anthrax albumose. Unfortunately, when, a few days later, I was inoculating mice with these cultures after a dose of anthrax albumose, I omitted to inoculate a control rabbit, so that although the culture showed itself virulent for my control mice, I have no certainty that it was still virulent for rabbits. The following experiment shows its effects on mice after treatment with anthrax albumose. Seven mice had each the millionth part of its body weight of anthrax albumose injected hypodermically. Two others had each the five-hundred-thousandth of its body weight. A week later they were all inoculated with *deuxième vaccin*. Two control mice were also inoculated, and of these one died in about thirty-six hours; the other was exceptional, inasmuch as it died only after 108 hours. Only one of the three mice, which had the five-hundred-thousandth of its body-weight of albumose, survived. Of the seven mice which had been protected by the millionth of their body-weights of albumose four died. So that in this experiment, out of ten mice inoculated, only four showed immunity against anthrax.

In another experiment, ten mice were each inoculated with the millionth part of their body-weight of anthrax albumose and with *deuxième vaccin* at the same time. Of these, three died after 108 to 116 hours; the others survived. Three others had only the two-millionth of their body-weights of anthrax albumose and *deuxième vaccin*. Two of them are now living. Four control mice were inoculated, and all died.

In my earlier experiments I gave larger doses of anthrax albumose, and on inoculation with anthrax the animals died, often before the control animals. For instance, I have had several cases of mice dying twelve to sixteen hours after the inoculation with virulent anthrax. In the spleen pulp of rabbits and guinea pigs, however, I almost always found under these conditions numerous phagocytes. In these the bacilli sometimes showed signs of degeneration, but more often appeared to be alive and growing. Sometimes the long chains of bacilli, so characteristic of the growth of attenuated anthrax, appeared to be growing out of the cells. In one case (a rabbit which died only 150 hours after inoculation) the only bacilli that I could find in the spleen were contained in phagocytes. I have found these phagocytes in rabbits not only after inoculation with *deuxième vaccin*, but also after virulent anthrax. In mice I have never found phagocytes, but often after a large dose of albumose and attenuated anthrax the bacilli in the spleen appeared to be in longer chains than in the control mouse. The appearance of these phagocytes and chains of bacilli led me to try the effect of very minute doses of anthrax albumose with the favourable results described above, for the possibility suggested itself that these phenomena were indications of a commencing immunity. In several experiments the animal received the anthrax only several days after a large dose of albumose; but in these cases also death ensued in a longer or shorter time than usual, according to the quantity of anthrax albumose injected; while numbers of phagocytes were usually to be seen. Apparently the albumose had remained in the system, or at any rate only a small part of it had been excreted. Beyond this power of conferring immunity with a small dose, or of hastening the course of the disease with a slightly larger dose, this albumose does not show clearly any physiological action in the quantities employed. I often noticed, however, that for a couple of days after larger doses the mice appeared to be sleepier than the control mouse living in the same cage.

Although the following inferences seem capable of explaining the above results more simply than any other theory, I do not pretend that they are as yet satisfactorily proved. I only wish to assert that my results make it probable that:

1. The anthrax bacillus owes its power of living in the animal body to its power of producing a poisonous albumose.
2. That this poisonous albumose is capable of suppressing the "germicide power" of the living animal.
3. That this albumose seems to be very slowly excreted.
4. That if a large dose of this albumose is injected into an animal, the entry of anthrax bacilli into the system is aided.
5. That if a very small dose of this substance is administered, tolerance is acquired against its poisonous properties. Consequently, when after a few hours or days the anthrax virus attempts to suppress the germicide power of the animal by means of its albumose, it is unable to do so because the animal has already acquired tolerance of its poisonous quality.
6. With a dose of anthrax albumose intermediate between that employed in the above two cases, death ensues in the usual time or (in other cases) life is greatly prolonged. Apparently in this case

complete tolerance of this comparatively large dose of albumose is unattained. Consequently the anthrax bacilli are able to live and produce more of their albumose, and at length by this means overcome the resisting power of the animal.

My observations have been made on over a hundred mice and about fifty rabbits. My best thanks are due to Professor Koch and to Drs. Fränkel and Weyl for their very kind advice and assistance.

RECENT EXPERIENCES IN THE SURGERY OF STONE IN THE BLADDER: 100 LITHO- LAPAXIES AND 32 LITHOTOMIES.¹

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IN the JOURNAL of December 24th, 1887, a paper of mine was published, entitled "A Recent Series of 100 Cases of Operation for Stone in the Bladder without a Death," which brought down the record of my operations for stone by all methods—421 in number—to August 8th, 1887. Between this latter date and the present time (April, 1889) I have operated on 132 cases of vesical calculus—100 by litholapaxy and 32 by lithotomy. I now propose giving some details of these operations, and transcribing from my notebook some observations of a practical character, jotted down from time to time whilst the occurrences or reflections to which they have reference were green in my memory. I must premise, however, by saying that I shall avoid going over ground already travelled in my published writings, except in so far as it may be necessary to modify or accentuate some previously recorded observations. It is necessary to mention this, lest to some of my readers this paper should appear more or less fragmentary.

In the table (No. 1) which follows will be seen at a glance the chief features of interest in the 100 cases of litholapaxy; whilst a second table (No. 2) is added, giving details of the 32 cases of lithotomy. I shall deal first with the litholapaxy cases, to which my remarks in this paper shall mainly be confined, devoting particular attention to the development of this operation in male children.

Amongst the 100 cases of litholapaxy there were 66 adults—64 males and 2 females—and the average age of these was 48 years nearly, ranging from 18 to 25. There were 34 children—33 boys and 1 girl—and the average age was $7\frac{1}{2}$ years approximately, varying from $1\frac{1}{2}$ to 14. I notice that Mr. Cadge, in his able article on "Lithotripsy," in Heath's *Dictionary of Surgery*, in a very friendly notice of my work, in referring to my first series of 108 cases of litholapaxy in adults, in which the average age was 47, writes: "Thus there were more young and probably healthy persons than English lithotritists are accustomed to meet with." The actual average age of my litholapaxy cases is, undoubtedly, less than that recorded by some European surgeons; but, as I have never refused any patient suffering from stone the benefit of operation, this is due entirely to the fact that the normal span of life amongst natives of India is much less than that of Europeans. I do not know if there are any trustworthy statistics published on this point, but I fancy that, in round numbers, a native of India at the age of 50 is comparatively as old as a European of 60. Like the rank vegetation by which they are surrounded, the races of warm climes are reproduced more rapidly, spring up to maturity at a much earlier age, and decline and die at an earlier period than in the case of those born in cooler regions.

The average number of days spent in hospital, or, in the case of patients in private practice, under treatment, was $5\frac{1}{2}$ nearly, the average for children being practically the same as that for adults.

The average weight of calculus in the 100 cases of litholapaxy was 184 grains, the average for adults being 221 grains, and that for children 112 grains nearly.

In my paper published in the JOURNAL of December 24th, 1887, already referred to, I intimated that, influenced by the very excellent results obtained by Dr. Keegan from the practice of litholapaxy in male children, I had abandoned the position of opposition which I, in company with other surgeons generally, had

¹ This paper was written in April last, but its publication deferred, as I had at one time hoped to be able to be present at the annual meeting of the British Medical Association, and read a paper on the subject dealt with.

previously maintained in regard to litholapaxy in males below the age of puberty. I then gave details of 16 cases of stone in male children in which I had successfully performed litholapaxy. Since that time 64 male children suffering from stone have come under my treatment, and in 33 of these I have performed litholapaxy, in all with complete success. I attempted litholapaxy in all the cases, but in 29 I found it necessary to have recourse to lithotomy. The proportion in which litholapaxy was not feasible is large, but this is due to the length of time it takes to procure lithotrites of small size from the good instrument makers nowadays, so that the smallest lithotrite in my possession previous to September, 1888, was a No. 7. In that month I received a No. 5 lithotrite from Weiss, and since then, out of 13 cases of stone in children I have disposed of 12 of them by Bigelow's operation, only one case in which the urethra admitted only a No. 3 sound being relegated to lithotomy. I may say that lithotomy in the adult has now been practically blotted out of my practice, only 4 out of 131 cases of stone in the adult that have come under my care since January 1st, 1886, having been operated on by this method (3 suprapubic and 1 median), litholapaxy having been found feasible in all the other 127 instances; and, after having now performed 49 litholapaxies in male children and 3 in female children without a death, I have no hesitation in saying that I confidently look forward to lithotomy in children meeting with a similar fate. I will now give details of some interesting cases of litholapaxy in children.

Case XLVII.—H. U., a Mahomedan male child, aged 9, was admitted to the Moradabad Civil Hospital May 23rd, 1888, suffering from stone, the symptoms of which had existed four years. He was suffering from fever, and extremely emaciated. The urine was passed in drops every few minutes with great pain. The child danced with agony, rolled about on the floor, and screamed with pain when he attempted to micturate. The prepuce was inflamed and ulcerated, the result of the child constantly pulling at it. A large stone was detected on sounding.

On May 25th I performed litholapaxy. A No. 8 lithotrite was passed with ease, and the stone at once grasped; but as it was found to measure an inch and a half in diameter, the lithotrite would not lock on it. This diameter was then changed for a shorter, on which the lithotrite locked; but the stone was so hard that the lithotrite failed to crush it. I then grasped the stone by one end, and after some manipulation broke off a portion. This was then reduced to fine *débris*, and evacuated through a No. 10 cannula. The lithotrite was now again introduced, and another portion of the stone chipped off and treated in a similar manner. This process was continued, and varied from time to time by scraping the sides of the stone by the jaws of the lithotrite, till the whole stone was eventually disposed of, the operation lasting two hours and five minutes. The calculus was extremely hard and tough, composed of carbonate of lime, resembling white marble. The *débris* when dry weighed 765 grains. The lithotrite was fourteen times introduced, and the cannula some sixteen or eighteen times; yet there was scarcely a trace of blood during the whole operation.

When I commenced this operation I had no idea that the calculus was such a large and hard one, and I must confess that during the operation I had grave misgivings as to the advisability of continuing it; the child was so weak, the stone so large and hard, and the operation so prolonged. Still I persisted, till the whole stone was removed. The child was extremely exhausted after the operation, and did not regain consciousness for two or three hours. Considering that the temperature in the operating room was 95° F., I may regard this as one of the hardest day's work I have ever performed.

The child had slight fever in the evening, but none on the 26th. On the 27th I had the pleasure of showing the case to Surgeon-Major R. Drury, of the Medical Staff. The child was then sitting up in bed, quite well and happy. On June 6th the child was discharged cured, and was brought to hospital on the 12th in excellent health.

This is, I believe, the largest calculus that has ever been removed from a child by litholapaxy; and I must confess my astonishment at the wonderful working power of a No. 8 lithotrite, as manufactured by Weiss. The case generally illustrates the manner in which, by the process of chipping and scraping—if I may so call it—a small lithotrite may be made to do work for which it was never intended; so that comparatively large stones may be thus disposed of—a matter of great significance when we have to deal with the narrow urethra of children. As I regard

this process as of great practical importance, will venture to give another case in illustration of its working.

CASE LXXXIII.—A male child, aged 10, admitted to hospital December 7th, 1888, with symptoms of stone of one year's duration. Health very bad. On the 8th I performed litholapaxy. The largest lithotrite that I could introduce was a No. 5. With this the stone was easily caught, but, owing to its size, the instrument could not lock. Time after time I grasped the sides of the calculus by the lithotrite, which was then screwed home, thus scraping off portions of the crust. In this way the main body of the calculus was reduced to such a size that the lithotrite eventually locked on it, when it was easily disposed of. The operation lasted sixty-five minutes, and the *débris* of the calculus, which was mainly uric acid, weighed 275 grains. The urethra, for a child of this age, was very narrow, only admitting a No. 6 cannula. The child was much exhausted after the operation, and passed no urine till evening, when, under the influence of hot fomentations to the perineum, a full flow of blood-stained urine came away. On the 10th the child was sitting up in bed, and was discharged cured on the 13th.

The process of scraping the surface of calculi here described is very tedious work, and demands much care, patience, and perseverance for its accomplishment. It will sometimes be facilitated by the fact that many calculi have alternate concentric layers of hard and soft matter. And here I may mention that my experience is that calculi in children are, as a rule, softer than in adults—a circumstance which, of course, much facilitates the crushing portion of the operation.

The current through a No. 6 cannula, even with the strongest aspirator, is very weak, and consequently it is necessary to crush the *débris* into very fine powder to facilitate its evacuation through a tube of this size. The shorter the course of the stream the greater its strength, so recently I have had very short canulae (only 7½ inches in length) made for young children, and find that they work better than the longer ones.

From the list of litholapaxy operations, it will be observed that many very young children were thus operated on. The youngest child on whom I have performed litholapaxy was one 18 months old, the details of which are as follows:—

CASE LXXII.—A male child, aged 18 months, suffering from symptoms of stone for two months, was admitted to the Moradabad Hospital November 2nd, 1888. On passing a sound a faint click was heard. Next day I performed litholapaxy, and had the honour of operating in presence of Surgeon-General W. R. Rice, Inspector-General of Civil Hospitals. A No. 5 lithotrite passed into the bladder with the greatest ease, and the tiny stone was soon caught and crushed. On withdrawing the lithotrite some difficulty was experienced in extracting it. This was due to congestion of the urethra and spasm. The operation lasted only eight minutes, and the *débris* when dry weighed only 3 grains. I saw the child in the evening, and he was then passing urine freely and without pain. Next day he was well in all respects. On the 5th—two days after the operation—the child was taken to the railway station in order that Dr. Rice, who was passing through, might see him, and he expressed much pleasure at the rapid and successful cure in a child of this tender age.

This is, as far as I am aware, the youngest child on whom litholapaxy has as yet been performed, and the facility with which a No. 5 lithotrite and a No. 6 cannula passed through the urethra convinces me that the modern operation for stone is practicable in even younger children. I have now performed 305 litholapaxies in patients varying in age from 1½ to 96 years, so that practically no age can be said to be a bar to the performance of the operation.

Turning now to litholapaxy in the adult, there were amongst the 66 cases thus operated on many presenting complications, such as stricture of the urethra, enlargement of the prostate, etc. As, however, I have dealt pretty fully with these complications in former papers, and particularly in my work on litholapaxy,² my present remarks shall be confined mainly to two or three cases presenting complications not previously dealt with. I must, however, in the first place, give particulars of the case of death which occurred in connection with this operation.

CASE XXIX.—A Mahomedan male, aged 60, was admitted to the Moradabad Civil Hospital, February 21st, 1888, suffering from symptoms of stone, which had existed four years. A large calculus was detected by the sound. The patient had been passing gravel for several years, accompanied from time to time by severe

² *The Modern Treatment of Stone by Litholapaxy.* London: J. and A. Churchill.

pain in the loins. He was suffering from fever, which had come on daily for weeks, so that the patient was in an extremely weak state of health. On February 25th I performed litholapaxy, Dr. W. R. Rice being present. A medium-sized lithotrite was first introduced, but failed to lock on the stone. My largest lithotrite was then passed readily, the stone caught and easily crushed, and the *débris* evacuated through a No. 18 cannula, three introductions of the instruments being necessary. There was no bleeding, and the operation presented no difficulties, the whole of the *débris* of a hard uric acid calculus, weighing 1 ounce 7 drachms, being removed in half an hour.

The patient did very well for the first two days, passing urine copiously, and suffering merely from slight fever every evening. On the 27th I found him sitting up in bed smoking the "hookah," and quite cheerful. Next morning he was found in bed insensible, and suffering from all the symptoms of uræmic poisoning. Later on he partially regained consciousness, and complained of pain in the back and pit of the stomach; but died in the afternoon.

At the necropsy there was nothing abnormal found in the condition of the bladder, save that the mucous membrane was chronically thickened, and slightly congested over a space the size of a sixpenny bit at the fundus. The left kidney was healthy. The right kidney was found enormously enlarged and inflamed, with pus flowing freely on section. Two large uric calculi, embedded in and connected by phosphatic matter, and weighing 2 drachms, were found filling the pelvis and calyces. Death was thus due to inflammation of the kidney, the result of kidney calculus. Whether, considering the fever from which the man had suffered before the operation, the inflammation had set in before his admission to hospital, or whether the operation acted as an exciting cause in producing the inflammation, it is impossible definitely to say; but I am inclined to regard the fever from which he had suffered before admission to hospital as symptomatic of kidney mischief. At any rate, the case must be accepted as one of death in connection with the operation.

Cases of stone complicated by stricture I almost invariably treat by performing internal urethrotomy, and at once proceeding to deal with the calculus by litholapaxy. The following case is interesting, illustrating as it does the fact that the existence of a bad double stricture is no bar to the performance of litholapaxy.

CASE LXXVI.—A Hindu male, aged 55, came to hospital November 7th, 1888, with symptoms of stone and stricture, from the latter of which he had suffered for several years. He was in extremely feeble health—a mere skeleton in fact—and so weak that he could not leave his bed. On examination, it was found that there were two strictures, one at the orifice of the urethra, extending 2 inches backwards, admitting a No. 5 catheter, and a second $4\frac{1}{2}$ inches from the orifice of the same calibre. A stone was detected by the metal catheter. The patient being put under preparatory treatment, on December 11th a soft No. 5 catheter was tied in. Next day both the strictures were divided fully by the urethrotome, and a No. 15 conical steel sound at once passed. By means of a No. 8 lithotrite the stone was then crushed, and evacuated through a No. 14 cannula. The calculus, which was phosphatic, weighed 122 grains. The patient made an uninterrupted recovery. On the 14th he was sitting up in bed, on the 16th a No. 14 steel sound was introduced, and on the 18th he was discharged cured.

It will be noticed from Table No. 1 that in many cases stones of considerable size were crushed and evacuated in a few minutes. The following may be taken as an instance of rapidity of execution:—

CASE XXXVII.—A male Hindu, aged 60, came to hospital April 17th, 1888, in very feeble health, suffering from stone, the symptoms of which he stated had only troubled him for six months. A large calculus was detected on sounding. The patient was at once anaesthetised, and litholapaxy performed. My largest lithotrite was passed into the bladder with ease, and, on opening the blades, the stone was at once caught. Its length, however, being three inches, the instrument could not lock on it, so I caught the stone by a shorter axis. The calculus was then easily disposed of, not being very hard, as it was composed of a mixture of urates and phosphates. I crushed the stone completely before the lithotrite was withdrawn. The *débris* was washed out through a No. 18 cannula, and weighed 485 grains. The whole operation lasted only ten minutes. Next day I had the pleasure of showing this man to Dr. Richardson, Sanitary Commissioner. On the 20th he was quite well, and it was with difficulty I persuaded him to remain till the 22nd, when he was discharged.

I am now in the habit of crushing as much as possible of the stone at each introduction of the lithotrite before withdrawing the instrument, so that in most cases of stones of ordinary size one introduction only of the instrument is necessary. It will be observed that in 48 out of the 100 cases of litholapaxy here referred to the crushing was completed at one introduction of the lithotrite. The repeated introduction of instruments should, I think, be avoided as much as possible; and this is particularly necessary when the urethra is not capacious, or when some difficulty has been met with in introducing the instruments originally. I consider, further, that (all undue haste and roughness of manipulation being avoided) it is desirable to complete the operation as rapidly as possible. This is particularly the case when the patient is old and much worn out by the disease. Prolonged narcosis from chloroform or any other anaesthetic in such cases is not, in my opinion, as harmless as it is sometimes made out to be.

The following case illustrates a difficulty I had not previously met with, as also the manner in which this difficulty may be overcome:—

CASE LXX.—A Hindu male, aged 25, was admitted to the Colvin Hospital, Allahabad, on October 17th, 1888, with symptoms of stone, which had existed some three months. Five months previously he had had litholapaxy performed by another surgeon. In addition to the usual symptoms there was some dribbling of urine.

On October 18th I performed litholapaxy, Surgeons Emerson and Fisher, I.M.S., and Dr. G. Griffiths, E.I.R., being present. A No. 14 solid steel sound was first introduced and passed over a small stone at the neck of the bladder, grating against it. I then passed a medium-sized lithotrite and made many unsuccessful attempts to catch the stone. The lithotrite was then withdrawn, and three or four ounces of water injected into the bladder. The lithotrite was again introduced; but, though the stone grated against the instrument at the neck of the bladder, by no manoeuvre could I catch it. I therefore endeavoured to dislodge the stone backwards by introducing a No. 16 cannula as far as the stone, and then injecting a strong stream of water from the aspirator, but with no success. I was then much exercised in mind as to what course to adopt, when I suddenly bethought me of introducing a small No. 5 child's lithotrite as far as the stone, which, after some manipulation, was caught in position and easily crushed there. The *débris* was washed out through a No. 16 cannula, and weighed 24 grains. The operation lasted twenty-three minutes, but most of the time was spent in endeavouring to catch the stone in the first instance. On the 20th the patient was all right, save that dribbling of urine still continued. Iron, belladonna, and nux vomica were prescribed. The patient left hospital on October 30th, the urine still continuing to dribble slightly.

In my previous writings I have dwelt on the comparatively trivial nature of Bigelow's operation when the stone is small. There are certain conditions, however, under which even in such cases the operation is not devoid of danger, as the following case exemplifies:—

CASE LXIX.—A Mahomedan, aged 32, came to the Colvin Hospital, Allahabad, October 4th, 1888, suffering from retention of urine, due to stone impacted in the prostatic urethra. The bladder was enormously distended and the man in fearful agony. The assistant-surgeon relieved him by the catheter, pushing the calculus backwards into the bladder.

Next day I performed litholapaxy, Surgeon J. W. Irwin, Medical Staff, being present. The calculus, which was a small one, weighing six grains only, was easily caught and crushed, and the *débris* removed through a No. 14 catheter, the operation lasting only five minutes. During the night after the operation the patient had high fever—temperature 106° F.—and was wildly delirious. On the 6th, the fever was less; but the pulse was extremely weak and rapid, with cold, clammy perspiration; so that we feared the man was dying. He was, however, passing urine freely and without pain. On the 7th the fever continued, but the patient was stronger. On the 8th the fever had almost disappeared; and by the 12th he was quite well.

I have recorded this case in detail, as bearing on a question of changing nomenclature recently proposed by Sir H. Thompson. It will be within the recollection of the readers of the JOURNAL that the publication of my paper in the JOURNAL of December 24th, 1887, already referred to, called down on my head the virtuous indignation of Sir Henry's pen—his contention being that twelve instances of small stone therein recorded ought not to be regarded

TABLE I.—Showing particulars of 100 Litholapaxy Operations.

Serial Number.	Date of Operation.	Age.	Sex.	Caste.	Number of Days in Hospital.	Number of Sitzings.	Number of Times Lithorite was Introduced.	Size of Cannula.	Weight of Calculus.			Variety of Calculus.	Time Occupied by Operation.	Duration of Disease.	Result.
									Ozs.	Drs.	Grs.				
1	August 11, 1887	Yrs	M.	H.	8	1	1	16				Oxalate of lime	Min.	8 years	Successful.
2	" 13, "	34	F.	H.	2	1	3	18				Uric	11	4 "	"
3	" 13, "	20	F.	H.	2	1	5	12				Uric and phosphate	12	4 "	"
4	" 14, "	6	F.	H.	2	1	1	12				Uric	30	4 "	"
5	September 9, "	85	M.	H.	3	1	1	12				"	5	3 "	"
6	" 15, "	80	M.	M.	3	1	1	16				"	5	6 months	"
7	" 21, "	25	M.	H.	5	1	2	16				"	15	4 years	"
8	October 11, "	50	M.	H.	4	1	1	16				Phosphate	6	2 months	"
9	" 11, "	14	M.	H.	4	1	2	18				Uric	6	3 years	"
10	" 25, "	30	M.	M.	5	1	1	16				"	20	4 "	"
11	" 25, "	65	M.	M.	6	1	2	16				"	5	1 month	"
12	November 7, "	22	M.	H.	5	1	1	16				"	12	7 years	"
13	" 9, "	12	M.	M.	8	1	3	11				"	10	1 "	"
14	" 18, "	7	M.	H.	5	1	3	12				"	40	3 "	"
15	December 4, "	10	M.	H.	4	1	2	10				"	15	1 "	"
16	" 10, "	20	M.	H.	5	1	1	16				"	15	3 "	"
17	" 17, "	10	M.	H.	7	1	2	10				"	15	1 year 6 months	"
18	" 17, "	3½	M.	M.	7	1	3	10				Uric and phosphate	9	1 year	"
19	" 18, "	65	M.	H.	5	1	1	16				"	15	1 year 6 months	"
20	" 20, "	13	M.	H.	4	1	2	12				Uric	10	2 years	"
21	" 20, "	45	M.	M.	2	1	0	16				Phosphate	10	1 "	"
22	" 29, "	10	M.	H.	4	1	2	10				Uric	5	2 months	"
23	January 11, 1888	14	M.	H.	5	1	1	10				Oxalate of lime	30	1 year 6 months	"
24	" 16, "	60	M.	H.	4	1	1	14				Uric	10	6 months	"
25	" 19, "	12	M.	H.	4	1	1	10				Phosphate	8	1 year	"
26	" 23, "	32	M.	H.	4	1	1	16				"	8	6 months	"
27	February 21, "	55	M.	M.	6	1	3	16				Uric	5	3 "	"
28	" 25, "	32	M.	H.	4	1	2	16				"	15	1 year	"
29	" 25, "	60	M.	H.	—	1	3	18				"	8	1 year 6 months	"
30	March 9, "	5	M.	H.	7	1	1	10				"	30	4 years	Died.
31	" 10, "	45	M.	H.	6	1	1	16				Phosphate	8	2 "	Successful.
32	" 11, "	73	M.	H.	16	2	1	16				Uric	8	2 "	"
33	" 15, "	8	M.	M.	11	1	2	10				"	10	1 "	"
34	" 28, "	64	M.	M.	6	1	1	10				"	15	2 "	"
35	April 15, "	11	M.	H.	5	1	6	10				"	10	1 "	"
36	" 16, "	60	M.	H.	5	1	3	18				Uric and phosphate	45	1 "	"
37	" 17, "	60	M.	H.	5	1	1	18				Uric	27	5 "	"
38	" 20, "	54	M.	M.	9	1	1	8				Phosphate	10	6 months	"
39	" 23, "	60	M.	H.	4	1	1	14				Uric	15	6 "	"
40	" 26, "	35	M.	M.	4	1	1	16				"	6	3 "	"
41	May 2, "	65	M.	H.	5	1	3	18				Uric and phosphate	5	1 year	"
42	" 4, "	40	M.	H.	3	1	1	18				Uric	30	2 "	"
43	" 10, "	50	M.	M.	12	1	5	16				"	4	6 months	"
44	" 11, "	12	M.	M.	4	1	2	10				Uric and phosphate	35	3 years	"
45	" 14, "	10	M.	M.	5	1	2	10				Uric	11	6 months	"
46	" 24, "	44	M.	M.	5	1	2	18				"	20	2 years	"
47	" 25, "	9	M.	M.	13	1	14	10				"	17	4 "	"
48	" 28, "	40	M.	H.	3	1	0	18				Carbonate of lime	125	4 "	"
49	" 31, "	60	M.	M.	9	1	1	14				Uric	2	1 month	"
50	June 1, "	18	M.	H.	7	1	1	16				Phosphate	5	3 "	"
51	" 2, "	10	M.	H.	6	1	4	10				Oxalate	8	4 years	"
52	" 4, "	65	M.	M.	4	1	1	14				Uric	20	6 "	"
53	" 8, "	80	M.	H.	8	1	2	16				"	5	6 months	"
54	" 14, "	24	M.	M.	8	1	1	9				"	8	2 years	"
55	August 2, "	60	M.	H.	7	1	1	14				"	10	2 months	"
56	" 2, "	25	M.	H.	4	1	2	16				Uric and phosphate	4	1 year 6 months	"
57	" 2, "	42	M.	M.	5	1	4	16				"	15	2 years	"
58	" 3, "	45	M.	M.	4	1	1	14				"	2	2 "	"
59	" 4, "	65	M.	H.	7	1	3	16				Oxalate	10	2 "	"
60	" 4, "	50	M.	M.	5	1	3	16				Uric	20	2 "	"
61	" 7, "	7	M.	M.	8	1	2	8				"	15	6 months	"
62	" 7, "	70	M.	M.	11	1	1	18				"	15	5 "	"
63	" 13, "	63	M.	M.	6	1	1	16				Phosphate	10	6 "	"
64	" 15, "	58	M.	H.	6	1	1	16				Uric	9	6 "	"
65	" 17, "	65	M.	H.	6	1	1	16				Phosphate	15	10 "	"
66	" 28, "	5	M.	H.	5	1	1	9				Uric	4	4 "	"
67	September 12, "	19	M.	H.	4	1	2	16				"	18	6 "	"
68	" 27, "	34	M.	H.	3	1	1	6				"	27	1 year	"
69	October 5, "	32	M.	M.	7	1	1	14				"	15	2 "	"
70	" 18, "	25	M.	H.	14	1	1	16				"	5	6 months	"
71	" 26, "	55	M.	H.	3	1	1	16				"	23	3 "	"
72	November 3, "	14	M.	M.	2	1	1	6				"	4	5 "	"
73	" 5, "	85	M.	H.	4	1	1	16				Phosphate	8	2 "	"
74	" 6, "	80	M.	M.	4	1	1	18				"	5	6 "	"
75	" 8, "	18	M.	M.	7	1	3	11				"	5	6 "	"
76	" 12, "	55	M.	H.	6	1	3	14				"	35	5 years	"
77	" 20, "	38	M.	M.	9	1	3	16				Uric	16	2 "	"
78	" 21, "	45	F.	H.	6	1	2	18				"	40	3 "	"
79	" 21, "	45	M.	H.	8	1	1	16				"	10	5 "	"
80	" 22, "	28	M.	H.	4	1	2	16				Phosphate	25	2 months	"
81	December 1, "	45	M.	H.	3	1	2	16				"	15	1 "	"
82	" 8, "	55	M.	M.	5	1	2	16				Uric	15	3 "	"
83	" 8, "	10	M.	M.	4	1	6	6				"	15	3 "	"
84	" 14, "	10	M.	M.	7	1	3	9				"	65	1 "	"
85	" 16, "	60	M.	M.	5	1	4	10				"	20	1 "	"
86	" 16, "	4	M.	M.	5	1	4	16				"	30	2 "	"
87	" 21, "	25	M.	H.	6	1	4	18				"	35	2 "	"
88	" 25, "	40	M.	M.	5	1	1	16				"	50	7 "	"

TABLE I.—(continued).

Serial Number.	Date of Operation.	Age.	Sex.	Caste.	Number of Days in Hospital.	Number of Sitzings.	Number of Times Lithotrite was Introduced.	Size of Cannula.	Weight of Calculus.			Variety of Calculus.	Time Occupied by Operation.	Duration of Disease.	Result.
									Ozs.	Drs.	Grs.		Min.		
89	January 7, 1889	Yrs	M.	H.	3	1	4	9		2	0	Uric	25	1 year	Successful.
90	" 9, "	35	M.	H.	4	1	1	18		7	5	"	10	2 "	"
91	" 25, "	3	M.	H.	4	1	1	7			10	"	5	2 months	"
92	February 1, "	12	M.	H.	4	1	1	8			6	"	5	15 days	"
93	" 3, "	20	M.	M.	4	1	3	16		5	58	"	21	3 years	"
94	" 9, "	2½	M.	H.	5	1	1	6			7	"	10	3 months	"
95	" 27, "	80	M.	M.	4	1	1	16		2	55	"	8	1 year	"
96	March 6, "	2½	M.	H.	5	1	3	7			55	"	25	1 "	"
97	" 12, "	3	M.	H.	5	1	1	8			32	"	10	6 months	"
98	" 25, "	55	M.	M.	6	1	5	16	3	0	23	"	35	4 years	"
99	April 5, "	4½	M.	H.	6	1	3	8		1	9	"	25	1 "	"
100	" 17, "	70	M.	M.	5	1	3	16		5	15	"	10	1 "	"

TABLE II.—Showing Particulars of 32 Lithotomy Operations.

Serial Number.	Date of Operation.	Age.	Sex.	Caste.	Number of days in Hospital.	Weight of Calculus.			Variety of Calculus.	Duration of Disease.	Result.
						Ozs.	Drs.	Grs.			
1	August 5, 1887	Years.			11			6	Uric	1 year	Successful.
2	" 8, "	4	M.	H.	13			20	"	3 months	"
3	September 15, "	6	M.	H.	10			10	"	2 years	"
4	" 21, "	8	M.	H.	17		2	50	"	3 "	"
5	October 12, "	3	M.	H.	9			12	"	3 months	"
6	November 3, "	11	M.	M.	17			40	"	1 year	"
7	" 9, "	5	M.	H.	13			30	Phosphate	1 "	"
8	" 16, "	3	M.	H.	11			2	"	4 months	"
9	" 21, "	2½	M.	H.	22			5	Uric	6 "	"
10	December 3, "	2½	M.	H.	16		1	50	"	2 years	"
11	" 14, "	3	M.	H.	12		1	40	"	2 "	"
12	" 20, "	3	M.	M.	29			20	"	1½ "	"
13	" 23, "	4	M.	H.	10		7	5	"	2 "	"
14	January 8, 1888	2½	M.	M.	10			58	Phosphate	1 "	"
15	March 16, "	2½	M.	H.	17			4	Uric	6 months	"
16	" 18, "	3	M.	H.	23			4½	"	2 "	"
17	" 22, "	12	M.	M.	20		1	55	"	2 years	"
18	" 27, "	4½	M.	M.	17		6	40	Phosphate	8 months	"
19	" 28, "	5½	M.	H.	27		2	25	Uric and phosphate	6 "	"
20	April 7, "	3	M.	M.	13			1½	Uric	16 days	"
21	" 8, "	2½	M.	H.	19			1½	"	18 "	"
22	" 29, "	2½	M.	H.	16			3	"	1 month	"
23	May 2, "	5	M.	H.	11			12	Phosphate	4 "	"
24	" 11, "	4	M.	H.	21			52	Oxalate	1 year	"
25	" 24, "	7	M.	H.	15			6	Uric	3 months	"
26	" 24, "	3	M.	M.	16		1	30	Phosphate	6 "	"
27*	" 27, "	35	M.	H.	36		3	2	Oxalate of lime	10 years	"
28	June 17, "	1½	M.	H.	7		1	0	Uric	1 "	Died.
29	" 27, "	2½	M.	H.	7		3	5	Oxalate	2½ "	Successful.
30	October 23, "	5½	M.	M.	18			3	Uric	1½ "	"
31*	March 29, 1889	30	M.	H.			3	4	Oxalate and phosphate	20 "	Died.
32	April 14, "	20	M.	H.	16			2	Phosphate	5 "	Successful.

* Suprapubic Cystotomy.

as "stone in the bladder" at all, on the somewhat novel ground that they were under twenty grains in weight, or had been removed by Bigelow's process entire through the urethra. As the question raised was one of considerable importance, involving, as it did, a proposal for a radical change in the nomenclature of calculous disease previously in vogue; and as Sir Henry's method of dealing with the statistics of my cases seemed to me somewhat objectionable, I thought it advisable to reply at some length—dealing with the question from many points of view—in the JOURNAL of July 7th, 1888. That paper still remains unanswered; for, in Sir Henry Thompson's rejoinder, published in the JOURNAL of July 21st, he does not attempt to grapple with any one of the arguments advanced by me in favour of the retention of the time-honoured definition of "stone in the bladder"—namely, any calculous formation, no matter of what size, which fails to pass out of the bladder spontaneously, and for the removal of which an operation is necessary. I have had the pleasure of receiving letters on this subject from many of the leading surgeons at home and abroad, and there seems to be a general consensus of opinion against the change in nomenclature proposed by Sir Henry Thompson. One of England's most distinguished surgeons, writing on this point, cynically inquires: If, in case of death occurring from the operation, the stone being below twenty grains in weight, we

are to omit such a case from our list of operations for stone in the bladder? It is for the purpose of emphasising the possibility of such an occurrence that I have recorded Case LXIX in detail. I will venture to say that even Sir Henry Thompson himself would scarcely go so far as to reply in the affirmative to the above question. But if fatal cases of small stone are to be recorded, surely it would be both unscientific and absurd to omit recording successful cases.

There was one argument used by me against the proposed innovation, which is forcibly illustrated in the present paper. I refer to the impossibility of comparing the results obtained from lithotomy with those from litholapaxy, if calculi below a certain weight are to be omitted from the lists of the latter operation and retained in the lists of the former. It will be observed that amongst the 32 cases of lithotomy dealt with in this paper, there were no fewer than 11 instances of calculi under 20 grains in weight, or more than a third of the whole number; whilst amongst the 100 litholapaxy cases there were 18 such calculi below 20 grains in weight—a much smaller proportion. I must confess that I am unable to conceive any scientific principle under which the latter 20 instances could be excluded from the category of "stone in the bladder," and the former 11 instances retained. Or—to enter still further into detail—why should I exclude from my list of opera-

tions for stone in the bladder Case LXXII, already referred to, in which a calculus weighing 3 grains was removed by Bigelow's operation from a child only $1\frac{1}{2}$ year of age, and retain on my list Cases No. XX and XXI (List No. 2), in which calculi weighing $1\frac{1}{2}$ grain each were removed from boys aged 3 and $2\frac{1}{2}$ respectively by the cutting operation? The suggestion reduces the proposed innovation to an absurdity.

Having already trespassed on the space of the JOURNAL to a larger extent than I had intended, and, as I propose on a future occasion dealing comprehensively with some 250 cases of lithotomy performed by me up to date, my remarks on the 32 cases of lithotomy referred to in this paper shall be very brief.

It will be observed that amongst this number there were only three adults, the remaining being children on whom litholapaxy was contemplated, but found not to be feasible with the instruments at hand. In two of the adult cases litholapaxy was found impossible, owing to the large size and extreme hardness of the calculi. The suprapubic operation, by Petersen's method, was performed in both instances. In one, in which Surgeon-Major R. Drury was present, no difficulties presented themselves, and the patient made a rapid and complete recovery. In the other, at which Surgeon-Major J. Boulger was present, the operation was found extremely difficult, as, owing to the contracted and thickened state of the bladder, the organ failed to advance forwards and upwards when the rectal bag was inflated. The peritoneum was also bound down to the symphysis, and was opened in extracting the stone. Death resulted on the fourth day, the abdominal wound showing no signs of union, the ureters being found full of pus, and the kidneys highly inflamed. Anyone having experience of the former operation would say that Petersen's method was both simple and safe; anyone seeing the latter, that it was both difficult and dangerous. I mention my experience in view of the mischievous tendency there seems to be in certain quarters to extend this operation to instances of small and moderate sized calculi, which are, of course, best dealt with by litholapaxy; next to this by lateral lithotomy. In the third adult case median lithotomy was performed, as litholapaxy was found impossible, owing to the stone being impacted partly in the prostatic urethra.

There was one death amongst the lithotomy cases in children in a child $1\frac{1}{2}$ year old. This case was a source of great grief to me, as it was the first and only occasion on which I have lost a child from lithotomy, having previously performed lithotomy in 191 children, or lads below 16, without a death.

There were, then, three deaths amongst the 132 cases of stone in the bladder here referred to: one in connection with litholapaxy, one from suprapubic cystotomy, and one from perineal lithotomy. It will be remembered that amongst the 100 cases of stone operated on by me immediately preceding this series there was no death. So that amongst my last 232 operations (177 litholapaxies, 52 perineal and 3 suprapubic lithotomies) there was only a mortality of 1.30 per cent.—a result than which nothing better can be expected, and which is altogether attributable to the introduction of Bigelow's operation.

OBSTETRIC MEMORANDA.

PNEUMONIA COMPLICATING PREGNANCY.

On the morning of June 14th I was requested to visit Mrs. T. I found my patient had taken to bed on the 13th, but had felt unwell for a few days previously, with feelings of chilliness and languor, but no recollection of a distinct rigor. I found her in the dorsal decubitus, complaining of much pain over the left mammary region, frontal headache, and a sensation of great prostration. Temperature 104.2° F.; pulse 125 to the minute. Marked dyspnoea, with shallow and frequent respirations, 40 per minute. Typical pneumonic cough, with scanty, dark-purple-coloured expectoration. Physical examination revealed slight enlargement of the affected side, resisting dullness over the lower two-thirds of the lung, increase of vocal fremitus, together with dry tubular breath sounds and crepitant rhonchus.

She was 33 years of age, with an excellent previous history, never having required medical attendance except at her confinements, of which she had had two. She was now between the seventh and eighth month of pregnancy, the movements of the child *in utero* being plainly discernible. A simple diaphoretic

mixture was prescribed, together with hot poultices to the side and back.

June 15th. Condition much the same. Bowels relieved by simple aperient.

June 16th. Temperature 105° ; pulse 130; respirations 50. Active delirium and insomnia. Expectoration very viscid and dark. A draught containing 10 grains of chloral hydrate, 20 grains of ammon. bromide, and 10 minims of "nepen-the," made up to an ounce with syrup of oranges, was ordered to be given for the insomnia, and to be repeated, if required, at two hours' interval.

June 17th. Condition the same as previous day, with the exception of some hours' sleep during the night, which, however, was not procured until a second draught had been administered.

June 18th. Patient had been very restless during the night, two sedative draughts being again required to induce sleep. Prostration very great; tongue dry and brown; abundant crop of herpes on lips. States she has not felt the child's movements since morning. Ordered brandy every three hours, and carbonate of ammonia mixture.

June 19th. Summoned at 6.30 A.M. by a messenger who stated the child was born and dead. Patient had had slight wandering pains in abdomen during night, together with diarrhoea, to which the pains were attributed, and about 6 A.M. was seized with one strong bearing-down pain, when the child, showing signs of commencing decomposition, was precipitately born. On my arrival I found my patient extremely prostrate, but buoyed up by a conviction that the birth of the child had removed "the inflammation." The respirations were over 60 to the minute; temperature 105.2° F.; pulse 140, weak and compressible. The colour of cheeks and lips showing marked want of proper arterial oxygenation. The uterus under friction contracted well, there being no difficulty in completing the third stage of labour by compression. Hæmorrhage trivial. The diarrhoea was kept in cautious subjection by a catechu and chalk mixture.

June 20th. Pneumonia symptoms much the same as yesterday; lochia scanty, and darker than usual; complaints of pain over left iliac region increased by pressure. Diarrhoea moderated. Breasts tense, nodular, and sensitive. Ordered belladonna plaster to mammae, and warm fomentations to lower part of abdomen and vulva.

June 21st. Crisis during early morning. Temperature 99° ; pulse 120; respirations 40. Lochia plentiful. Since then my patient (with the exception of a slight acceleration of pulse and elevation of temperature on the seventh puerperal day) has steadily though slowly progressed towards convalescence, being for the last week able to sit up for a few hours each day, although unable to undergo any exertion without feeling much fatigue.

As points of interest in the above case I would specify:

1. The severe onset and large extent of lung tissue primarily involved, which Wernich states is usual when this complication supervenes during the later stages of utero-gestation.

2. The marked increase in the number of respirations after the emptying of the uterus, which would seem to confirm the opinions of Gusserow and Wernich that the intra-thoracic space is actually increased during pregnancy, and that the retention of the fetus *in utero* is of itself on this account an element of safety to the mother, rather than of danger, as was formerly supposed from the belief that the encroachments of the gravid uterus upon the intra-thoracic space lessened the expansile capabilities of the unaffected portions of lung tissue.

3. I should have expected that the high temperature would have been adverse to such an early and abundant mammary secretion.

4. As to treatment: Had I again such another case, I should avoid the employment of chloral hydrate, or of any agent possessing powers of producing uterine contraction, the act of parturition, according to Fasbender, whether naturally or artificially produced, being a serious additional peril to the mother's life; but whether in the present case the drug could be held in any way responsible is extremely doubtful, as the probable foetal death caused by placental anæmia, the high temperature, and advanced stage of pregnancy, would render the continuance of gestation extremely doubtful.

5. The probability of the child having died *in utero* would lead one to consider the advisability of effecting its early delivery; perhaps some of your readers of more experience than myself would give their opinion as to the safest methods to be employed under such circumstances.

6. From the high pulse rate after the birth of the placenta, I