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THE TREATMENT OF PHTHISIS BY  
SULPHURETTED HYDROGEN.

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## The Treatment of Phthisis by Sulphuretted Hydrogen.\*

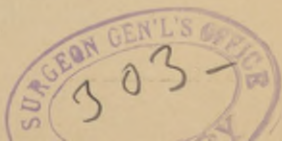
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IT has not been many years since the faces of patients in a consumptive hospital were merged into a uniform ugliness, each in fact being cased in a mask of greater or less proportion, with various machinery in its centre, which was dignified by the name of a respirator. It is noteworthy that the respirator was armed with germicides or antiseptics, and was to cure consumption antiseptically. Now the destroyer of phthisis germs and the characteristic phenomenon of the pulmonary hospital bids fair to be a caoutchouc bag, a bottle of bad-smelling solution, and a rectal tube and nozzle. Whether this last claimant for therapeutic favor shall, as is not improbable, finally follow the respirator into oblivion or not, is at present uncertain. But the matter certainly is of sufficient importance to require careful treatment at the hands of the THERAPEUTIC GAZETTE.

In 1883, M. Debove, professor at the *Hôpital de la Pitié*, declared in one of his clin-

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\* Dr. V. Morel, "Nouveau Traitement des Affections des Voies Respiratoires." Paris, 1886. *Gazette Hebdomadaire*, December 17, 1886. *La Semaine Médicale*, July 14, 1886; October, 1886.





ical lectures that consumption being due to the presence of a parasite, the proper treatment of it was the use of a parasiticide. It was left, however, for M. Bergeon (of L'Ecole de Médecine of Lyons) to put into actual practice this suggestion, and on the 12th of July, 1886, he gave his results to the French Academy of Science. He rejected the lungs themselves as the channel through which the parasiticide should find entrance into the system on account of the rapidity of absorption from them, and of the fact that medicines taken up by them are carried immediately in a concentrated form to the right side of the heart, and, moreover, exert in the lung itself a too great local irritant influence. The disagreeable tastes of most of the antiseptics render their administration through the mouth and stomach difficult, whilst the work of Claude Bernard has shown that gaseous substances taken into the large intestine are absorbed with great rapidity and go into the general system. M. Bergeon, led by this train of thought, used various substances, such as chlorine, turpentine, ether, ammonia, and bromine injected into the rectum, but found them all so violently irritating that they had to be abandoned, but at last he discovered that a mixture of carbonic acid and sulphuretted hydrogen was perfectly tolerated by the intestines, if the gases be pure and be unmixed with atmospheric air. Under these circumstances the rôle of the carbonic acid was to act as a diluent to the sulphuretted hydrogen.

The apparatus of M. Bergeon consisted of a caoutchouc bag having a capacity of four

or five litres, which was filled with pure carbonic acid and connected with a Wolffe's bottle, which was in turn connected with the tube inserted into the rectum of the patient, so that by compressing the bag the carbonic acid could be forced to bubble through the solution of sulphuretted hydrogen, natural or artificial, in the Wolffe's bottle, and pass into the intestines. The common sulphurous waters, especially Eau de Bonnes or Eau de Challes, were thought by Bergeon to be superior to any artificial waters, but this is probably a mistake.

In the Hôpital Cochin, where the method has been much practised, the following two solutions have been employed :

SOLUTION NO. 1.

R Sulphide of sodium, pure, 10 grammes, or 10 parts by weight ;  
Distilled water, enough to make 100 cubic centimetres, or 100 parts by weight.

One cubic centimetre of this liquid engages exactly ten cubic centimetres of sulphuretted hydrogen when there is added to it one cubic centimetre of the following solution (No. 2) :

SOLUTION NO. 2.

R Acid tartaric, 25 grammes, or 25 parts by weight ;  
Acid salicylic, 1 gramme, or 1 part by weight ;  
Distilled water, enough to make 100 cubic centimetres, or 100 parts by weight.

This solution in the Hôpital Cochin is used by an apparatus which, under the directions of Dujardin-Beaumetz, is made by H. Gallante, of Paris, and which, though much more complicated, is no doubt more convenient than the apparatus of Bergeon. A description of this apparatus with figure may be found in *Les Nouveaux Remèdes*, November 24, 1886.

By M. Bergeon himself four or five litres of carbonic acid gas, which had been passed through two hundred and fifty to three hundred grammes of the sulphurous mineral water, were thrown into the rectum twice in each twenty-four hours. In the Hôpital Cochin the amount of gas injected varies from one to four litres at each séance. The apparatus used at this hospital is superior to that used in the original method, because it allows a definite amount of sulphuretted hydrogen to be introduced with the gas. The amount of sulphuretted hydrogen used in the Hôpital Cochin is not positively stated, but about fifteen cubic centimetres of the solution of sulphide of sodium (equivalent to one hundred and fifty cubic centimetres of sulphuretted hydrogen) seems to be the amount employed at a séance.

In his original communication, M. Bergeon claimed that the success of this mode of treatment is very rapid and remarkable ; it is stated that the cough immediately diminishes, the expectoration lessens or even ceases, the appetite increases, the sleep becomes undisturbed, the fever abates, and the bodily weight greatly increases.

In the discussion before the Société de Thérapeutique, at the meeting of December 8, 1886, Dujardin-Beaumetz confirmed the statements of M. Bergeon, and further said that the amelioration must be due to the sulphuretted hydrogen, as he had repeatedly tried injections of pure carbonic acid without doing good.

The French reports indicate very strongly that the drug acts, not as was originally ex-



pected, upon the parasite of phtthisis, but upon the inflamed diseased lung-tissue itself, since Dujardin-Beaumetz states that there is no lessening in the number of bacilli in the sputa: moreover, great benefit is obtained in the treatment of cases of simple chronic bronchial catarrh. This is also confirmed by the studies of M. Chentemesse, of the Hôpital St. Antoine, who affirms distinctly that there is no lessening of the bacilli, and that very marked relief has been afforded to asthmatic patients. Moreover, *no evidence is forthcoming to show that sulphuretted hydrogen is poisonous to the tubercular bacillus.* It is, so to speak, the natural gas of putrefaction, and without definite proof cannot be considered to be even probably inimical to low organic forms.

Dr. James Henry Bemett has published in the *British Medical Journal*, December, 1886, a paper upon Bergeon's method of treatment, in which, however, he adds nothing to our knowledge of the subject, merely stating his own experience in a single case of asthma.

In this city the method of treatment has been used in the Philadelphia Hospital in a large number of cases, especially in the wards of Dr. Bruen. A personal inspection of the result shows that the statements made by the French observers are correct, and there seems to be no doubt that under the treatment there is rapid alteration of some cases of phtthisis for the better. In the Philadelphia Hospital the solution at first used contained five grains of the chloride of sodium and five grains of the sulphide of sodium, but at present the strength has been doubled, so

that in the Wolffe's bottle, through which the carbonic acid passes, ten grains of each of the chemicals is put. Once charging of the Wolffe's bottle is made to suffice for a number of patients, each of whom receives at each treatment from three to five pints of carbonic acid. It will be seen at once that in this method the amount of sulphuretted hydrogen received by the patient is unknown and variable, and is very small. A personal inspection of the carbonic acid used showed that it is very impure, the odor indicating that it contains sulphurous acid. Chemical testing has shown that the gas coming from the Wolffe's bottle contains sulphuretted hydrogen, the odor of which is also distinctly present. The chloride of sodium in the solution would appear to be superfluous, the carbonic acid reacting directly with the sulphide of sodium. The following formula represents the probable change:  $\text{NaS} + \text{CO}_2 + \text{H}_2\text{O} = \text{NaCO}_3 + \text{H}_2\text{S}$ .

Such is the evidencé which I have been able to gather from the experience of others in regard to Bergeon's treatment, and it is sufficient to indicate that we are in the presence of a very important improvement of, or rather a very important addition to, medical therapeutics. It is of vital importance to decide the mode in which the treatment acts. The experiments of Dujardin-Beaumetz show that the carbonic acid is not the active agent, and that the good achieved is produced by the sulphuretted hydrogen. Reasons already assigned are sufficient to make it improbable that the good achieved is the result of any parasiticial influence. All clinical experience indicates that heredity is in the production



of consumption a vastly more important factor than is any poison introduced into the body from without. Only a portion of the medical profession believes in the active contagiousness of phthisis, whilst the experience of any life insurance company affords a firm foundation for the belief in the heredity of the disease. If the bacilli really are the exciting cause of phthisis, the susceptibility to their action must be a more important factor in the production of phthisis than are the bacilli themselves. There is at present, then, no proof that the sulphuretted hydrogen, when it does good in phthisis, acts by killing the bacilli, and there is still less proof that it in any way increases the direct resistive powers of the individual to the action of the bacilli. In some acute and chronic diseases of the skin, local applications of sulphur act with the most astonishing rapidity and effectiveness, and the thought naturally suggests itself that in Bergeon's treatment of consumption good is achieved by the action of the sulphuretted hydrogen upon the inflamed lung-tissue, or in other words, that the plan of treatment is simply a means of making an application of sulphur to the pulmonic mucous membrane and tissue. This thought is not merely of speculative interest, but also of practical importance, for it suggests that the method of treatment will prove of value not only in consumption but in various forms of chronic or subacute affections of the lungs. This is confirmed by what experience we have. Cases of asthma and pulmonic catarrhs have already been quoted in this article as having been published in the French journals, in which

the remedy has proven of the greatest service.

I saw in the Philadelphia Hospital one case of asthma with chronic catarrh and emphysema in which the administration of the rectal injections had been followed by the most pronounced relief. In another case, of catarrhal pneumonia with an enormous amount of purulent expectoration, and general symptoms so bad that a fatal prognosis had been given, the administration of the remedy was at once followed by rapid lessening and even cessation in the purulent secretion, and in a short time by convalescence.

As an important illustrative case, I cite one from my own recent experience. Mrs. L., over 70 years of age, received a severe contusion of the side in a railway accident, which was followed by pleurisy, in turn followed by bronchial pneumonia, with an enormous expectoration. She has been under my care for nearly three months, and though often temporarily benefited by various remedies, had failed to properly respond to the most careful treatment that I could give her. The expectoration remained exceedingly profuse, amounting sometimes to a pint in the course of twenty-four hours, although very irregular. The general symptoms were very bad: sinking spells were frequent and alarming. I finally told the family that she would die, unless the gaseous injections would do something for her. Within forty-eight hours after the use of the gas, the expectoration notably decreased; the expression of the patient's face changed entirely, and at present writing, fifteen days after the use of the sulphuretted hydrogen, she is ex-

pectorating not one-sixth the quantity she did formerly, has regained the natural expression of her face and color of her skin, as well as her appetite, and a fair amount of strength, and seems to be convalescent. A notable fact in this case is that the injections of gas relieve in a few minutes the sense of suffocation and sinking the patient formerly felt in the mornings. The secretion of urine was sensibly increased. As tested on three occasions, the subnormal temperature rose  $0.4^{\circ}$  F. within the half-hour after the exhibition of the gas either by the mouth or rectum.

One difficulty with Bergeon's method of treatment in private practice is the cumbersome apparatus and the skilled labor required for the preparation of the carbonic acid. A plan which would avoid this and reach the same result in regard to the lung-disease is certainly a desideratum.

According to Gay-Lussac and Thénard, water at  $52^{\circ}$  Fahrenheit will absorb three times its volume of sulphuretted hydrogen. To prepare this solution, the gas, previously washed with water, is passed alternately through each of two bottles half filled with water; while it is being passed through one, the other is closed with the stopper and shaken, to insure complete absorption; and thus the process is continued till the water is completely saturated. One of the bottles is then completely filled with the liquid, and removed with the mouth downwards. The resulting solution is a colorless liquid, having the odor of putrid eggs, and a sweetish taste. When heated, it evolves the whole of the gas. Bottles containing the solution of sulphuretted



hydrogen should be habitually laid upon their side.

*A priori*, there is no evident reason why this solution, if injected into the rectum in proper doses, should not exert all the influence upon the pulmonic tissue obtained by Bergeon's treatment. I have tried the solution thrown into the rectum, and found it free from any irritant action. The habitual use of injections two or three times a day is, however, very disagreeable to most patients, and the questions naturally arise, Is there any necessity of administering the drug by the bowels, and will not sulphuretted hydrogen water be taken without too much repugnance by the mouth and without nauseating? At the various sulphur springs large quantities of such water are habitually drunk by the patients. Led by such considerations, I have tried the sulphuretted hydrogen water in as many cases as I have been able to get, and so far, when properly given, it has been usually taken readily, and has not disagreed with the stomach. Some persons, however, will not tolerate it at all. The effects upon the disease have seemed to be entirely similar to those produced by the injections. At first a half-ounce, afterwards an ounce, of the saturated solution of the sulphuretted hydrogen should be placed in a tumbler, and two or three ounces of carbonic acid water be run into it from a highly-charged siphon, the whole being drunk while effervescing. This may be given three to five times a day, so that the patient will receive daily between a half-pint and a pint of the sulphuretted hydrogen gas. Injections of gas into the rectum pro-

duce in some persons more or less violent attacks of colic, especially if given at a time when the food is well down in the intestinal tract. Thus, in the case of Mrs. L. the night injection caused so much pain that it could not be borne, although the injection in the morning was actually pleasant. The two methods of administration were then combined, the gas injection being given in the morning and the sulphuretted hydrogen water in the afternoon and evening. Within the last forty-eight hours, at Mrs. L.'s earnest request, the gas injections have been entirely abandoned in favor of the exhibition by the mouth. Of course the two methods are simply different ways of accomplishing the same result, and may be variously combined or substituted for one or another according to the peculiarities of the individual cases within the last day or two.

It is a matter of the greatest importance to fix definitely the dose of sulphuretted hydrogen gas. With the method employed in the Philadelphia Hospital this cannot possibly be done. The solution employed in the Hôpital Cochin, whose formula is given in the first part of this article, seems to be superior to the solution of the chloride and the sulphide of sodium, in affording known quantities of sulphuretted hydrogen. Even with it, however, the chemical reactions are so slow that practically it is scarcely possible to decide how much of the gas is evolved in a brief time. The substitution of sulphuric for tartaric acid would largely obviate this. When the medicine is given by the mouth exact dosage is possible. In Mrs. L. five ounce-doses appeared to be too much. She is now taking three doses daily.

In a recent number of the *British Medical Journal* it is stated that M. Morel affirmed before the Biological Society of Paris that the dose of the gas is twenty-five cubic centimetres. That it is not incapable of doing harm is shown by the experiments of M. Peyron, who injected into the rectum of a dog one hundred and fifty cubic centimetres of a saturated solution of sulphuretted hydrogen in two doses at intervals of three minutes. Symptoms of poisoning began to be manifested within two minutes, and death took place in ten minutes. Another dog died quickly after two injections of the same strength, given at intervals of twelve minutes, while two others, in whom only very small quantities of the gas, or large quantities very much diluted, had been injected, experienced only slight inconvenience, and rapidly recovered. Not long since, in the University Hospital in Philadelphia, about one quart of a mixture containing equal quantities of carbonic acid and sulphuretted hydrogen were injected into the rectum of a patient ; within three minutes the man was unconscious and apparently dying. The breathing-rate was one hundred per minute, and the respirations so shallow that they could scarcely be observed. The pulse at once became very rapid and feeble, and even imperceptible at the wrist, while a very marked odor of sulphuretted hydrogen appeared in the breath. Under treatment the symptoms all subsided in about fifteen minutes. The rapidity with which these symptoms developed and with which they subsided indicates that when the gas is thrown into the rectum its effect is very immediate and fugacious,



and it is entirely possible that the more continuous influence of rectal injections of the aqueous solution of sulphuretted hydrogen may act better in pulmonic diseases than does the short influence of the gases now administered. Of course poisoning by overdoses of sulphuretted hydrogen is a no more valid objection to its proper use than is opium poisoning to the employment of opium.

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