tion of phonograph and telephone, or the "electric phonograph," that the reader of a paper in a medical congress can hereafter have his thoughts recorded on a properly prepared iron disc, and, when invited to read it, instead of taking a trip across the ocean, will forward his disc, which, being connected with the speaking telephone, can be heard by the audience as well as if the writer was near and spoke through the telephone.²⁷ A serious objection to this arrangement is that we should be deprived of the pleasures due to social intercourse at the place of meeting and the magnetic influence of the speaker.

The programme as printed for each day will enable you to know the subjects of papers and discussions to be presented to the Section, and I will no longer trespass on your patience and keep you from the consideration of the valuable treatises that will be offered by the matured experience of those who are to participate in our scientific work.

THE GALVANO-CAUTERY SOUND, AND ITS APPLICATION ESPECIALLY IN HYPERTROPHIED PROSTATE; WITH REPORT OF CASES.

Read at the International Medical Congress, Washington.

By ROBERT NEWMAN, M.D., of New York.

THE galvano-cautery sound originally devised by me, for treatment of the hypertrophied prostate gland, has also been applied to other localities, and proved beneficial in kindred maladies. To show the benefit of its use as originally intended I will first report one successful case as a typical illustration.

CASE I. Hypertrophy of the Prostate; Curc.—Dr. T. F. H., aged 60, who had practised in New Jersey for the last thirty-five years, came to me on May 25th, 1886. He suffered greatly from enlarged prostate, frequent and painful micturition, and cystitis. The history of the case shows that he had a violent cystitis attended with painful micturition as early as 1874. His urine was dark and blended with pus and blood. He had a renewed and aggravated attack in 1879. The present attack had been marked since 1884. At times he had retention of urine, and was obliged to draw it off with a catheter.

Examination.—Digital examination by the rectum disclosed a hypertrophied prostate, enlarged in its entirety, with a preponderance of pars intermedia. There was a slight discharge from the urethra. Examination of the urethra with the *bougie à boule* showed at 2½ and 5½ inches respectively from the meatus two strictures, easily passed with a No. 18 French sound. At these points the walls of the urethra were somewhat indurated. The ejaculatory ducts were 7½ inches from the meatus, indicating that the galvano-caustic applications must be directed to that point as a central region. The patient was otherwise in perfect health.

May 26th. The fenestra of the galvano-cautery sound (in which the platinum wire is) was brought against the hypertrophied prostate at 7½ inches from the meatus; then the cautery was applied by two instantaneous flashes. The operation occupied but a moment, and was painless and bloodless. The patient immediately left for home by rail, 80 miles distant. On June 7th he reported that he had suffered no inconvenience from the last operation. The galvano-cautery was repeated in the same manner as on the first occasion, with the same result. On June 21st to make more room for the instrument and enlarge the calibre of the urethra, electrolysis was applied with an egg-shaped electrode (No. 23 French) as the negative pole against the first stricture in the urethra. The positive sponge electrode was held in the palm of the hand. Only three milliamperes were used for five minutes, when the electrode passed through both strictures and into the bladder. October 5th.—A No. 23 French sound passed very easily through the entire length of the urethra, proving that during an interval of 3½ months the calibre of the urethra had suffered no contraction. October 12th.—The galvano-cautery was applied to the prostate at 7½ inches. Three effective flashes were given. October 19th.—The patient felt better, and had suffered no pain or unpleasant effects from the cautery, which was repeated to-day. On November 9th, 15th, and 22nd, the galvano-cautery was applied as before. The patient was better; the urine was now clear, without sediment. He passed water more easily, and had ceased to use the catheter. On December 21st and 30th slight flashes of the galvano-cautery were applied to the prostate at 7 inches. On January 24th, 1887, the galvano-cautery was applied to the prostate at 8 inches. On March 9th stronger applications were made at 8 inches. The patient had no untoward symptoms or pain, but several days after the appli-

cation passed occasionally with his urine small coagula of blood, without unpleasant feeling. On March 21st light applications were made at 7½ inches. Digital examination disclosed that the gland had been reduced almost to its normal size, the left lobe only appearing a little large; the other side and the pars intermedia were normal. On May 18th the patient reported continued improvement, and considered himself well. He passed urine voluntarily, easily, at regular intervals; slept undisturbed the whole night; and could retain the water for eight hours. The urine was clear, and there was no residuum. The galvano-cautery was applied at 8 inches over the left lobe. On May 30th the application at 8 inches was repeated. On June 14th and 28th further galvano-cautery applications were made. On July 12th a No. 24 sound passed easily into the bladder without irritation or inconvenience. The meatus urinarius was small, and would admit no larger size; there was, however, no valid reason for cutting it. The prostate was normal.

REMARKS.—I submit this record as a typical case, so perfect in its simplicity that the facts must stand unquestioned and undisputed. My diagnosis of hypertrophy of the prostate had been confirmed by three surgeons (of New York and Philadelphia) of the highest standing as operators, teachers, and authors, whose works are recommended by colleges as text-books, and are in almost every medical man's library. The patient is a physician, and gave, in writing, his diagnosis of the case, its treatment, and results. He feels improved—nay, well, and is so jubilant over his cure that he is ready in person to give any information about his case; even to submit to examination to prove that his prostate is now normal. He testifies that treatment by galvano-cautery is painless and without inconvenience. He has had eighteen sittings. The course of treatment was under unusual difficulties, the patient travelling before and after each operation eighty miles, therefore coming very irregularly, sometimes at intervals of more than three months. It is expected that better results will be obtained where the patient is near the operator's office, and comes regularly every three or five days as directed. Whether or not a relapse will occur, and what the *post-mortem* appearance may be, the future will disclose. At present it must stand as a successful case.

The *galvano-cautery sound*, as devised by me, was first introduced to the profession at a meeting of the American Medical Association, held in St. Louis, when I had the pleasure to demonstrate its working at the Surgical Section, June 5th, 1886. Since then I have constantly laboured to improve the instrument. For many years I have endeavoured to apply the galvano-cautery directly to narrow cavities like the deep urethra, bladder, etc., but for want of a suitable instrument was unable. The stumbling-block was that instrument makers would not carry out my plans, declaring them impossible; or when my proposed instrument was nearly completed, the instrument maker improved according to his idea, producing a miscarried monster unrecognisable as my offspring, and better adapted for a dry dock than for my purposes. The desired instrument was a catheter-shaped, smooth-surfaced sound of small size, and so easy of introduction as to glide to the spot to be cauterised. Both poles, thoroughly insulated, running side by side without touching, must be placed within the small tube of this instrument, and the mechanism so arranged that the platinum burner could be heated to the desired degree instantaneously with certainty and beyond possibility of failure. The cautery, its beginning, duration, and ending, as well as the quantity used, must be under the absolute control of the operator. The platinum must not, in its entire length, touch anything; the heat must be concentrated, and not approach the surrounding parts of the instrument; the connections must be perfect and act promptly. The instrument must be light, small, handy, and have the correct curve, and so arranged that the operator can manage the entire procedure without an assistant. The entire mechanism must be placed within the limited space of a No. 18 French scale sized tube. Next we must have a battery so constructed as to give a certain quantity of electricity of a fixed potency, suited to the work to be done and the instrument; too high a potency will melt the platinum wire, or cut the tissues like a razor; on the other hand, too low a potency will fail to heat the wires or not be effective. It is not practicable to measure the heat for galvano-cautery, or say how many degrees we need. Sufficient electricity and no more must be generated to heat the platinum burner to the desired degree. According to the length and size of the burner this heat must be adjusted; a fluid battery changes it almost every instant by polarisation.

The instrument is catheter-shaped, of smooth, polished metal, with a short curve at one end, where there is a fenestra, in which is placed a platinum wire. A serpentine form is best for this wire; each end is firmly fastened to one of two copper rods inside the tube, and represent respectively the positive and negative poles. The other end

²⁷ *Op. cit.*

of the instrument is straight, and forms the handle, in which commence the above-mentioned copper rods, each of which is fastened to one of the pins or heat-conductors. These two pins are connected to the electric cords by binding screws; the other ends of the two electric cords are fastened respectively to the positive and negative poles of the battery. The current breaker is movable, and when set straight and firmly pressed down on the screw, electricity is evolved, and the burner instantaneously heated. The recent improvements consist in (1) having the handle in a light, easily managed, convenient piece; (2) having the current breaker under the immediate control of the index-finger; (3) having the fenestra filled up, whereby the instrument is more thoroughly insulated, and less liable to become heated; (4) having the tube filled up, thus preventing it from getting wet, or blocked with *débris* inside. Any good galvano-cautery battery may be used with the instrument, but it is necessary, as before stated, so to regulate the battery that it yields the exact electrical potency to be used for the operation. I use a Dawson battery, which works to my entire satisfaction. The heat must be of a high red colour, just short of white heat, the instant the current breaker is touched; this heat must be kept up while the wire is in contact with the mucous lining. Less electricity is required to heat a free wire in dry air than to heat a wire held against a moist surface. The strength of the fluid is adjusted according to these requirements; the elements are immersed in the fluid to a certain depth, the electrode wires are regulated with regard to their size, length, etc. We can also use the storage battery, consisting of a series of cells, which answers our purpose as well as for electrical illumination. This battery, one adjusted with reference to the quantity needed, works with equal power and steadiness till the stored electricity is exhausted. The last of its electricity has the same effect as the first. This instrument, though portable, is rather heavy. We may use the dynamo machine, which can be operated by hand, foot, hydraulic pressure, or steam, according to construction and desire.

In experimenting with the instrument on mucous linings, we find that a galvano-caustic application of the same power acts differently according to the length of contact with the tissues. Thus the effects can be regulated from a light blush to the total destruction or even amputation of the tissues. It is a mischievous idea of many that the galvano-cautery necessarily burns, destroys, and is followed by cicatricial tissues. Nevertheless, this is a favourite objection of some ignorant persons and enemies of electricity. If the operator bungles, or wishes to destroy, he can, but the expert will not. It is well known that eminent neurologists apply galvano-caustic directly to the faces of young ladies, without ever causing marks. All depends upon the manner of application. Even deeper applications on mucous linings may cauterise without destroying.

Hypertrophy of the Prostate.—We will now consider the application to the enlarged prostate, as the instrument was devised mainly for that purpose. I omit any consideration of the anatomy, physiological relation, pathology, etc., of the prostate in health and disease, as it is well known to you all, and not within the scope of this article; though of late valuable additions have been made by Mr. Reginald Harrison (*Liverpool Medical-Chirurgical Journal*, July, 1885), and by A. H. Wilson, M.D., of Boston, at the last meeting of the American Medical Association (not yet published). It is sufficient to say that hypertrophy of the prostate is of frequent occurrence, causing much suffering and death.

I have proposed, in the treatment of prostate enlargement, three methods of galvano-cautery.

1. The regular (slow) method by the galvano-cautery sound.
2. The rapid method in one sitting.
3. The operation for radical cure by the removal of the hypertrophy.

1. The regular (slow) method by the galvano-cautery sound will principally occupy our attention. I prefer and recommend this treatment, as it has done good service. It consists in giving to the substance of the enlarged gland a short application, from an instant to a few seconds in duration; this produces not more than a white film similar to the effect of nitrate of silver in the treatment by Desormaux.

Modus Operandi.—The galvano-cautery sound is connected with the two electrode cords, which are then attached to the two binding posts of the battery, each respectively to one pole, or, in case of the Dawson battery, to the zinc and platinum poles. The fluid in the cells must be of the right standard, and all the machinery in perfect order. When all is in readiness, I invariably let the elements down, and try my instrument with a short flash. No matter what assurance I have of the perfection of the appliances, this little precautionary trial excludes any failure. The prostatic portion to which the cautery is to

be applied must have been ascertained, and the distance from the meatus measured. This distance is then marked on the instrument with a small rubber band. The patient, according to his preference, may stand erect, or be on an operating table or in bed. The instrument is then introduced so that the fenestra, with its platinum wire, is in contact with the part to be cauterised. The operator will know by touch when the instrument is in the right place, and the measure will corroborate the correctness of the situation. One hand holds the instrument in this place firmly, while the other hand sets the battery in motion, and then the current breaker is placed in a straight line, and pressed firmly upon the screw. A flash follows, and the raising of the finger from the breaker disconnects the current. In one moment the operation is finished, and the instrument withdrawn. It causes no pain, and in some instances the patient scarcely believes that anything has been done. He is able to walk about, and is not detained from his business. In the cases of very sensitive patients I have used cocaine injections, but it was scarcely necessary. The sitting should be repeated in about three days, or even in two. The instrument must be kept scrupulously clean, as the cautery will fail if there is dirt between the connections.

The question now arises, how does this method bring about a cure? The end sought is, first to remove the obstruction so that the bladder can discharge all the urine, and at regular intervals, and then to reduce the prostate to its normal size. The theory is that the cautery first acts as a tonic and next as an astringent, the mucous lining shrivels up, the glandular tissue contracts, and by shrinkage the size is diminished. The stimulation gives new life and healthy action. Each repetition of the operation acts similarly, and perhaps on another part of the hypertrophy. The operation must be continued till the cure is effected; care must be taken not to over stimulate and cause prostaticorrhoea, prostatitis, etc., thereby creating or aggravating the very ailment we seek to cure. The cautery must be given just severely enough to accomplish the object and no more. If the cauterisation is too prolonged and too deep, the glandular action is overtaxed and weakened, and will be followed by a terrible prostaticorrhoea which takes a long time to cure. At the same time an inflammation is created, which causes pain and swelling, and at last, the too greatly cauterised tissue will slough away and may cause septicæmia.

For these reasons I prefer the slow method described, and am opposed to rapid methods or too deep cauterisations. The practical workings I judge by analogy, from observations of the cautery in hypertrophied tonsils. Great similarity of structure exists between the tonsils and the prostatic gland—both are glandular organs, covered by mucous lining having epithelium; both are secretory organs, having ducts, follicles, canals, and one twelve to fifteen orifices, and the other twelve to twenty small excretory ducts. In hypertrophy of the tonsils, after other remedies had failed, I succeeded by using galvano-cautery with this instrument. The application was made in the cases of children of very tender age, who stood free before me, and without any aid or force opened the mouth and went through the operation without flinching. Not one complained of pain, all came back to have the cautery repeated, and then stood still with more confidence than at first. In these cases the immediate effect was a splendid illumination of the whole buccal cavity, and a white film was seen on the tonsil after withdrawing the instrument. The cautery was repeated in two or three days; in one case the next day. Sometimes the cautery was repeated in the same place, at other times, from preference, an adjoining place on the tonsils was selected. Almost daily observations of this series of cases convinced me that the galvano-cautery acted practically just as I theoretically describe. The patients were benefited, the tonsils diminished in size, and a cure was effected. It was remarkable how soon the mucous lining regained its normal colour, and when a deeper cauterisation was used there was no unpleasant slough, only a patch was observable, like follicular tonsillitis. The instrument was well adapted for the tonsils, the curve suited exactly, the fenestra could be held against the exact place to be cauterised, without possibility of accidentally burning any other part.

In the treatment of the enlarged prostate by galvano-cautery, it is absolutely necessary to pay attention to other symptoms and troubles of the patient, according to established principles. Pain must at all hazards be allayed; this I generally accomplish by rectal suppositories. In medication I rely mostly on belladonna. The bowels must be kept regular, as constipation adds considerably to the inflammation, and by pressure causes pain. While the galvano-cautery is used, it is of the greatest importance to attend to the state of the bladder, by drawing off the urine and washing the bladder out. This treatment is indicated in all cases of enlarged prostate, where urgent necessity for immediate relief does not exist, and particularly in such cases

where the patient is perambulant. It is useless if the patient is in the last stages of albuminuria, where uræmic poisoning may carry him off at any moment. The earlier the treatment is instituted the better result may be expected.

Will this treatment cure always and in all cases? No. From present experience our treatment will improve, and cure only when the hypertrophy has not been allowed to become too great, and other complicating troubles have not advanced to a dangerous condition. It is impossible to state the exact size of the enlargement which can always be cured, or the limit of the enlargement beyond which this treatment would be useless. The general state of the constitution and health, habits, business relations, temperament, the home and its surroundings, and attention to details of orders in treatment, all have an influence on the progress of the treatment and its results. The time needed to effect an improvement, or a cure, depends principally on the size of the enlargement and frequency of the applications, also on the habits of the patients. The aim of this treatment is to remove the obstruction to a free discharge of urine, thus relieve the bladder from distention, inflammation and degeneration, finally to reduce the hypertrophy of the prostate, thereby preventing a recurrence of this painful bladder-trouble and its consequences.

Theories are subject to doubt and discussion. I have given not only a theory, but have shown that hypertrophy has been reduced and bladder-troubles terminated. I am sustained by patients who testify to the efficacy of the galvano-cautery sound and by the report of cases. In conclusion, I again deny that the treatment properly administered will so cauterise or burn as to destroy tissues. But slight flashes, which are harmless, must be used frequently and carefully to effect the object contemplated. For these reasons I practise and recommend this first method.

The question may be raised whether or not good results in hypertrophy of the prostate cannot be obtained by electrolysis rather than by my method of galvano-cautery. Electrolysis has been used, and some cases reported with favourable results. I have tried electrolysis in various ways. Sometimes progress was made, but I never could establish a method which cured or could be recommended. In my report of Electrolysis in Surgery (*Journal of American Medical Association*, April 25th, 1885, p. 452) I have mentioned the subject. The drawback appears to be that the application to the prostate acts too quickly as an over-stimulant, causing greater inflammation, instead of diminishing the hypertrophy. While I have had in some cases good results, I have failed in others, and in some the galvanism has made matters worse. One difficulty is to regulate the current to each case. Then these cures are isolated, and do not definitely establish anything.

I have used the galvano-cautery sound with perfect satisfaction since October, 1885. It has answered its purpose, and never caused pain or uneasiness; and no untoward after-symptoms ever occurred when it was applied with care. The cases are all so similar to the one already described that it may serve as a type of the rest.

The galvano-cautery sound has also been employed in other diseases with good results. I mention briefly some of its uses, without record of cases.

Spermatorrhœa.—This disease is rare, but one genuine case was treated by applying the cautery to the ejaculatory ducts at $6\frac{1}{2}$ inches from the meatus. The application was repeated once a week.

Impotence.—In several cases the galvano-cautery was applied to different places, such as the prostate, Cowper's glands and ejaculatory ducts. The treatment was aided by other means.

In Diseases of the Bladder the instrument has worked admirably, particularly in villous tumour with hæmaturia, and in traumatic ulcer of the bladder. The patient had been injured, and a ragged wound near the neck of the bladder was transformed into a chronic ulcer. The place could be felt by the introduction of the instrument; the patient himself could give the best information when any instrument came in contact with the ulcer. One patient, weakened by constant hæmaturia for years, passed no bloody urine after the first application of the cautery.

Urethral granulations, denuded surfaces, and ulcers readily yield to the galvano-caustic treatment. Frequently patients present themselves to be treated for a chronic discharge—some call it leakage. I consider it error to assert that all chronic discharges of the urethra spring from strictures. On the contrary, I often find that when strictures are radically cured, the old troublesome discharge remains. For twenty years I have treated such cases by local applications through the endoscope. Generally we find chronic granulations, which yield to local circumscribed applications of nitrate of silver repeated at intervals. Sometimes we find denuded surfaces, which bleed at touch; sometimes chronic congestions, and even ulcers.

With these affections the galvano-caustic has done better and cured quicker than the old method. The endoscope is needed to diagnose and locate the diseased spot.

II. *The rapid method by the galvano-cautery in one sitting* is plausible, but at the present time not practicable. It consists in passing an instrument by galvano-cautery through the obstructing prostate, and establishing a new free passage in one sitting. Professor Bottini, of Padua, practised a similar operation with success. He constructed his own instrument, and used galvano-cautery against the offending portion of the prostate for forty-five seconds. The patient was kept in bed afterwards, and on the twenty-fourth day for the first time passed water voluntarily. It took six months before he was cured. While I admire the zeal of Bottini, I scarcely think his method will become popular. His instrument is very clumsy, unhandy, and needs so large a galvano-cautery battery as to be too heavy to be moved about. His instrument is shaped like Heurteloup's lithotrite, without any curve, the end only having a short *coudé*, like Desormeau's fenestrated male endoscopic tube. Such an instrument is exceedingly difficult to introduce, and, in many cases of hypertrophy, unintroductible. The intention is to push this instrument into the bladder, over and beyond the enlargement of the prostate, then to reverse it inside, so that the beak is turned downwards. The galvano-cautery knife is *caché* inside the beak, and moves outward by turning a dial on the handle, while the battery heats it, thereby making a central cut and division in the obstructing prostate. While the idea of the operation is excellent, I cannot approve of the instrument.

There are many objections to this method. It is a very severe and uncertain operation, with an immediate shock, followed by pain, much suffering, and inflammation, which may cause a new obstruction, partly by spasm of the bladder, and partly by the *débris* of the destroyed tissue, which may also cause a septicæmia.

III. *The Operation for Radical Cure by Galvano-Cautery.*—This consists in the removal of the hypertrophy by galvano-cautery *in situ*, and in one operation, access being gained by either perineal section or laparotomy. This removal may be partial or entire, and can be done with the galvano-cautery burner or wire sling. This operation is indicated, in fact we may say peremptorily demanded, when the patient is in immediate danger of succumbing, and no time is left for a slower method of procedure. This state has arrived when the hypertrophy causes absolute retention of urine, and there is no possibility of gaining an entrance through the obstruction so as to evacuate the bladder. Complications have generally taken place, and the fatal end is within a few hours, either by rupture of the bladder or uræmia, as even aspiration of the bladder would only give temporary relief.

My radical operation, proposed for such a state, is not free from danger, but as the patient without such severe means will succumb in a short time, the operation cannot decrease his chances of recovery; on the contrary, can only increase them.

The rationale of the operation proposed will be seen better by a retrospect of recent doings in this line of surgery. Different operations have been reported, successful cases by excision of the hypertrophied prostate with the knife after perineal section. As such reports are on record and well known, I cite but one case, which I give in detail.

CASE VIII. *Hypertrophy of the Prostate; Supra-pubic Operation; Galvano-Cautery; Perineal Section; Prostatotomy; Recovery.*—H. M., aged, 66, English, widower, has suffered from an enlarged prostate for ten years past, which gradually prevented voluntary micturition. Three years ago he began to use a catheter. One year ago the catheter broke, and was part left in the urethra. All efforts to remove this part failed. He went to the Hahnemann Hospital in New York, where the piece of the catheter was removed by the supra-pubic operation on May 20th, 1885. The broken piece had remained in the bladder two weeks. A catheter was left in the opening of the wound through the abdomen, as an outlet for the urine. This outlet was left open, so that the urine emptied through a continuous rubber tube into a vessel as soon as it entered the bladder, leaving the bladder in a constant collapse.

February 11th, 1886, I saw him for the first time. He was in a tolerable condition, in bed at his house in Brooklyn, with his harness of rubber tubes and catheter in the abdomen attached. He was very much troubled with spasm of the bladder. A metal catheter (No. 21 French) passed by the urethra into the bladder with less difficulty than was expected. The water injected into one opening passed out through the other outlet pretty clear, and in a full stream. Only spasm of the bladder troubled him. Such water will run well at eight inches from the meatus. The urine contained pus, some phosphatic deposits, and was cloudy. Examination by the rectum revealed a

slightly hypertrophied prostate. Urethral suppositories were ordered, containing extract of belladonna and opium. The bowels were nearly regular.

On February 12th the bladder was washed out and gradually dilated. It would not tolerate more than one ounce and a half of urine. The urine was allowed to accumulate in the bladder by stopping the drainage-tube with a cork; when enough had accumulated, it was let out. During the night the water was let off four or five times, between which the patient enjoyed a good sleep.

On February 13th he had some voluntary micturition by the urethra. This was the first voluntary micturition in a year. He could hold three ounces and a half in the bladder. A No. 23 catheter was passed easily over the prostate into the bladder. The urine ran out at eight inches, but at seven and three-quarters the water stopped.

On February 16th, galvano-cautery applications were made to the prostate at different places; four flashes were given without pain. On February 18th there was improvement. The endoscope was used, and showed an almost healthy bladder.

On February 20th the galvano-cautery was applied to the prostate, three prolonged flashes. The patient felt the cautery, but no pain or inconvenience therefrom. On March 2nd I had a consultation with Dr. Hutchison, who approved the treatment and mapped out the boundaries of an enlarged prostate. The galvano-cautery was repeated. On March 9th and 13th two more galvano-cautery applications were made to prostate. The patient discontinued the treatment. He was improving steadily, and I knew of no reason for the discontinuance. On April 3rd, 1886, he went to Brooklyn Hospital, where Dr. Hutchison performed perineal section and prostatotomy. The patient was on the operating-table about half an hour. Two hours after the operation he began to bleed quite freely, and was in great pain, and required morphine.

On April 4th he passed a very restless night, having a great many spasmodic contractions of the bladder. The bladder was washed with borax solution and a large rubber tube was inserted, but it did not seem to work very well, much of the urine coming through the old opening.

April 5th. He continued to have very violent contractions, occurring every half-hour, and not controlled by morphine. Temperature 103°. The appetite was poor.

On April 19th the patient was much worse, delirious during the night, face flushed, perspired very freely, pulse weak and rapid; the hyosciamus was stopped.

On April 20th he was not quite so delirious, the spasms were less frequent, but the general condition not so good.

On April 24th he continued to improve, the spasms were very infrequent and not severe. Most of the urine passed through the tube.

May 24th. The tube was removed altogether, and the urine was allowed to drain away through the lower opening. The spasms were less, and the patient felt much better.

June 1st. Commenced to-day to draw the urine every two to three hours through the lower opening; the suppositories were continued.

June 2nd. The above plan worked admirably, the patient retained all the urine and nothing drained away either above or below. The catheter had to be passed every two and a half to three hours, the suppositories were continued.

June 4th. No urine had passed through the upper opening since the last plan was adopted. The urine which was drawn was very clear, and the cystitis and the spasms had entirely subsided.

June 5th. The patient got up to-day for the first time, and felt first-rate in every way.

From this time the patient continued to improve steadily. He passed urine through the natural channel on June 17th without inconvenience, some escaping through the perineal incision.

July 1st. The wound had entirely closed. He remained here till July 13th, when he took his discharge.

For the above record from the Brooklyn Hospital I am indebted to Dr. Raynor, the house-surgeon of the hospital.

August 19th, 1887.—Dr. Breswith, who assisted Dr. J. C. Hutchison in the operation, kindly informed me that it consisted in external median prostatotomy. The prostate was incised in the median line, but no portion of it was removed. The patient wore a large silver tube for several weeks until the upper opening left from the suprapubic operation was closed.

I have further information up to date from the son of the patient, as well as from his family physician, that he has enjoyed pretty good health since.

This case illustrates three points: 1. That prostatotomy by perineal section was a success, the patient remaining well; 2. That my first

method of treatment by the galvano-cautery sound was a success, and devoid of any danger, as was proved by the subsequent operation; and 3. That the suprapubic operation is not dangerous, as was formerly believed.

The next question to be considered is, which operation is better for our purpose, perineal section or the suprapubic? Several contributions considering these points have lately been added to our literature, and the latter operation has been much improved and simplified. According to Dr. Dennis's statistics (*Exploration of the Bladder by the Suprapubic Method*, by F. S. Dennis, M.D., *Journal American Medical Association*, May 28th, 1887, p. 604). The mortality since 1879 has been reduced from 30 to 9 per cent. in cases of the largest stones. There is less danger if the operation be simply prostatotomy, than for large stones, and with antiseptic precautions there is every reason to believe that the danger may be still further reduced by galvano-caustic prostatotomy.

The foregoing shows a decided progress in prostatotomy, and I believe I am justified in regarding galvano-caustic prostatotomy by the suprapubic method a further advance, for which I propose the following *modus operandi*. The rectum should be prepared and the rubber water-bag introduced, which is dilated with sufficient water to bring the bladder upwards and forwards. The bladder may be injected, but in most cases this will be impossible, as the operation is performed when the urethra is impassable. The opening in the abdomen is made in the usual way, through the linea alba, and avoiding the peritoneum. When the bladder is reached, sutures should be introduced to be used as retractors to avoid inflammation. As the bladder could not have been emptied before, the urine is now drawn off by a trocar and cannula, and then through the cannula the bladder is well washed out and disinfected. Then the bladder is opened, and the prostatotomy performed either by the galvano-cautery sling or burner. Drainage is established, and a tube introduced for after-treatment and washing out of the bladder to combat cystitis. Further details of the operation are omitted, as such can be found in recent articles on the subject of suprapubic cystotomy, etc.

The advantages of this operation must be considered in two parts: 1st, suprapubic method over perineal section; and secondly, galvano-cautery in preference to the knife or scissors.

I. The advantages of the suprapubic operation above the perineal section are:—

1. The ducts and ureters are not wounded.
2. Perineal fistula is prevented.
3. The operator sees what he is doing, and does not work in the dark.
4. The after-treatment is easier, and cystitis can be better combated.

The former drawbacks in the suprapubic operation are now much reduced, and with care the peritoneum will not be wounded nor infiltration allowed, and antiseptic precautions will prevent sepsis.

II. The advantages of galvano-cautery above the knife are: 1. That it avoids hæmorrhage, both primary and secondary; 2. It leaves no raw surface exposed; 3. It heals better; and 4. Avoids septiciæmia.

The statement of some reporters that in prostatotomy with the knife bleeding does not take place, cannot be accepted, as the history of cases shows that primary as well as secondary hæmorrhage does occur, both of which are entirely avoided by galvano-cautery.

Such an operation may be decided upon according to circumstances, but is imperative when the patient's death is certain without it. This operation gives him at least 91 per cent. of chances for a new lease of life.

THE TREATMENT OF STRICTURE OF THE URETHRA, AND URINARY PENILE AND SCROTAL FISTULÆ BY ELECTROLYSIS.

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My attention was first drawn to this subject by the very instructive papers of Dr. Steavenson and Mr. Bruce Clarke, read before the annual meeting of the British Medical Association at Brighton in 1886, and reported in the *JOURNAL* for November 27th of last year. Owing to the great kindness of these gentlemen, I was shown over the electrical department of St. Bartholomew's Hospital, and had the process demonstrated to me.

CASE.—P. G. shoemaker, aged 46, had always been healthy until