty in passing the neck of the bladder with the lithotrite, whether from enlargement of the prostate or from a fixed position of the stone itself, should deter from the employment of lithotriety.

5. In a debilitated or reduced state of the system from purulent cystitis and protracted suffering, irrespective of the size of the stone, lithotomy should be preferred. Emptying the bladder instantaneously of its foreign contents, and putting it at rest by draining off the urinary secretion, will afford the patient in such a condition the best chance to rally and recover.

6. In a case of stricture of the urethra, its complete cure should be a preliminary step to the employment of lithotriety.

Although the author's experience, communicated entire in the foregoing pages, does not embrace a very large number of cases, it authorizes him, as he believes, to claim for the operation of lithotriety a decided superiority in its application to the following cases :

1. Female patients, in whom the shortness of the urethra and its great dilatability facilitate the discharge of large sized fragments, and consequently diminish the number of operations requisite to complete the cure. In three cases of this class (21, 22, 24) it will be remembered that the patients themselves were able to extract large fragments that came within reach, and that others were readily extracted by the aid of ordinary dressing forceps.

2. In cases in which the existence of a calculus had only recently manifested itself, and in which the operation of lithotriety may be regarded as almost entirely without danger. In such cases the ordinary mode of exploration with a steel sound fails to detect the presence of the calculus, and it is only by actually seizing it with the lithotrite that its presence can be demonstrated. Cases 3, 4, 7, 12, are remarkable examples of this class.

3. In cases where the lithic diathesis is so persistent that new formations take place after a first relief, whether by lithotriety or lithotomy, and such relapses may recur almost any number of times. Remarkable examples of this class are afforded by cases 4, 7, 8, 9, 28. Though successful cases are on record of

several successive repetitions of the operation of lithotomy in the same individual, yet who would not shrink with fear from the anticipation of even a second infliction of so formidable an operation?

The perfected instruments which modern lithotrity has furnished us have also an important application in the removal of certain foreign bodies which have been introduced into the bladder from without.

The following comprises the author's experience in this department, already reported in the Medical Record of February 1, 1870:

Mr. A., a resident of Connecticut, about sixty years of age, suffering with atony of the bladder, was obliged to have a catheter introduced daily.

On Saturday, 20th November, at noon, his physician, as usual, introduced a flexible catheter, No. 7, twelve and a half inches in length, of English manufacture. At the entrance of the bladder some difficulty was encountered, but was readily overcome, and the catheter passed on its entire length till the ivory rim at its outer end reached the meatus. After clearing away some clotted blood with the wire ordinarily used for the purpose, the ivory rim dropped off into the vessel. This occurrence attracted no attention till a moment after, when, on wiping off the parts with a towel, his physician discovered, to his great dismay, that the catheter had disappeared and was out of reach. Twenty-four hours having elapsed since the previous introduction of the catheter, the bladder was distended at the time of the accident, and thus afforded room for the escape of the entire catheter within its cavity.

I first saw Mr. A. fifteen hours after the above occurrence, and found him quiet, and unconscious of the presence of the catheter in the bladder from any suffering occasioned by it. The urine still continued to dribble away as before the accident. From percussion of the hypogastric region the bladder did not appear to be very considerably enlarged in size. Digital exploration per rectum could not detect the presence of the catheter in the membranous or prostatic portions of the urethra. The prostate gland itself was found moderately and uniformly enlarged and of firm consistence. I proceeded to introduce a full-sized bougie with a tapering inner extremity, with the view of engaging it in the open outer end of the catheter, if it was still lodged in the urethra. To my no small surprise the bougie passed on into the bladder without encountering any thing in the urethra.

A large-sized silver catheter was then introduced with entire facility, and the contents of the bladder drawn off, amounting to about three pints of blood-stained urine. Nothing further at the time was attempted. At the expiration of twenty-two hours after the occurrence, another consultation was held with his physician for the purpose of removing the foreign body from the bladder. Our choice of resources lay between extraction per urethram and an incision of the neck of the bladder as for lithotomy. Having been apprised that his physician had suspected the presence of a calculus in the bladder prior to the recent accident, I had provided myself with a duck-bill lithotrite, No. 2, in addition to instruments for extracting foreign bodies from the urethra. I therefore decided first to attempt the seizure and extraction of the catheter with the lithotrite, calculating that it would have become soft and compressible by maceration in the warm urine. After the first emptying the bladder with a silver catheter No. 12, I proceeded to introduce the lithotrite, but found it would not pass the neck of the bladder, notwithstanding the catheter had passed with the greatest facility. Attempts to advance it caused severe pain and involuntary spasmodic startings on the part of the patient, which obliged me to abandon further attempts, and think of other means of relief. His physician, however, suggesting that another trial should be made with the aid of chloroform, I willingly assented, and after anæsthesia had been produced, the lithotrite was again inserted, and, to my great satisfaction, passed on into the bladder without the slightest resistance. I now commenced the search by opening the jaws of the instrument and directing them right and left, closing and opening them so as to seize the catheter. The mere contact with the catheter would not, as in the case of a calculus, convey any perception to the hand; it would only be by actual seizure that I would become aware of its presence in the instrument. Soon, however, in two or three minutes, a seizure was effected and became manifest, not by any sensation of compressing a solid substance, but by the slight degree of separation of the blades indicated at the handle of the instrument. Holding the jaws in firm contact, I proceeded to withdraw the instrument, and, on reaching the neck of the bladder, had confirmation of the success of my seizure in the resistance encountered at that point. Carrying the lithotrite over the pubes and hugging the abdomen with the handle, by moderate, steady traction I disengaged the jaws of the instrument charged with its contents from under

the symphysis pubis, and arrived in the prineal portion of the urethra, and without further resistance advanced to the meatus. I could now distinguish by the touch the doubled catheter along the under surface of the penis. With the thumb and fingers supporting the glans penis on opposite sides of the meatus, I succeeded by moderate traction in disengaging the charged jaws and bringing out the entire catheter, flattened and doubled upon itself in such a manner that one limb was about three inches longer than the other. Softened by maceration in the urine, it had adapted itself in its passage to the varying dimensions of the urethra. No hemorrhage followed, or other indications of any injury sustained by the operation. (Fig. 8.)

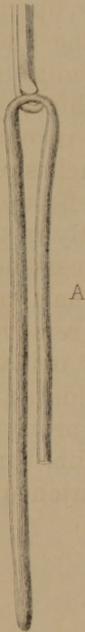
The escape of the entire catheter into the bladder is of very rare occurrence, and could scarcely happen unless the bladder itself was considerably distended, as in this instance. In former years, when bougies made of gutta percha were brought into use, cases occurred in which a few inches of the inner end of the bougie would break off, from the effect of warmth only, and remain behind in the bladder, or partly in the bladder and partly in the urethra. In my own experience, such a case occurred many years ago, about two and a half inches of a bougie remaining behind in the bladder. It was removed in the following manner: After three or four hours of urinary secretion had been allowed to accumulate in the bladder, a duck-bill lithotrite was introduced and several seizures promptly effected. In urinating the first time after the operation, three or four fragments were expelled, which, on being matched together, made up the entire original fragment. (Fig. 9.)

Fig VII



Fragment cut out from Urethra

Fig. VIII.



A

A. Flexible Catheter as seized and brought away by Lithoclast.

Fig. IX.



Fragments of a Cutta Percha Bougie expelled after being broken up by Lithoclast.



B

B Ivory Rim belonging to outer end of flexible Catheter.

SUPPLEMENTARY REPORT.

The delay in the publication of the volume for 1869 of the State Medical Society's transactions occasioned by the destruction by fire of the printing establishment of the publishers, affords the author an opportunity of submitting a supplementary report of additional cases which have occurred in his practice up to the present time.

CASE 4.—LITHOTRITY—RELAPSES.

Mr. I. N. P., whose case has already been communicated in the previous report (IV) has continued under treatment to the present time, and has been subjected to frequently repeated operations as will appear from the following enumeration :

October 5, 1870. A search with a lithotrite was made without result.

November 4. One seizure and crushing by a grasp of one inch.

November 9, 14, 30, December 4 and 10. All without result.

December 18 and 25, January 15, and February 5, 1871. Several seizures of small, soft fragments at each operation.

March 5. Two seizures of five-eighths and three-eighths of an inch grasp.

March 12. Only one seizure by reversing the lithotrite and directing its jaws toward the rectum.

April 26. A single small seizure.

May 22 and 27, June 3. Several seizures and charges of detritus brought away at each operation.

June 17, August 6, September 10 and 14. Without result.

October 16. A single seizure of three-quarters of an inch grasp.

November 15. Without result.

November 26. One seizure of three-quarters of an inch grasp.

January 9, 1872. First seizure of three-quarters of an inch grasp ; several subsequent seizures of small grasp, all soft.

Mr. P.'s general health is well sustained ; his greatest discomfort is from frequent micturition. Composition of aggregate detritus since previous report. Phosphate of lime ammoniaco, magnesian phosphate. Weight 3 ij, gr. xxxvi.

CASE 46.—LITHOTRITY.

H. B. Æt. circ. 57. A medical practitioner, resident of Connecticut, of healthy constitution, relates the following particulars

of his case: In August, 1870, after an evening walk, he passed considerable blood per urethram, and the next evening following the same thing occurred after a walk. From that time on, much walking or rough riding produced a dragging sensation in the perineum, often followed by bloody urine. About the middle of March, 1871, a surgical colleague ascertained by sounding the presence of a calculus in the bladder, and made attempts on several different occasions to crush it with a lithotrite. On the 25th April I visited the doctor at his residence and found him suffering with the ordinary symptoms of stone. The urine indicated considerable catarrhal cystitis and his general strength was below par.

1st Operation.—Without anesthesia. Five seizures and crushings with grasps of one-half and five-eighths of an inch.

2d Operation.—*May 3.* Three or four seizures and crushings of five-eighths of an inch grasp.

3d Operation.—*May 15.* Three or four seizures of one-half inch grasp and less.

On the *20th May* I visited the doctor in the city at his boarding-house.

May 22. The urine being still charged with mucopus, I commenced injecting the bladder.

4th Operation.—*May 24.* Crushed nothing; brought away a small fragment in the jaws of the lithotrite.

June 11. Resumed injections of the bladder with marked good effect.

June 24. The doctor returned home free of symptoms of any foreign substance in the bladder and improving in his general health. Composition, fusible calculus. Weight, gr. xlviiii.

CASE 47.—LITHOTRITY.

Morton, Z. G. Æt. 20. Resident of Rossie, St. Lawrence county, New York State; admitted into St. Luke's hospital June 7, 1871. He has had bladder trouble as long as he can remember. The existence of a stone in his bladder was only first ascertained by sounding in May last. His symptoms are well characterized, but only of moderate severity. His bladder is in good condition and capable of retaining its contents for three or four hours.

June 10. An explorative examination was made with a lithotrite and two seizures were promptly made, one by a grasp of one inch, the other of three-quarters of an inch, from which the

size of the stone was estimated to be equivalent to the volume of a small nutmeg. The urethra was found of normal calibre and patient's general condition was good.

1st Operation.—*June 12.* After four hours' accumulation of urine in the bladder, and without anaesthesia. Inserted first a fenestrated lithotrite and promptly made three or four seizures and crushings; the largest grasp was one inch; the stone was moderately hard. I then inserted a duck-bill lithotrite and crushed several fragments, and brought away a charge of detritus in the jaws of the instrument. The time occupied was less than five minutes, and the operation was well borne by the patient.

2d Operation.—*June 15.* Four or five seizures of small fragments were promptly executed and a charge of debris brought away.

June 20. Has passed no fragment since the day following the last operation, and is now free from any sensations of a foreign substance in the bladder. Urinates only four or five times in twenty-four hours. A final, thorough exploration with the lithotrite detected nothing remaining in the bladder. Patient tested his condition by a ride in an omnibus to the Battery and back, and suffered no discomfort.

Discharged cured, June 28.

Composition, oxalate of lime; weight, gr. xliii.

CASE 48.—LITHOTOMY.

D. Manning. *Æt.* 8, from Perth Amboy, New Jersey, admitted into St. Luke's hospital, June 13, 1871, in a miserable, emaciated condition, suffering with stone in the bladder, the symptoms of which, as his mother believes, have existed for four years. He is also suffering from intermittent fever of a tertian type. A sound introduced into the bladder readily encountered a stone.

Operation.—*June 15.* After etherization was executed according to the lateral method. After having incised the neck of the bladder, the forefinger of the left hand was introduced its entire length to dilate the opening; the stone was felt at the same time. On being seized by the forceps the stone broke and was brought away piecemeal. A second stone was then discovered and extracted entire. It was of the size of a large nutmeg, with three or four flattened facettes and a smooth surface. Both were estimated of about the same size. The second stone that came away entire afterward broke into pieces in an attempt to crowd

it into a vial. The fragments separated in a laminar form of the thickness of orange-peel, and a central nucleus of the size of a tamarind pit was inclosed in each one. They weighed 3 iv, gr. ij, and 3 iij, gr. xliv, respectively, and in the aggregate 3 vij, gr. xlvi. The hemorrhage was moderate.

June 16. Was ordered sol. sulph. quiniæ for his intermittent. He made a good recovery; on the 29th urine passed per urethram.

July 5. Patient was up and going about. The wound has healed. Micturition is performed naturally. He is regaining strength and vivacity. Discharged July 8, 1871, cured. Composition, phosphate; incrustation; urate nucleus.

Wt. 3 vij, gr. xlvi, filled an ounce phial.

CASE 49.—LITHOTRITY.

Mrs. Myrta B., Æt. 42, married, resident of New Britain, Conn., admitted into St. Luke's hospital, October 11, 1871. She states that prior to her marriage twenty-two years ago she began to pass small urinary concretions from the bladder, and to suffer from time to time from attacks of renal colic, affecting the right side. In every instance the concretions after arriving in the bladder would soon be voided in urinating. For the past two years, however, she has been conscious of the constant presence of a foreign substance in the bladder, and has often felt its movements in changing her position. The characteristic symptoms of frequent and painful micturition and turbid urine have been constantly present. She has in her possession a vial of concretions varying in size from a pin's head to a small bean, which she has passed at different times, and which are equal to a dessert spoonful. Her general health is pretty good.

1st Operation. Was performed October 14, without anesthesia, as were all the subsequent operations. The urethra was easily and promptly dilated so as to admit the forefinger. A sound introduced into the bladder encountered the stone at its entrance. Though some difficulty and delay were experienced in making the first seizure of the stone with the lithotrite, it was at length accomplished by a grasp measuring nearly two inches, and the stone was crushed with a moderate force. Several subsequent seizures and crushings were promptly effected. Owing to the dilatability of the urethra several large fragments were extracted by the aid of a polypus forceps slightly curved edgewise. A teaspoonful of detritus was got rid of by this first operation. The pain attending the manipulation of the instruments was not

excessive, and soon subsided. In this case, as in all others, hot fomentations were kept up over the pubes for several hours after every operation. Without describing in detail each subsequent operation, it will suffice to state that nine operations in all, at each of which several seizures and crushings were effected, were performed on October 16, 21, 23, 25, 28, 31, and November 3 and 6. Besides the spontaneous discharge of debris in the intervals between the operations fragments of considerable size were brought away entire in the jaws of the lithotrite. Three thorough searches of the bladder were made on the 9th, 11th and 17th November, and nothing found remaining. There has been no discharge of detritus since the day following the last operation on the 6th November. Patient's sensations no longer indicate the presence of a foreign substance, and the bladder retains its contents for three or four hours at a time. For a few days prior to leaving the hospital, Mrs. B. suffered from her old symptoms of a concretion, on its descent from the left kidney. She was discharged to return home November 29th, greatly relieved.

Composition of concretions and detritus cystine and occasional layers of phosphate.

Wt. 3 vjss, filling an ounce phial.

CASE 50.—LITHOTRITY.

Daniel E. F. Æt. 24, native of Massachusetts, resident of New Britain, Conn., a farmer by occupation, was admitted into Roosevelt hospital, November 22, 1871. Symptoms of bladder trouble first appeared in 1866, while patient was serving in the army in Texas. On one occasion after a hard march and jolting in the railroad cars bloody urine and pain in hypogastric followed. Since that time he has continued to suffer with gradually increasing severity. His present condition is good, his general health not having materially deteriorated. His bladder is retentive to the extent of three or four hours accumulation of urine. In an explorative examination with a lithotrite two seizures of the stone were promptly made, one by a grasp measuring one inch and three-quarters; the other, one inch and a half.

1st Operation.—November 29. Fearing the stone might be found too hard to admit of crushing safely, and that lithotomy might have to be resorted to, ether was administered. The meatus was found too scanty to permit the introduction of the largest sized fenestrated lithotrite and was therefore incised posteriorly toward the frœnum. The lithotrite then passed readily

and several seizures were promptly made, and crushings effected, by the application of the screw power. The stone proved to be hard and required considerable force to overcome it. The first two or three seizures measured one inch and three-quarters in diameter; subsequent ones measured less. This operation occupied scarcely five minutes, and was borne well by the patient, and followed by a large discharge of detritus. The urine during the succeeding twenty-four hours was loaded with a heavy deposit of glairy, brownish, and very tenacious secretion that adhered to the bottom of the vessel even when inverted.

2d Operation.—*December 6.* Was performed without anaesthesia. A duck-bill lithotrite was inserted and five or six seizures and crushings were promptly executed. The largest grasp measured one inch; a charge of detritus was brought away in the jaws of the instrument, and an abundant discharge of debris followed in the succeeding twenty-four hours.

3d Operation.—*December 8.* Five or six seizures and crushings were again promptly made; the largest grasp measured less than one inch.

December 10. Last evening a large sized fragment became arrested in the urethra a little anterior to the scrotum; fortunately the passage of urine was not obstructed by it. It had been already observed in withdrawing the lithotrite when charged with detritus that this portion of the urethral canal was narrower than elsewhere, and in order to pass through it it was necessary to reduce the volume of the charge by screwing the jaws of the lithotrite closer together. Persevering and repeated attempts to dislodge the fragment having failed, I visited the patient this evening, and first made renewed efforts to dislodge it with urethral forceps and then with a urethral lithoclast. Though it could be seized and held firmly by the lithoclast, it could not be dislodged, nor could it be broken by force exerted with the hand alone. I then resorted to the use of a small sized lithotrite armed with a screw power. With this I succeeded first in nipping several times the presenting edge of the fragment, and then in getting the jaws fairly astraddle of it so as to break it into two pieces by the action of the screw power. One of the pieces was at once extracted with urethral forceps and the other was soon after expelled by the patient in urinating. The soreness and swelling in the urethra, at the seat of impaction, gradually subsided under appropriate treatment.

4th Operation.—*December 13.* Several seizures and crushings

of small fragments, none exceeding one-half an inch in grasp, were rapidly effected.

December 18. All symptoms of foreign substance in the bladder have disappeared, and no discharge of detritus has taken place since the day following the last operation. A thorough search with a lithotrite detected nothing in the bladder.

December 22. Patient considers himself well, and further to test his condition, he rode in an omnibus to the Battery and back, without the slightest discomfort. Left the hospital cured, Dec. 24th, and returned to his home in Connecticut.

Composition of calculus, oxalate and phosphate of lime.

Wt. 3 ij.

No. 46 WEST 29TH STREET.

NEW YORK, *Jan.* 10, 1872.

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