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**Contributors**

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ON  
INJECTION  
OF THE  
BRONCHIAL TUBES,  
AND  
TUBERCULAR CAVITIES  
OF THE LUNGS.

BY HORACE GREEN, M. D., LL.D.,

PRESIDENT OF THE FACULTY, AND PROFESSOR OF THE THEORY AND PRACTICE OF MEDICINE IN THE  
NEW-YORK MEDICAL COLLEGE ; CORRESPONDING FELLOW OF THE LONDON MEDICAL  
SOCIETY ; MEMBER OF THE AMERICAN MEDICAL ASSOCIATION, ETC.

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FROM THE AMERICAN MEDICAL MONTHLY.

JANUARY, 1855.

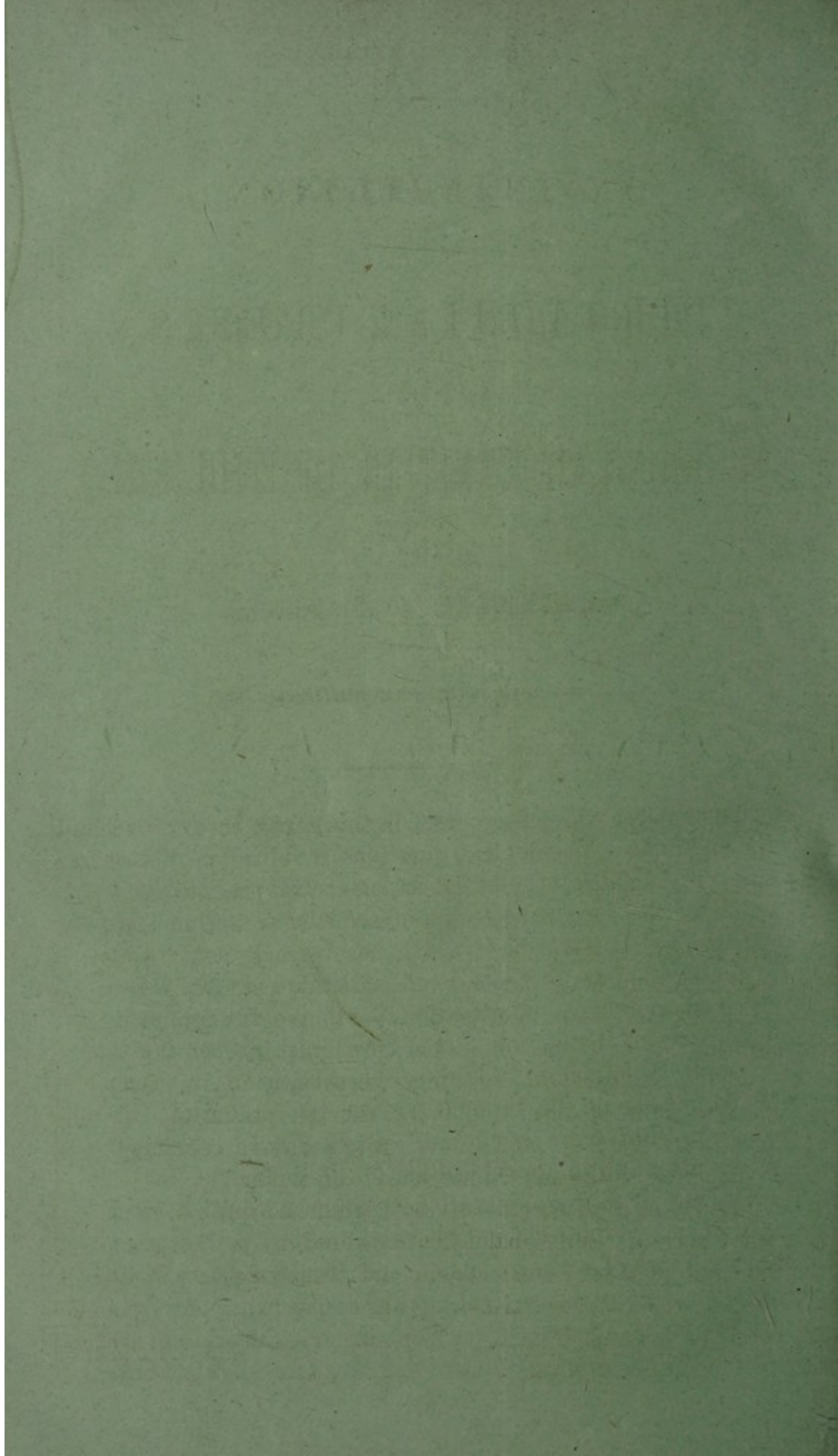
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New-York :

EDWARD P. ALLEN, No. 9 SPRUCE-STREET.

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[From the American Medical Monthly, January, 1855.]

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THE subject which I propose, in this paper, to consider, and the anatomico-physiological questions involved in this discussion, are, I believe, of sufficient importance in practical medicine to claim the special attention of the members of the medical profession. It is a subject which has been discussed recently in the London and other foreign medical societies, and it has received, moreover, the attention of some of the foreign medical writers of distinction. It is therefore quite proper that a question, belonging as this does more especially to American Medicine, should be brought before the profession of this country. But there is another reason why I have concluded to ask attention to the subject matter of this paper.

Having by many observations established the pathological fact, that certain lesions hitherto unnoticed by pathologists, are the cause of a very common and troublesome sympathetic affection, I prepared, several months ago, a paper on "Aphonia arising from organic lesions," which paper I thought to lay before the members of the New York Academy of Medicine.



But, I confess, a recollection of my earlier experience in advancing some peculiar doctrines in medicine, positively deterred me for the time from bringing my views before the members of the profession of my own city and country. Accordingly, at the request of a corresponding member of the London Medical Society, who to some extent had become acquainted with my views, I transmitted the paper to be read before the London Society. It was received and read, and, with the discussion it elicited, was published in many of the British journals. For this paper the thanks of that society and its fellowship were voted to its author.

Fully believing that I have made other important observations, if not discoveries, of a medico-chirurgical nature—discoveries which, I believe, will lead to important changes in the prophylaxis and treatment of pulmonary disease—I have deemed it to be my duty to bring these views, *first*, before a professional jury of my own city and country, giving to them the opportunity of proving or disproving, of receiving or rejecting, the propositions advanced.

It is well known that medication of the larynx and trachea, “after the manner of Trousseau and Belloc” (as the journals, and many physicians in America, have long been accustomed to say), has been practised not only by myself, but by many other physicians, both in this country and in Europe, and with an amount of success in the treatment of some of the diseases of these organs that has been highly satisfactory; few, I believe, at the present time refusing to admit the practicability and utility of topical treatment in certain diseases affecting the upper portion of the air-passages. Indeed, for a long time, it has not been deemed necessary to prove, to the more intelligent portion of the profession, the possibility of medicating the larynx and trachea by topical remedies; for among those who have employed successfully this method of treating disease, and who have acknowledged its importance, are to be found the names of many of the most eminent practitioners of this and other countries. It has therefore been with many a matter of much surprise, that two of the most distinguished men in Europe,—one of them the hitherto-acknowledged pioneer in this treatment,—should recently, as they have, denied emphatically the possibility of passing a sponge-armed probang into the larynx and trachea, even of the cadaver, much less



into that of the living subject. I refer to Professor Erichsen of London, and Professor Trousseau of Paris!

In a valuable work recently published in London, on the "Science and Art of Surgery," by John Erichsen, Professor of Surgery in University College, and Surgeon to University College Hospital, and which has just been republished in Philadelphia, Professor Erichsen, after alluding in a favorable manner to what American surgeons have accomplished in the topical treatment of diseases of the throat, thus remarks: "Some of its advocates, however, not content with curing in this way disease that is visibly seated in the throat, pretend that the morbid action extends down the trachea into the bronchi, and that it is necessary to follow it in these situations. They accordingly speak of sponging and mopping out those parts of the air tube, and of applying the caustic solution to them, as if this were a proceeding that could be adopted with as little difficulty as passing the sponge into the nares. I cannot believe, however, that this practice, though commonly spoken about, and professedly employed, is ever in reality carried out. Any one acquainted with the physiology of the larynx knows how acutely sensitive it is, and how, in its normal state, it resists the introduction of any foreign body by the most violently spasmodic fits of coughing; and any surgeon who has seen the effects resulting from the fair and complete inhalation of a drop or two of a solution of the nitrate of silver, in a morbid and irritable condition of this tube, must feel sure that no sponge saturated with a solution of this caustic could ever have been thrust down between and beyond the vocal chords. But not only does physiology and ordinary experience tend to disprove the possibility of such a procedure, but repeated experiments, both on the living and on dead subjects, have led me to the conclusion that it is utterly impossible to pass a whalebone, whether curved or straight, armed with a sponge, beyond or even between the true vocal chords. I have frequently endeavored to do this in cases of cut-throat, in which, the air-tube having been laid open, the passage of the sponge could readily have been observed, and in which the facility of doing so would have been greatly increased by the larynx being no longer subservient to respiration, but in no one instance have I succeeded in passing the sponge so as to make it appear at the external wound. In the dead-house,



also, I have repeatedly endeavored to pass the curved whalebone tipped with sponge into the trachea, but have never yet succeeded in doing so by employing those manipulations which could alone be practised on the living subject, or indeed by any ordinary degree of force.

"From the repeated observations I have made upon this point, I have no hesitation in expressing my conviction that the sponge has never been passed, in the living subject, beyond the true vocal chords; though I believe it is possible that, in some instances, and, with the requisite dexterity, it may for a moment be introduced between the lips of the glottis, so as to apply the solution freely to those parts, not, however, without inducing the most intense and spasmodically suffocating cough. I have little doubt, that in those cases in which the sponge has been supposed to have been passed between and beyond the vocal chords, and in which the operator speaks of having felt the constriction exercised by these in its entry and exit, it has, in reality, not entered the larynx at all, but has been passed behind this tube into the œsophagus, the constriction being produced by its passage beyond the projection of the thyroid and cricoid cartilages, and that the caustic solution has been applied to the mucous membrane in this situation, instead of to that lining the interior of the air-passages."\*

Prof. Trousseau of Paris, also, not only renounces in favor of Bretonneau all claim to priority in medicating the larynx, but in his clinics he declares that the passage of the sponge-probang into the larynx, either in the living or dead subject, *cannot be accomplished*. With regard to the former subject, I will give Prof. Trousseau's disclaimer, in his own words, contained in a letter to myself, received a few months ago. After alluding to another subject, Prof. Trousseau thus remarks:

"I begin by asserting that never, either before or since the publication of your labors, have I attempted to introduce into the larynx, or into the trachea, a sponge saturated with a caustic solution. I have done it several times *after tracheotomy*, but never without having previously performed that operation.

\* The Science and Art of Surgery. By John Erichsen, Professor of Surgery in University College, and Surgeon to University College Hospital. London, 1853. pp. 694-5.



"Now, I shall endeavor to indicate the part that my preceptor, M. Brettonneau, and myself have taken in reference to *topical medication*, applied to diseases of the larynx.

"M. Brettonneau, as early as the year 1818, carried over the aryteno-epiglottic ligaments, several times a day, a sponge fastened to the extremity of a piece of whalebone, and charged either with pure chlorohydric acid or with a saturated solution of nitrate of silver. He expressed (the fluid from) the sponge at the entrance to the larynx, and the patient in the convulsive movements of respiration caused a certain quantity of the caustic solution to enter therein. He also caused vapors of chlorohydric gas to be inhaled. He did this in the treatment of croup.

"When he performed the operation of tracheotomy, in the last stage of croup, he carried with a small sponge a caustic solution into the trachea, and into the larynx, and penetrated into the trachea by the wound he had made. You will find all these details set forth in the *Traité de la Diphthérie*, published at Paris by M. Brettonneau, in 1826.

"M. Brettonneau, with an immense and deserved reputation, practised, and still practices, at Tours on a small field. I, his pupil, have been able in Paris to repeat his experiments on a far greater scale, and my labors in the treatment of croup have been published very often in the French and English journals. I need not at all refer to them in this place; they were merely the practice of my old and illustrious master.

"But in 1830, I had for the first time occasion to treat chronic diseases of the larynx, by caustic applications made to the superior portion of the organ, that is to say, to the aryteno-epiglottic ligaments. I made use precisely of the process which I have pointed out above in the treatment of croup, and I endeavored to express the caustic solution into the cavity of the larynx.

"The first two observations which I published on this mode of treatment can be found set forth in a well-known French journal, the *Bulletin de Thérapeutique*. You will find them in the first volume, published in 1831, pages 163 and 276.

"I continued these labors on the diseases of the larynx up to 1835, the period at which Dr. Belloc and I sent to the Academy of Medicine a treatise on *laryngeal phthisis* and *chronic diseases of the larynx*—a work which obtained the grand prize



the following year, and was afterwards published in the form with which you are acquainted.

"And, consequently, the direct introduction of the sponge, saturated with a caustic solution, into the larynx, and into the bronchial tubes, does not belong to me in any respect whatever; and even at the present time I content myself with expressing the caustic at the entrance of the larynx, or with causing powders or vapors to be inhaled.

"Accept, sir, and honorable confrère, the assurance of my high esteem.

A. TROUSSEAU,

Professor of Medical Clinique of the Faculty of Medicine of Paris."

Although Professor Trousseau here avers, that he has never cauterized the larynx and trachea himself, except through the opening made in the operation for tracheotomy, yet he does not in this communication declare that the operation cannot be performed.

Since this letter was written, however, he has, at the Hotel Dieu, in the presence of several medical gentlemen, expressed his conviction that the passage of a sponge-armed probang into the larynx cannot be effected.

The opinions of such men as Erichsen and Trousseau, on any question connected with medicine or surgery, must necessarily, I am fully aware, have great influence with the profession of both hemispheres. Their opinion on this subject, thus deliberately and emphatically given, is not to be ignored. It therefore seems to have become necessary either to relinquish our claim to this operation, or, by instituting a series of experiments, to prove, unanswerably, its easy and positive performance.

That great good may be accomplished by the topical application of a solution of nitrate of silver to these parts, when diseased, is not denied by these gentlemen. On the contrary, Professor Erichsen declares, that "the treatment of these various chronic inflammations of the pharynx and larynx requires to be conducted by the topical application of the nitrate of silver, which may be looked upon almost as a specific in these diseases;"\* but he denies the possibility of applying the sponge to the parts below the vocal chords. On the other hand, we claim that this method of medicating the larynx and tra-

\* Op. Citat. p. 694.



chea is accomplished with much ease, and, ordinarily, with great certainty; and that, by this means, diseases of these organs, which would otherwise have proved mortal, have been repeatedly arrested.

We claim, and positively aver, what is susceptible of proof, that the sponge-probang, which Professor Erichsen declares with as much positiveness, "has never been passed, in the living subject, beyond the true vocal chords," has been, in a thousand instances, "thrust down" between and beyond these chords, and has been carried not only through the trachea and its bifurcations, but at different times, and in the presence of more than five hundred different medical men, has been passed, at will, into the right or left bronchial divisions!

I shall now give the proof, not only of the practicability of this operation, which has been so positively denied, but of our ability, as Americans, to accomplish still more than this for the treatment of thoracic diseases; to perform operations of which the conservative Englishmen and skeptical Frenchmen have never dreamed!

When Dr. Marshall Hall came to this country, he held and expressed the same opinion that Erichsen now entertains with regard to this operation; for, when assured by Dr. Brainard of its practicability, he declared that "the passage of a sponge wet with the caustic solution into the larynx and trachea, as proposed, would prove fatal to animal life," and yet, Dr. Hall was willing to see the attempt made, for he visited my office for this purpose, where he had an opportunity of witnessing its accomplishment in many instances, and it was he who suggested the employment of a tube, that the truth of its positive introduction into the larynx might be established, as it would be should the passage of the air be effected through the tube when in this position. After learning, therefore, these views of Professors Erichsen and Trousseau, I procured several of Hutchings' flexible tubes, of different sizes, and to the extremity of one of these, which is thirteen inches in length, I attached a sponge of the same size with those which are used with the ordinary throat probang.

At this time I had under treatment many patients having disease of the air-passages, into whose larynges and trachea I had passed (as I believed) the sponge-armed probang in many instances. But, as other proof besides my own opinion and



belief was necessary to establish this, in the estimation of many, I selected one of these patients, an intelligent clergyman from Canada, and wetting the sponge at the extremity of the flexible tube in a strong solution of nitrate of silver, I passed it down to the vocal chords, through the rima-glottidis (as I supposed), and several inches into the trachea; then withdrawing the wire from the tube, I directed the patient to close his lips and blow, and breathe through the tube. This he did for several moments, filling and emptying the chest of air repeatedly. A lighted lamp was then brought, and this he extinguished promptly, several times, by *blowing through the tube!* This experiment was performed on the 5th of October, in the presence of several physicians.

But as it was intimated by one of the medical men present that it might be averred, by those skeptical on this subject, that the light was extinguished by the air passing through the nostrils, or by the side of the tube, another patient was selected for repeating the experiment. This gentleman was the Rev. Mr. McAnn, the superior third of whose epiglottis could be seen easily by depressing the tongue. Upon the laryngeal face of this cartilage, the extremity of the tube was placed and introduced readily through the chink of the glottis into the trachea. This operation was also performed in the presence of several physicians, among whom were Dr. Sims, Prof. E. H. Parker, and several others. The instrument being thus introduced, one of the physicians closed the anterior nares of the patient, and the light was again extinguished by the expired air through the tube. A large pasteboard card, perforated in the centre, and of sufficient size to screen the nose and mouth completely, was then slipped over the tube, to which it fitted closely, and the patient directed to blow out the light, which was accomplished through the tube as promptly as in the first instance. After all this, Mr. McAnn was requested to expand the chest, by breathing through the instrument. This was several times performed—the patient inhaling and exhaling easily and freely through the inserted tube. These experiments were subsequently repeated on some eight or ten patients, always with the same results, and in each instance in the presence of several medical men. Among those physicians who were present on one occasion or another, I may mention the names of my colleagues, Professors Barker, Davis, Peaslee and Parker



Dr. Bowditch of Boston, Professor Davis of the University of Virginia, Crawcour of New Orleans, Smith of Galveston, formerly surgeon in the army of Mexico, Rose of Indiana, Patterson of Ohio, Sims, Sayre and Minor of New York, and more than forty other physicians of this and other cities, every one of whom expressed himself satisfied with the success of the experiments, as proving the introduction of the instrument "between and beyond the true vocal chords" into the trachea of the patients. In order to test, still further, the truth of the operation, a small air-tight, elastic bag was tied over the upper extremity of the tube, and on introducing the instrument, six or eight inches into the trachea of a gentleman, this little bag was inflated and collapsed a dozen times, by the acts of inspiration and expiration on the part of the patient. In performing this last experiment, an incident occurred (which, had the tube been shorter, might have proved an accident), that is an additional proof of the position of the instrument. The tube which, as I have stated, is thirteen inches long, was introduced its whole length, so that the upper extremity was flush with the lips of the patient, the elastic bag, which is three inches long, only remaining out of his mouth. After the patient had filled and emptied the sac several times, I let go, for a moment, my thumb and finger hold of the extremity of the tube. Just then the patient made a strong inspiration, when the whole instrument, sac and all, was drawn suddenly in, and for a moment disappeared out of sight. Thrusting my fingers immediately into the throat of the patient, I could barely reach, at the base of the tongue, the upper extremity of the bag, which I seized with my thumb, and finger and drew the whole out together.

Other experiments, confirmatory of the above, were instituted, such, for example, as the suspension by a thread of a small ball of floss before the mouth of the tube, which was alternately drawn into and expelled from the opening, by the act of respiration.

The above series of experiments were considered conclusive, by those who observed them, in proving that the operation of passing the sponge-probang into the larynx and trachea, as we have claimed, is positively being accomplished, and we submit to the members of the profession, whether the dogmatic assertions of Professor Erichsen, that "the sponge has never been



passed, in the living subject, beyond the true vocal chords," and that the operation "is utterly impossible," has not been by these experiments disproved?

But we have declared it to be possible to do still more, for the treatment of thoracic disease, than can be effected by this operation, though its practicability be fully admitted. After accomplishing what has already been described—namely, that of introducing the elastic tube into the bronchial divisions, for it must have passed several inches into these, if it entered the trachea—these questions occurred to my mind: What shall now hinder the introduction of medicinal agents, through this tube, into the lungs, or directly into the bronchi and their terminations? What will prevent the injecting, even of a vomica, under favorable circumstances, with appropriate remedies?

Having under treatment, daily, patients laboring under, not only chronic bronchial disease, but those affected with tuberculosis, in almost every stage of the disorder, I determined to test the effect of a solution of nitrate of silver, applied directly and freely to the bronchi in disease of their membrane; also in disease of the lungs, to inject, if possible, the same solution into tubercular excavations.

The first trial of this nature was made on the 13th of Oct. 1854. It is unnecessary to give the previous history of this case, in which the operations of *catheterism of the air-passages* was first performed.

The patient, a lady from Connecticut, thirty-two years of age, is in the advanced stage of tubercular consumption; a large cavity exists in the apex of the left lung, and a deposition of tubercles is present in the right. All the physical signs of both these conditions are present; my own opinion has been confirmed by the examination and opinions of several good auscultators. She has had, for several weeks past, the treatment, both topical and general, ordinarily employed in the management of such cases. Once in two or three days, the larynx and trachea have been cauterized, and the iodide of potassium, with both vegetable and mineral tonics, have been administered, and with considerable benefit. But still, the signs of advanced tuberculosis are present. The cough and free expectoration of purulent matter continue.

*Oct. 13th.*—To-day, instead of using the sponge-probang, I



passed No. 12 of Hutchings' elastic tubes (which is thirteen inches long) through the trachea, and into the left bronchial division. Through this tube, with a small glass syringe, I injected one drachm of a solution of nitrate of silver, of the strength of forty grains to the ounce of water, into the lung. No cough whatever, or any sense of suffocation, was produced by this operation, nor did the patient observe in the least the ordinary bitter taste of the solution. A few minutes after the operation she stated that she "felt a warm sensation" in the upper portion of the left lung, but no pain, or any unpleasant feeling whatever, followed the operation. Mrs. A. did not return to have the operation repeated until the 17th, four days afterwards, when she stated that for twenty-four hours after the use of the injecting tube, her cough and expectoration were both greatly diminished, that she had breathed with more freedom than before; that these favorable symptoms had continued, though not as marked as at first, up to the present time. She was therefore much disposed to have the operation repeated. The tube was again introduced through the trachea its entire length, and at this time one and a half fluid drachms of the solution were thrown into the lungs. The immediate results were the same as at first, but after some minutes, she began to cough, and expectorated easily, and at once, nearly two ounces of purulent matter, changed in its color and consistence, apparently, by its immediate contact with the argentine solution. Indeed, the expectorated matter presented precisely the appearance which is observed to take place with the purulent matter of an external ulcer when cauterized with the nitrate of silver. This changed condition of the expectoration was observed by several physicians who were present when the operation was performed. The relief which followed this last operation in Mrs. A's. case was still more marked and decided than in the first instance. Her cough she stated was much relieved, the expectoration yet more diminished, and her breathing was easier. A pain in the chest of which she had complained was removed; and during the two nights which followed the operation her sleep was better than it had been for a long period before. Mrs. A. remained until the 26th, during which time the elastic tube was introduced into the left bronchial division seven times, and on each occasion from one and a half to two drachms of a strong solution of the nitrate



of silver were injected into the lungs. Her improvement was constant. She grew stronger, and gained flesh in this period ; but, being obliged at this time to return to her home, she left with the intention of coming back to renew the treatment, in a few weeks.

The same day on which I succeeded in introducing medication into the air-tubes of the above patient, I commenced in like manner the treatment of other cases, and since the thirteenth day of October, there have been treated for a longer or a shorter period, thirty-two patients laboring under tubercular or bronchial diseases, by the direct introduction into the lungs of a strong solution of the nitrate of silver injected through the elastic tube. Of these thirty-two cases, nineteen showed unequivocal physical signs and symptoms of tuberculosis in the different stages of the disease ; complicated, many of them, with bronchial inflammation. Thirteen of the number are cases of chronic bronchitis, the disease in some of them being of many years' standing. Of the nineteen cases of tuberculosis, nine of the number presented, on auscultation, the usual signs of the presence of tubercular cavities in one or both lungs. All these cases of thoracic disease, with one or two exceptions, appear to be benefitted, some of them greatly, by this method of topical treatment.

Although a rigid and circumstantial history of these cases, and of their treatment, is being kept by my assistant, Dr. Richards, I shall not detain the reader with a relation of them, but will merely select a few whose history and sanatory condition, on coming under my treatment, were known to other medical men, for all of these cases to which I shall refer were committed to my care by their attending physicians.

The first case of which I shall speak is that of Mrs. A., whom I first saw early in January, 1854, in consultation with a distinguished physician of this city, Dr. John W. Francis. She had suffered from chronic bronchial disease for several years ; but her symptoms, from taking cold, had been greatly aggravated some few months before this consultation, and on examination at this time, there were revealed signs of extensive bronchial disease, with tubercular deposition in the apex of the right lung. Marked dullness, on percussion, was found under the clavicle on the right side, with crepitating mucous râles and prolonged expiration, indicating the commencement of tubercular soften-



ing; on the left side puerile respiration, with coarse mucous râles over the whole chest. The disease seemed to have been preceded, or attended, by follicular disease of the pharynx; for the mucous crypts of the pharyngeal membrane were destroyed, and the right tonsil had become completely atrophied. Mrs. A. was feeble and much emaciated, had a severe cough with large muco-purulent expectoration. After continuing the treatment of the patient for some time, in consultation with her attending physician, at his request I consented to take charge of the case, on condition that the patient should visit me at my rooms.

In addition to the ordinary general treatment, which it is not necessary to particularize, topical applications of the nitrate of silver to the pharyngo-laryngeal membrane were employed. These cauterizations were continued, at first, three or four times a week, and subsequently twice a week, during the remainder of the Winter and the following Spring. No diminution of the cough or expectoration occurred until the local treatment had been continued for several weeks. Gradually both improved; Mrs. A. gained in strength and flesh, so that when she left the city in June, to spend the warm season in the country, she had gained several pounds in weight, and, although the cough and expectoration still continued, both were greatly diminished. No marked change in the patient's symptoms occurred during the Summer, but soon after her return to the city, at the close of the season, her pulmonary symptoms, from taking cold, or from some other cause, were aggravated, and her cough and expectoration were again increased. The treatment was renewed. Applications of the nitrate of silver were made to the larynx and trachea, which at once diminished, as before, the urgency of the symptoms. On the 25th of October, I introduced the flexible tube through the trachea, and conveying it down the right bronchial division, injected one and a half drachms of the argentine solution, of the strength of forty grains to the ounce of water, into that side. As in the first instance described, the irritation was much less than when the sponge-probang is used. Indeed, no cough or disturbance in any degree followed this operation. The effect on the prominent symptoms of the patient was very favorable. For twenty-four hours afterwards, the cough and expectoration were greatly diminished; nor did tightness of



the chest, or any uneasiness whatever, follow the suppression of the discharge. On the contrary, the patient experienced so much relief during the subsequent week, that she did not return until the first of November (one week afterwards) to have the operation repeated. On this day two drachms of the fluid were introduced ; and thrice since, making five times in all, has the same operation been performed. Mrs. A. has continued constantly to improve, and notwithstanding the unfavorable season of the year, has certainly gained more in the last six weeks, than during several months before. But what the ultimate result will be, it is of course impossible to pronounce. Of one thing we are positive, that Mrs. A. is in much better health now than she was nearly a twelvemonth ago, at which time she exhibited unmistakable signs of tubercular exudation, complicated with general bronchial disease.

Some months ago, General P. of Niagara, having just returned from Europe, called on me with an invalid sister, bringing with them a letter from Professor Trousseau, of Paris, under whose treatment Miss P. had been, containing his full opinion of her case, and commending her to my care. The following is an abstract of the letter of Trousseau : " Miss P., whom I have examined with great attention, will hand you the consultation which I have given her. I think she has pulmonary emphysema, with chronic bronchitis, but I have not been able to find any of the signs of tubercular affection."

An attentive examination of this lady's case confirmed the opinion given by M. Trousseau. Extensive bronchial disease existed, with pulmonary emphysema—a complication which, I believe, is almost always more or less present in serious and prolonged bronchitis.

No treatment was adopted at this time, as Miss P. was on her way home, but she proposed to return in a few weeks, and have the treatment I had advised employed. But I saw nothing more of this lady until the 15th of last October, when her brother came with her to New York, and placed her under my care. Her case now presented symptoms more unfavorable than when I first saw her. She was emaciated and feeble ; was harassed by an incessant cough, and had a most profuse mucopurulent expectoration. Auscultation now revealed, not only extensive chronic bronchitis, and pulmonary emphysema, but bronchial dilatation. In addition to an almost constant bron-



chial cough, she was subject, daily, to paroxysmal attacks of spasmodic cough, so severe, at times, as nearly to suffocate her. The local treatment, conjoined with appropriate general remedies, was adopted in Miss P.'s case. The applications of a solution of nitrate of silver were made daily, first to the pharynx, and then into the larynx and trachea. Improvement, in her case, began, as it almost always does in bronchial disease, as soon as the small amount of caustic fluid, which the sponge will take up, had been introduced a few times into the larynx and trachea. On the 4th of November I employed, for the first time, in her case, the tube and syringe, and injected, on this occasion, two drachms of the caustic solution into the bronchial divisions. The effect of this irrigation of the pulmonary mucous membrane, was, as the patient herself remarked, "perfectly astonishing." The cough and expectoration were both greatly relieved, the oppressive sensation about the chest, long complained of by the patient, was abated, and on her return to the office, three days after, she manifested improvement in every symptom.

The injections have been repeated every day and every other day up to the present time, and Miss P.'s improvement has been going on constantly. She is now much stronger; coughs less; has gained flesh in the last three weeks, and has exchanged her pale, sickly look, for one indicative of returning health. To-day, November the 28th, I injected, for the sixteenth time, in her case, in the presence of Professor Davis, of the University of Virginia, Dr. Minor of Brooklyn, and several other medical gentlemen, two drachms of a solution of the nitrate, of the strength of two scruples of the salt to the ounce of water, without producing the slightest cough, or any irritation whatever.

Of the thirty-two instances mentioned, of tubercular disease, it would not be difficult to select a dozen cases, from among those who have been the longest under this form of treatment, which have manifested signs of improvement as extensive, and decided, as have those cases to which we have referred. I shall, however, only allude briefly to one of these, the character and treatment of which has been observed, with much interest, by several medical gentlemen.

On the 21st of September, Dr. Varick of Poughkeepsie, placed under my care a young lady from that town, who for several years had been afflicted with chronic bronchitis of a



grave character. The disease began four years ago ; commencing in the form of a follicular inflammation of the pharyngeal membrane, and extended by continuity to the mucous membrane of the larynx and bronchi. The disease was attended with a loss of voice, an almost constant and harassing cough, and a profuse muco-purulent expectoration. Miss V—— presented many of the rational signs of tubercular consumption; but auscultation revealed only mucous and bronchial râles over both lungs, with vesicular emphysema and bronchial dilatation. There were no positive signs of the presence of tubercular exudation, although slight flatness, with prolonged expiration existed on the right side. Dr. Varick had employed, in his treatment of her case, along with general remedies, the topical application of the nitrate of silver ; but as he had not been able to medicate the larynx, and the patient was not relieved, he requested me to take charge of the case. I soon succeeded in cauterizing the larynx and trachea, both of which were ulcerated, and after continuing the local treatment for two or three weeks, the voice was restored to nearly its normal condition, but the cough was not materially relieved, nor was the profuse bronchial expectoration in any degree diminished. A deep seated dull pain, under the sternum, which had long continued, and which had resisted the effects of counter-irritation, and other measures, still remained.

On the third of November, in the presence of several medical gentlemen, I passed the tube through the larynx and trachea, down to the bifurcation and injected into the bronchial divisions, two drachms of a strong solution of the nitrate of silver. From this hour, her troublesome symptoms began to improve, the cough which heretofore had vexed her night and day was arrested completely, for a period of twenty-four hours, after this first operation ; and what was equally surprising, the pain under the sternum, which had been so persistent, ceased altogether, and has not since returned.

On the second day, she coughed again, but moderately, and expectorated with more ease than before. The injection was repeated on the 6th of November, and again on the 8th, and was attended, apparently, with continued advantage to the patient. The effect of the remedy was so prompt and decided in checking the profuse expectoration, that some fears were entertained by me, in this case, as well as in that of Miss P——, tha



unfavorable symptoms might follow the sudden suppression of such long continued and habitual drains. But in neither of these cases, nor in any one of those similarly affected and treated, have I observed any dyspnœa or oppression of the chest whatever, to follow the diminished expectoration.

Inasmuch, therefore, as the effect of the treatment in Miss V.'s case continued to be decidedly favorable, the operations were repeated every few days, throughout the month of November. During this time, she had added about ten pounds to her weight; her cough was nearly gone, her voice restored to its normal condition; and, as her whole appearance and symptoms were indicative of returning health, she was, on the first day of December, dismissed from further topical treatment.

In the treatment of the various chronic inflammations of the bronchi, I have been accustomed, for many years, to depend upon the topical application of a solution of nitrate of silver to the mucous membranes of these parts, and so uniformly has success followed its employment, that, as Erichsen has said of its effects on the pharyngo-laryngeal surface, I can affirm, that in my hands it has proved almost a specific in these diseases. Others who have given the remedy a fair trial, have borne the same testimony in its favor. Dr. Allison, of London, who has published an interesting brochure on the "Medication of the Larynx and Trachea," says: "In chronic inflammation of the larynx and of the upper portion of the trachea, the solution of the nitrate of silver has, in my hands, as in others, been very useful in bringing the disorder to a conclusion, and where that has not been accomplished by reason of its dependence upon incurable disease of the lungs, it has almost invariably afforded very considerable relief, by rendering the cough less frequent and violent, and removing much of the tickling and uneasy sensations at the upper portion of the larynx. In this form of disease the treatment is particularly suitable, whether it be simple or of a specific character. \* \* \* \* \*

"In some cases of disease of the larynx and trachea, in which the symptoms inclined to the suspicion that ulceration existed, the same local application of nitrate of silver has been very useful. Old bronchial affections have in a large majority of cases been similarly benefitted."\*

\* The Medication of the Larynx and Trachea. By Scott Allison, M. D. pp. 7-8. London, &c.



Professor Bennett, of Edinburgh, in his recent work on Tuberculosis, thus speaks of the effects of this local remedy: "The action of the nitrate of silver solution is not that of a stimulant, but rather that of a calmative or sedative. It acts chemically on the mucus, pus, or other albuminous fluids it comes in contact with, throws down a copious white precipitate, in the form of a molecular membrane, which defends for a time the tender mucous surface or irritable ulcer, and leaves the passage free for the acts of respiration. Hence the feeling of relief almost always occasioned; that diminution of irritability in the parts, which is so favorable to cure, and why it is that strong solutions of the salt are more efficacious than weak ones.

"It may be easily conceived that such good effects must be more or less advantageous in almost all the diseases that affect parts so sensitive, from whatever cause they may arise; and that this treatment is not adapted to one or more diseases of the larynx, but, like all important remedies, meets a general indication which the judicious practitioner will know how to avail himself of."\* And he closes a work of great interest with the following "practical conclusions."

"1st. That not unfrequently diseases, entirely seated in the larynx or pharynx are mistaken for pulmonary tuberculosis.

"2d. That even when pulmonary tuberculosis exists, many of the urgent symptoms are not so much owing to disease in the lung as to the pharyngeal and laryngeal complications.

"3rd. That a local treatment may not only remove or alleviate these complications, but that, in conjunction with general remedies, it tends in a marked manner to induce arrestment of the pulmonary disease."†

Hitherto, in the treatment of bronchial disease, a difficulty has arisen from our inability to introduce, by means of the sponge-probang, a sufficient quantity of the caustic solution into the bronchial divisions; for in passing the instrument into the opening of the glottis, and through the rima of the glottis, much of the fluid is discharged from the sponge before it reaches the tracheal division. On this account I have, in a multitude of instances, when treating bronchial disease, introduced the saturated sponge, several times, at the same sitting, in order to

\* The Pathology and Treatment of Tuberculosis. By John Hughes Bennett, M. D., &c. p. 140.

† Ut supra, p. 142.



convey an increased amount of the fluid into the bronchi, and it has frequently happened, that patients observing its effects, have returned in a few days requesting that as much of the solution as possible be passed into the wind-pipe, as the cough and expectoration, they have declared, are invariably greatly improved by the operation.

By this method of catheterism of the larynx and trachea, the solution is not only conveyed with more certainty and directness to the bronchial, mucous surfaces, but any amount of the medicament may, in this way, be introduced. What quantity of the solution may be the appropriate amount to be employed, in any given case; of what strength; how often to be repeated; or how long to be continued—are important questions, to be solved by future experience, and by repeated observations.

Of one interesting fact we are now fully assured, that whenever the remedy has been freely employed in the treatment of bronchial disease, the effects have been invariably salutary. Catheterism of the larynx and trachea has now been employed in my hands, in the treatment of more than twenty cases of chronic bronchitis—some of them of a very severe and protracted nature, in which from one to three drachms of a solution of nitrate of silver, of the strength of from thirty to forty grains to the ounce, have been injected every few days, in each case, through the trachea, into the bronchi; and in every instance, with not a single exception, improvement has followed the treatment. In those cases where tubercles exist, whether the exudation be in a crude state, or beginning to soften, the beneficial effects of the treatment have been, thus far, as uniform and certain, although the improvement has not been as rapid in these, as in the former cases. Most of these cases of tubercular disease are still under treatment, and the final result cannot be foretold.

In the employment of catheterism of the bronchi, by means of the flexible tube and the syringe, repeated proofs have occurred of the presence of this tube in the trachea. The coughing of the patient before the injecting was completed, has often driven a portion of the solution, with force, through the tube, and to a distance of several feet from the patient. Several distinguished auscultators, who have been present when the operation was performed, have had the curiosity to examine the chest of the patients, both immediately before and after the operation, when they have detected readily, by auscultation, the presence



of the fluid in the lungs, immediately after the injection was made.

Of more than fifty medical men, comprising many distinguished physicians of our country, who, from time to time, have been present at these operations, all, *with one or two exceptions*, have been fully satisfied that these injections were, in reality, made, not into the œsophageal tube, but into the tracheal and bronchial divisions.

Among the patients who have been the subjects of this treatment, is Dr. Pittard, an intelligent and experienced physician from North Carolina, who came to this city to be treated for a severe and long continued bronchial disease. The following is Dr. Pittard's testimony on this subject :

"In compliance with your request, I give you a simple statement of the effect of an injection into my lungs of the nitrate of silver. The application of the remedy caused a considerable glow through the chest, which was felt for several hours. There was no irritation produced on the bronchial membrane, by the introduction of the fluid ; but, on the contrary, the cough was suspended, or greatly moderated for a day or two.

"It may be said that the injection passed into the stomach, instead of the lungs. This may have been possible in some other instances, but in my case there could be no doubt of its having entered the air-passages, for you will recollect that the breath was passed out through the tube, as soon as it was inserted, which may be considered conclusive evidence, besides, I tasted the nitrate of silver, in the matter expectorated for twelve or fifteen hours after the administration of the remedy.

"Very Respectfully,

"JNO. PITTARD, M. D."

In conclusion, it is here maintained, that the direct medication of the lungs, by means of catheterism of the air-tubes, an operation I believe not before performed, has been repeatedly accomplished—that the operation may be performed by the dexterous surgeon with ease and facility, and with perfect safety to the patient, and that the results of this method of treating disease, whether it has been employed in bronchial affections, or in the commencement of tuberculosis, have already afforded the most gratifying indications that practical medicine will be greatly advanced by this discovery.



