the colon being found, as the peritoneum was protruded by the gas in the cavity. In the third case (as in the second) colotomy was performed by Mr. Heath.

In 1879, Mr. G. Brown brought before the same Society¹⁷ a case of typhoid fever, in which an accumulation of odourless gas took place in the peritoneal cavity, without any perforation of bowel occurring. Puncture, with absolute relief to urgent symptoms, was resorted to; the pulse fell at once from 50 to 36, and the heart regained its natural position. This change enabled a greatly distended condition of the urinary bladder to be recognised. Mr. Brown's account contains some interesting speculations as to the origin of the gas formed within the peritoneal sac.

In 1879, Dr. Broadbent described in the *British Medical Journal* (Sept. 27th) a case of intestinal obstruction, owing to the pressure of a pelvic tumour, successfully treated by repeated puncture of the small intestine by means of a long aspirator needle. He mentions some necessary precautions to be observed in performing the operation.

In 1884, Dr. Hunter brought before the Obstetrical Society of New York¹⁸ a case in which, following a subsequent peritonitis, tympanites was so urgent that the patient appeared moribund. The use of the long rectal tube proved insufficient for relief, and the abdomen was punctured by a long hypodermic needle, when gas escaped, and continued to do so for half an hour. The patient recovered. The gas was not offensive, and had accumulated in the peritoneal cavity. In the discussion, Dr. Nicoll, Dr. Murray, and Dr. Polk related cases showing the good results of the operation. In a subsequent meeting the latter gentleman quoted another case in which death was averted by the operation.

Quite recently Mr. W. Furner brought before the Brighton and Sussex Medico-Chirurgical Society¹⁹ two cases of abdominal puncture for flatulent distension. In both instances faecal escape took place; and in one case it was found, after death, that it was the small intestine which had been pierced.

(To be concluded.)

ON INHALATION AND THE LACK OF PRECISION IN THE METHOD OF USING IT;

WITH A DESCRIPTION OF DR. ISOARD'S "SULPHYDROMÈTRE."

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CONTINUING my tour of inspection of continental spas, it was my good fortune to visit Allevard in the lovely highlands of Savoy last September, and in the hope that I may be able in some slight degree to contribute towards our knowledge of "healing springs," I submit the result of notes taken at Allevard, together with translations from those of Dr. Isoard.

1. *On inhalation and on the lack of precision in the method of using it.*—The inhalation of the gaseous constituents disengaged by sulphurous mineral waters has gained in the therapeutic treatment of diseases of the respiratory passages a rank which is now no longer disputed. Clinical observations have proved its value. The superiority of this method is the result of the double action that it allows the sulphurous vapour to exercise on the organ. The first, which is entirely local, is due, as is now well known, to contact with the very sensitive mucous membrane of the bronchi; the second, which is general, resembles that of water taken in drinking, and is the result of its absorption by the lung and subsequent diffusion over the whole system. But even if no doubt be thrown on the power of this treatment, yet we must acknowledge that it is applied under very defective conditions. Neither doctor nor patient has any means of determining the intensity of the treatment pursued. It is graduated, indeed, simply by calculation of the time of remaining in the inhalation rooms. Yet nothing could be more uncertain than this determination. Numerous experiments made with test papers, either entrusted to patients or placed in different parts of the room, or by a standard sulphydrometer for water, have shown that there are considerable differences in the quantity of mineral constituents diffused in the atmosphere.

Dr. Isoard found in two experiments a degree of sulphura-

tion four times greater in the one than in the other; and yet at Allevard, where the method was first used, nothing was neglected to ensure the inhalation all its power; the arrangement of the rooms leaves nothing to be desired; the water which feeds them is subjected to a system of spraying and evaporation, which releases from it nearly all the gas it holds in suspension. The reason of this variation lies in the fact that the chemical composition of the atmosphere can be altered by causes which an irreproachable arrangement could not foresee. I will confine myself to quoting the most evident: (1) certain barometric conditions favour or impede the disengagement of the gas contained in the waters; (2) the proportion of sulphurous vapour mixed with the air of the room varies according to the number of patients in the room and the time which has elapsed since the beginning of its action.

2. *Consequences of irregularity of treatment.*—The variation in the degree of impregnation of the air intended for inhalation being recognised and its principal causes pointed out, it is necessary to indicate the inconveniences, even dangers, to which those who undergo it are thereby exposed. All the gases given off by sulphurous waters have not the same therapeutic importance nor the same harmlessness. Carbonic acid and nitrogen, for example, only increase the proportion of these same elements which enter into the composition of ordinary air; and even if their action on the animal economy can sometimes be profitably employed, yet it may be said that it is not sufficiently powerful to necessitate a rigorous system of dosing. But the same remarks do not hold good of sulphuretted hydrogen, a very powerful gas, to which the inhalation owes its curative properties, and which standardises the therapeutic richness of all sulphurous waters, since therein lies the resultant of all the decompositions of the various substances which are dissolved in the waters. The absorption of this gas by the pulmonary passages is preceded by an energetic action on the tissues with which it comes in contact before being assimilated into the blood. This local action shows one of the most remarkable therapeutic properties of the gas—namely, that which is due to the slight excitatory movement to which it gives rise, and whose resolute action on lesions of the respiratory organs is nowadays well known and established. But this excitatory or inflammatory movement requires the greatest vigilance. The limit may easily be passed. Congestion, even hæmorrhage, may result from the unseasonable or irregular administration of a remedy otherwise very valuable. There is therefore an absolute necessity of giving this mode of treatment the degree of precision which it lacks, a defect which is very often the only reason for hesitating to try it. The number and duration of the sittings give altogether insufficient indications of the quantity of sulphuretted hydrogen absorbed. Some patients believe they can be guided by the intensity of the characteristic odour liberated by the water. This proceeding gives rise to the same errors. The odour of the water does not give a measure of its degree of sulphuration. It would be more logical to take as a guide the observed physiological effects. But everybody cannot gauge them to the same degree, and their manifestations are not absolutely constant. Yet an analysis of the air of a hall, every time it is to be used, is out of the question. That would necessitate the construction of a small inhalation room for every patient. What is absolutely indispensable is not an analysis giving the exact quantity of sulphuretted hydrogen diffused in the atmosphere, but a method capable of indicating in a visible manner, evident to everybody, the variation in the degree of sulphuration of the atmosphere intended for inhalation; in fact, a kind of registering apparatus by means of which every patient can follow the graduation of his treatment.

3. *Mode of using Dr. Isoard's sulphydrometer.*—Dr. Isoard says: "The process which I propose to employ seems to me to fulfil all the conditions," which we have discussed above. "It consists simply of an application of the means I have used to find out the irregularities I have mentioned. The test papers, impregnated with a solution of a salt of lead, take in contact with the sulphuretted hydrogen a tint which is the more intense the longer the exposure is continued, as the degree of sulphuration of the atmosphere is high. It seemed to me natural to take the shades which correspond to the time usually given to the sittings, and to exactly reproduce them in unalterable colours, forming a gradation of tints through all of which the test papers have to pass, and to give the gradation thus obtained a form easy of com-

¹⁷ Transactions, vol. xii., p. 235.

¹⁸ Ibid., June 3rd.

¹⁹ British Medical Journal, May 5th, 1887.

parison. Moreover, the scale of shades has been determined in a room set apart at my disposal for this special purpose. The quantity of the water was carefully ascertained and also the amount of sulphuretted hydrogen it contained. No patient was allowed in the room during the experiment. The tints, then, have been obtained in an inhalation room acting under the most regular conditions. They have been arranged on a card pierced with two longitudinal slits to admit of the application of the test paper opposite the shade one wishes to obtain. The greatest care has been given to the reproduction of these tints, to the choice of paper, and the preparation of the solution with which it is impregnated. The indications which this table can furnish will have a character of precision, which a measurement of the time passed in the room cannot give.

"Of course it must not be required of a process like this to furnish with the exactitude of a laboratory instrument the quantity of sulphuretted hydrogen in the air in milligrammes—that is, moreover, not necessary. But this apparatus, placed in the room beside the patient, or affixed to his clothing, undergoing simultaneously with him the action of the air he breathes, informs him whether he ought to prolong or shorten his stay, and gives him a protection against the disappointment of an illusory treatment and the unpleasant surprises of one too strong. The mode of using it is so simple that everyone can do it. The shade of the test paper must coincide with the one which has been assigned to the patient on the graduated table. This comparison is much facilitated by applying to the apparatus a narrow, thickish piece of paper, pierced with an opening, across which the juxtaposed tints are compared. The sulphuretted hydrogen acts with most intensity on the edges of the paper. It is the middle portion that should be compared with the table. To regulate the intensity of the treatment according to the degree of sensitiveness of the paper, it suffices to know that tint No. 1 corresponds to the shortest sitting usually prescribed (about three minutes).

"All that I have said refers to *cold* inhalation, the one usually practised and whose use requires the most care. It is so called because the rooms thus used are supplied exclusively with cold mineral water, and thus have a temperature differing but little from that of the open air. But there is another kind of inhalation, the *tepid* or *temperate* inhalation. It differs from the first in that the rooms assigned to it, and the mineral waters also, receive a jet of steam from ordinary water, which, while partially condensing, raises the temperature of the room to about 28° C. or 30° C. (= 82° F.—86° F.). This condensation gives rise to a light spray formed of very minute drops, whose part an ingenious theory has well explained. These minute drops dissolve the gas given off by the mineral water on account of the temperature and pressure forming a spray of chemicalised water in so fine a state of division as no pulverisation could produce, and thus penetrates, with the sulphurous element, into the finest ramifications of the bronchi.

"It is evident that this treatment, which has its special indications, is nothing but a simple application of thermal hydro-therapeutics. One thing which distinguishes the tepid inhalation is the fact that the sulphuretted hydrogen coming by this process in contact with the mucous membrane of the bronchi has a more feeble local action on it. Everyday experience proves, indeed, that a length of time can be given to the sittings for tepid inhalation which would be dangerous for cold inhalation. The sulphydrometer, since it does nothing but faithfully show the variations of the degree of sulphuration of the atmosphere, can be used in all the rooms assigned to the two kinds of inhalation. In the tepid inhalation rooms, however, the shade corresponding to the shortest, which is taken as the starting point, should be one degree higher than in the cold inhalation rooms, on account of the greater tolerance of the action of the gas, which I have mentioned, and the greater sensitiveness of the test papers in a humid atmosphere. The name of sulphydrometer, given to an apparatus which does not accurately determine the dose of sulphuretted hydrogen, may seem pretentious to some; to me, however, it seems justified. Nevertheless, I should be glad if only its title is contested, if its utility is recognised, and if a kindly reception is accorded to my modest efforts towards a therapeutic treatment which has stood its tests, but whose results will be more constant when scientific and precise methods of using it are employed for its application."

The waters of Allevard are of the same character as those of Aix-les-Bains, but being at a higher elevation the air is

more bracing. They are beneficial in rheumatic and gouty ailments, sciatica; particularly beneficial for throat affections and delicate children. The majority of persons who resort to Allevard labour under affections of the organs of respiration. I have had demonstrated to me the great benefit derived from the Allevard treatment in lymphatic tubercular subjects, cases of chronic laryngitis, asthma, and pulmonary or laryngeal affections. Dr. Niépce (the medical inspector of the baths) speaks highly of Allevard as a health-resort for children, especially if suffering from chronic pharyngitis and enlargement of the tonsils. Allevard is not two hours further than the now fashionable Aix-les-Bains, on the same line of rail, and we get a fresher air, away from excitement, excessive luxury, and their accompanying expenditure. The fame of mineral waters is a thing of slow growth, and of no great permanence when gained; many highly esteemed by the last generation are now wholly disused. I feel confident that the more Allevard and the medical treatment there are known, the higher it will rise in public esteem.

Ladbroke-grove, W.

TRACHEOTOMY AND INFLATION IN THE TREATMENT OF A STILLBORN CHILD.

By CHAS. SCOTT WATSON, M.D.

THE treatment of stillborn children is so unsatisfactory in some cases that I make no apology for publishing the following unsuccessful case, in which the ordinary treatment was supplemented by tracheotomy and inflation of the lungs.

Mrs. H—, aged twenty-nine, was confined of her second child (a boy) on Jan. 5th, 1887. Her first child was born two years and a half ago, after a severe instrumental labour, and lived four days. Concerning the confinement, in which I attended her, the following points may be mentioned:—I was called to her at 5 P.M. on the 4th, she had been in labour since 2 P.M., the os was the size of a shilling, the membranes intact, and the vertex presenting in the first position. At 7 P.M. the os was fully dilated and the membranes were ruptured. The head entered and stuck in the brim of the pelvis, and at 2 A.M. on the 5th forceps were put on and delivery easily effected. On the delivery of the head the mouth and throat were cleared of mucus, and the child made one or two ineffectual attempts at inspiration. When delivery was completed, which occurred without any unusual delay, the child was pale and flaccid, but its heart was beating strongly, at the rate of about 60 a minute, and at intervals of a quarter of a minute or so it made a single strong inspiratory effort, in which the chest walls were sucked violently inwards, but no air entered the lungs. The usual means of resuscitation—slapping, sprinkling with cold water, artificial respiration, &c.—were used without result. I then made several attempts to pass a catheter into the larynx by the mouth, but failed, and last of all tried insufflation from mouth to mouth with pressure backwards on the trachea, without producing any good effect. By this time the child was cold, and evidently at the point of death. The inspiratory efforts, always ineffectual, still occurred, but so feebly and at such long intervals that each appeared likely to be the last, and the heart was scarcely to be felt beating. As it seemed that nothing was to be gained by simple persistence in the foregoing treatment, and as the symptoms pointed to some obstruction to the entrance of air into the lungs, tracheotomy was rapidly performed. There was no bleeding. A No. 7 male gum-elastic catheter was then passed into the trachea and air blown down it. During these insufflations it was found necessary to hold the child's mouth and nose, and also the edges of the wound, tightly round the catheter, to prevent air escaping at these openings; but in spite of all the nurse and I could do some air always did escape. Expiration was produced by pressure on the chest. As each of these acts caused a bubbling noise in the air passages, the action of the catheter was reversed, and about a drachm of mucus and meconium was sucked up into its tube and so got rid of. The spontaneous inspirations still continued at long intervals, but now of course drew air into the chest, and the heart's action soon began to improve. After this artificial respiration had been persevered in for about half an hour, each spontaneous deep respiration was followed by five or six rapid shallow ones, and in about an hour after its birth the child was breathing freely, moving its limbs, and crying when the wound was