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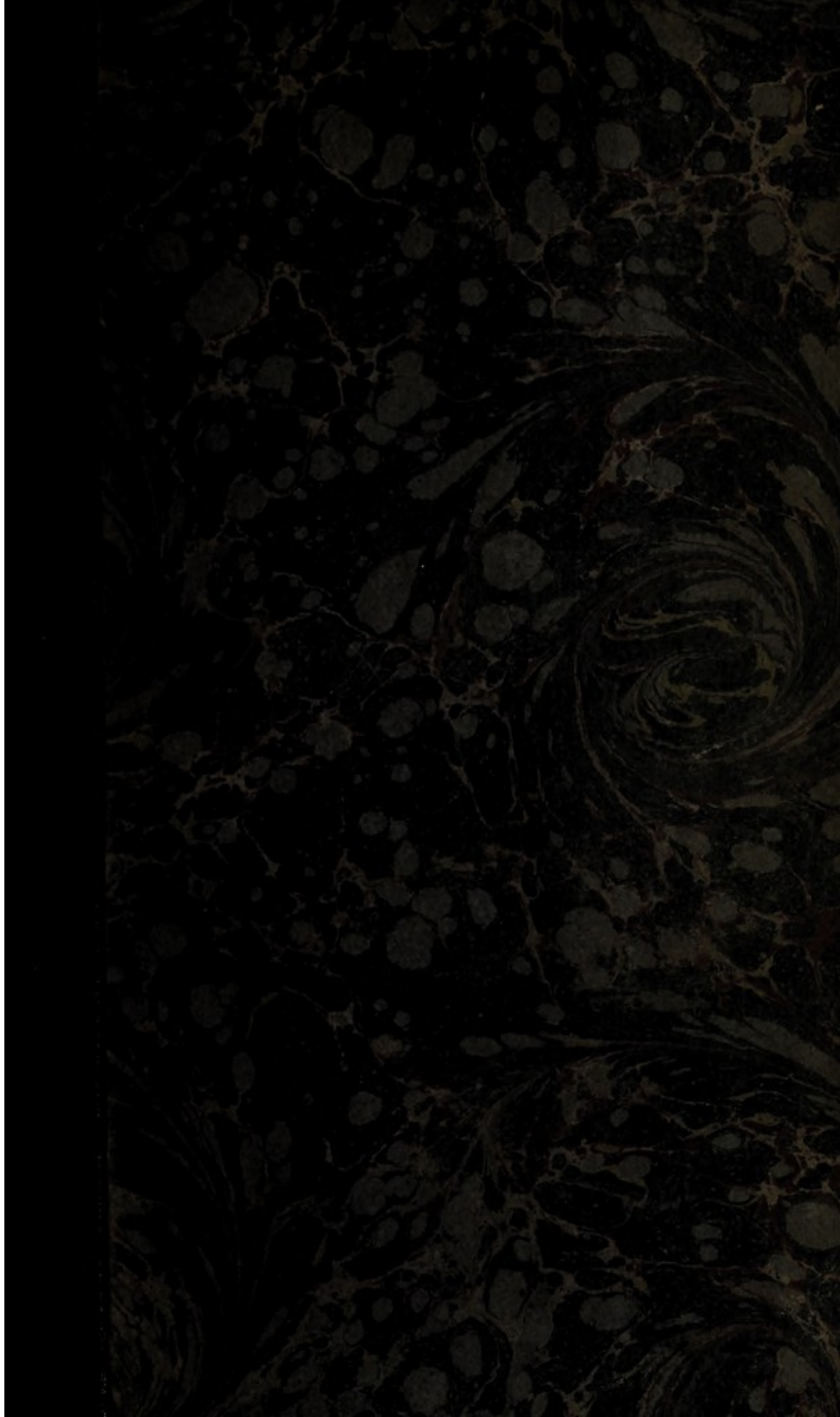
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ON THE
DISCUSSION RESPECTING CHLOROFORM,

IN THE ACADEMIE DE MÉDECINE OF PARIS.

By JOHN SNOW, M.D.

(Reprinted from the "*London Journal of Medicine*" for April 1849.)

THE original conclusions arrived at by the Commission appointed to investigate the fatal case at Boulogne, and the general question of the safety or danger of chloroform, were ultimately adopted by the Academy, with very slight alteration (as was shown in the abstract of the proceedings in the last number of this JOURNAL), but not till they had met with a very stout opposition, more particularly from MM. Blandin and Jules Guérin. With the first conclusion, which acquits chloroform of the death of M. Gorré's patient, I cannot agree, any more than these gentlemen, and a number of other speakers. The Commission commenced their investigation, with the assertion that chloroform always produces intoxication and insensibility before death; and their reporter, M. Malgaigne, adheres to their opinion to the end, in opposition to all contrary evidence, and even denies that chloroform can cause death by its direct action, and especially by poisoning.

Now the truth is, that the vapour, when inhaled of a certain strength, is just as sure to cause sudden death without premonitory intoxication or insensibility, as it is to cause its ordinary beneficial effect when inhaled of another strength, or to fail altogether of its desired action, if diluted beyond a certain point. I have several times made animals—small birds, mice, and rabbits—breathe air saturated with vapour of chloroform at the ordinary temperature of the atmosphere, and the consequence has always been, that after attempting for a few seconds to escape from the capacious jar in which they were inclosed, they suddenly exhibited signs of distress, and died without any interval of intoxication or insensibility, in periods varying from less than half a minute to a minute after their first exposure to the vapour. In these experiments, not more

than one-sixth part of the air was displaced by the vapour diffused through the remainder. The vapour of chloroform never acts, as supposed by the Commission, by excluding the air, and so producing asphyxia. This is physically impossible. The same quantity of vapour of ether in the air causes a much slighter effect; and, of some vapours, a scarcely appreciable influence, even when the air is quite saturated with them. Chloroform acts by its narcotic properties alone; and when inhaled of the strength employed in the above experiments, it paralyzes the action of the heart at the same time as the respiratory movements. In two experiments of this nature previously related,¹ I found the blood in the lungs still florid, immediately after death.

In the case at Boulogne, artificial respiration was performed for upwards of an hour after death, and with force enough to cause permanent dilatation of the air cells. At the subsequent inspection of the body, air was found in the pulmonary veins, in the heart, in the right carotid artery, and in the veins generally; a little frothy blood being found at the orifice of the vena cava. The conclusion of the report which has been adapted by the Academy, is, that death was probably caused by this mixture of gas with the blood. The report does just notice the idea that the air might have entered during the artificial respiration, but adds that this would not explain the cause of death, having prejudged, that it was not the narcotic action of the chloroform; and goes on to state that the froth at the orifice of the vena cava proves that the air entered during life, entirely overlooking the fact (and I do not see it alluded to by any of the speakers), that the froth would be produced by the churning of the blood backwards and forwards in the large vessels, during the artificial respiration which had introduced the air. The Commission suppose that the air or gas was suddenly developed in the vessels by some unknown cause, and curiously the speakers who oppose their conclusion, admit this sudden evolution of gas, but attribute it to the chloroform—to a peculiar action of ether on the blood. This is the weak point in their argument, for M. Malgaigne justly replies that this is only hypothesis.

One fact of importance has been brought to light by this inquiry. In the report previously published, it was stated that not more than from fifteen to twenty drops of chloroform had been employed; but by a judicial examination of what was left in the bottle, it was found that from five to eight grammes had been used—from 77 to 123 grains, or from one to two tea-spoonfuls, a quantity amply sufficient to cause death.

After thus treating the special case submitted to them, it is not sur-

¹ Medical Gazette, October 13, 1848.

prising, that the conclusions of the Commission on the general question are vague and unsatisfactory. Part of them are commonplace remarks in which everybody agrees; but in what danger really consists, and how it is to be avoided, is nowhere pointed out. They state: "there is risk of asphyxia when the anæsthetic vapour is not sufficiently mixed with air." The risk is not one of asphyxia, but of over-narcotism, which, according to circumstances, may cause death by paralyzing the respiratory movements, and so bear a certain resemblance to asphyxia, or may arrest the action of the heart, and so resemble syncope. They lay down, as a rule: "To take care, during inhalation, that a sufficient quantity of air be mixed with the chloroform, and that respiration be entirely free"; but they do not state what is a sufficient quantity of air; whether 75 parts air to 25 vapour is sufficient, or whether it should be 95 parts air to 5 of vapour, we are left entirely in the dark. The truth is, it ought to be somewhere about the latter quantity, and the vapour cannot ever be breathed with safety in larger proportion than 10 parts by measure to 90 of air. The conclusion of the Commission means no more than that there should be sufficient air for the purposes of respiration, and this is a fatal mistake—I say fatal, for there has been a death from chloroform in France, since the adoption of the report by the Academy. It occurred in a public hospital, and would, in all probability, have been prevented, by a different line of conclusions on the part of that learned body. The chloroform in this case was applied on lint, which was placed loosely over the mouth and nostrils. There was no impediment to free respiration, but the man suddenly expired, as in the previously recorded cases; and so long as so powerful an agent as this is given with no better means of regulating its strength than a handkerchief or sponge, such melancholy cases cannot fail, now and then, to happen. Many patients, who have not suffered, have narrowly escaped; several cases of syncope from chloroform were mentioned in the late discussion, and they have frequently occurred in this country under the use of the handkerchief, although it is no part of the action of chloroform, when carefully given, to cause syncope. The pulse may become small on account of struggling or altered breathing; and when sickness follows the inhalation, there is often a degree of depression attending it, but never sudden fainting, which, if caused by the vapour, must depend on a near approach to paralysis of the heart.

The last recommendation of the Academy is judicious enough, "to suspend the inhalation as soon as insensibility is procured", etc., but unless there be some means of regulating the strength of the vapour, there may be a dangerous increase of the narcotism after the inhalation is suspended, owing to absorption of a large quantity of vapour that

may be present in the lungs at the moment, and which will take about twenty seconds to get absorbed and reach the brain; thus accumulating the effect during that period.

M. Roux remarked, that if he supposed it necessary to take all the precautions recommended by some surgeons, he would for ever renounce the use of chloroform. I would reply, that those who are not willing to take very great precautions in using this powerful medicine, should employ ether, in the use of which, danger can be avoided by only moderate precaution, as it cannot act so swiftly as not to give due warning.

From the London Medical Gazette, February 22, 1850.

54, Frith Street, Soho.

in two recent cases of robbery it has been asserted that chloroform was used to render the victims insensible, and although no real evidence has appeared of such having been the fact yet the statement has gained great publicity through the newspapers, and the consequences on the prisoners have apparently been rendered more severe by the publicity. It can readily be shown that if thieves and prostitutes were to resort to the use of chloroform in the public streets, in the manner alleged, the attempt would only lead to their instant detection on the spot. The sensation of pungency in the nostrils and throat that is caused by the agent when its vapour is in sufficient quantity to produce any effect on the system is so strong and peculiar that no person can take a single inspiration without being aware that he is inhaling something very unusual. Chloroform, in fact, can never be administered without the consent of the patient, and it cannot be given to a person who is not in a state of insensibility. The case of children and the aged is especially to be remembered, and it should be noted that the vapour of chloroform is always awake before it is administered, however much the patient may be insensated. It is perfectly under the control of the person who would administer it, and it is not a matter of chance, as in the case of ether, that it may be present in the lungs at the moment, and which will take about twenty seconds to get absorbed and reach the brain; thus accumulating the effect during that period.