

**The induction of sleep and insensibility to pain by the safe self-administration of anaesthetics / by John M. Crombie.**

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*Mr. J. M. Crombie*  
20  
THE INDUCTION OF SLEEP AND  
INSENSIBILITY TO PAIN

BY THE

SAFE SELF-ADMINISTRATION OF ANÆSTHETICS.

BY

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(SECOND EDITION.)



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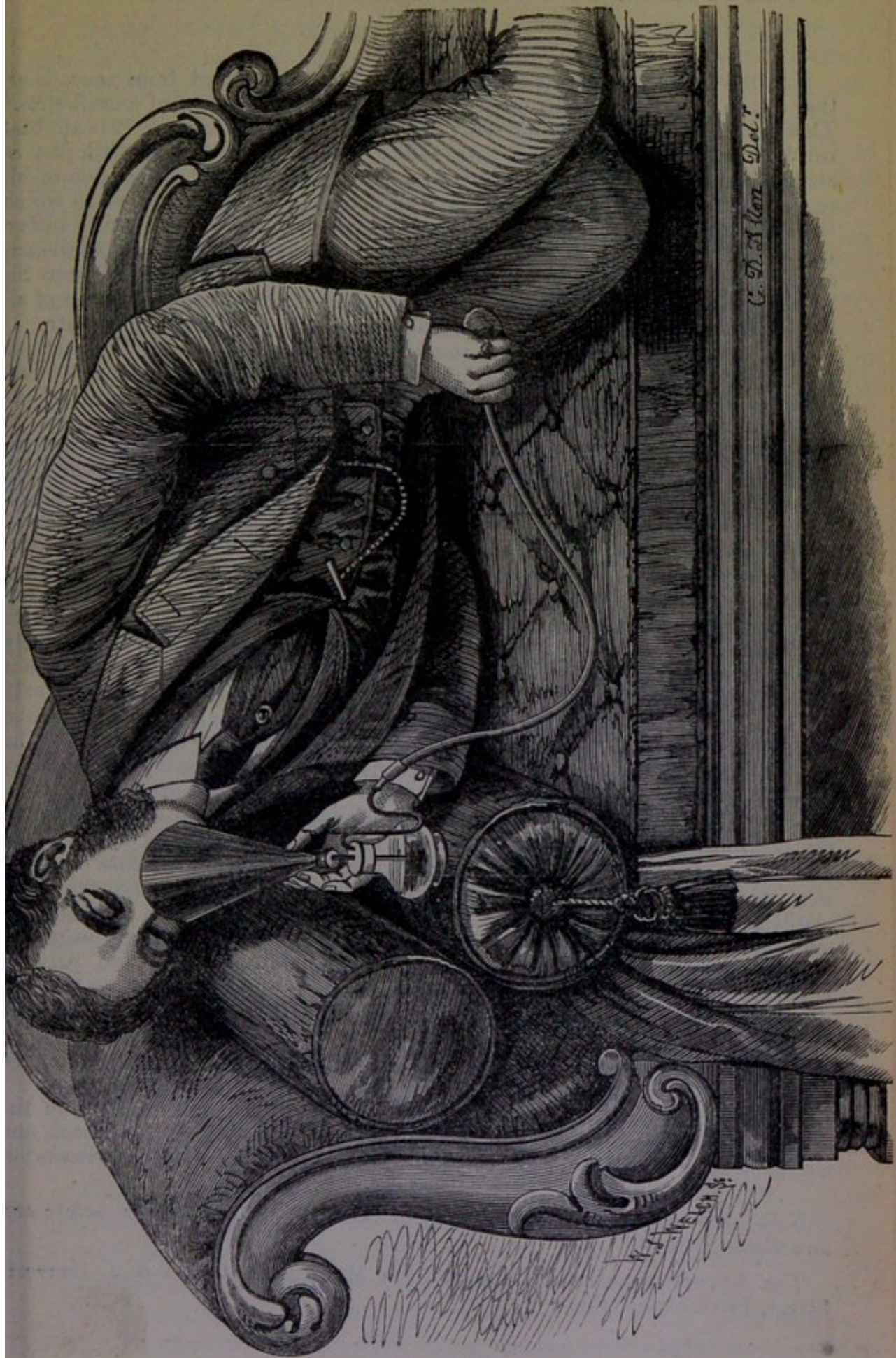
1876.

PRICE TWO SHILLINGS AND SIXPENCE.

Let us now turn to the study of the  
history of the world, and see how  
the events of the past have shaped  
the world of the present. We shall  
find that the history of the world  
is a story of progress and improvement.

Our first lesson is that the world  
is a better place than it was  
in the past. We shall see that  
the progress of the world is  
a result of the efforts of  
the human race. We shall  
find that the world is a better  
place than it was in the past.





C. D. Allen Del.



# INSTRUCTIONS FOR THE USE OF THE ADMINISTRATOR.

UNCONSCIOUSNESS, to the extent of *sleep*, as distinguished from *coma*, is all that can be produced by this method for the self-administration of anæsthetics.\* This is all that is necessary for relief from pain, however severe ; it is all that can be reached and sustained with safety. The sleep thus induced, just as sleep when it occurs spontaneously, does not imply the total suspension of all susceptibility to impressions, but is that degree of unconsciousness in which the susceptibility is so diminished that what otherwise would be acute suffering or violent pain, can at most be felt only as a feeble or momentary experience, and consequently does not awaken the sleeper at the time, nor recur to his recollection afterwards. *Coma*, on the other hand, is an entire suspension of all susceptibility to impressions—a condition immediately bordering on death.

It is possible to attain *sleep*, and impossible to produce *coma*, by this method, for the following reason : *the inhalation of the vapour ceases whenever the patient begins to sleep*, and this because it is dependent on certain movements of the hand, which are arrested by the approach of sleep.

Sleep induced by anæsthetics is dangerous, like natural sleep, in advanced diseases of the heart, lungs, or brain. Persons suffering from such diseases are always in danger, when asleep, of sleep passing into coma and death, and if they had recourse to anæsthetics would increase that tendency. But, with those exceptions, sleep induced by chloroform or ether is not attended with danger.

The anæsthetic to be inhaled is poured into the bottle until the absorbent within is saturated therewith, or less, as may be thought expedient : but any in excess, that is not absorbed, must be removed. *The anæsthetic in the bottle of the apparatus is thus practically solid.* The stopper is then screwed tightly down, and the point of the delivery-tube fixed in the inhaler. The inhaler is placed over the mouth and nostrils, and at each compression of the air ball, the anæsthetic vapour, mixed with air, passes into it : the rate of compression being guided entirely by the patient's capacity for respiring the vapour. The process is simple and natural, and as regards safety cannot be equalled by any other mode of administration.

Before commencing the inhalation the patient should be in bed, or lying in the horizontal position on a sofa, with the head, as usual, slightly raised. The body must also be comfortably warm ; cold feet or hands or any sense of chilliness whatever being first entirely recovered from. If necessary, therefore, artificial means of warmth must be applied as an indispensable preliminary, and it is desirable, also, that the sleeping room should be moderately warm.

Perfect quietness must be enjoined on attendants, if any, and patients should compose themselves as in preparing for sleep ordinarily, so as to assist the action of the anæsthetic, and must not be interfered with during the process.

When sleep supervenes, the ball of the instrument is let go, just as the plaything drops from the hand of the sleeping child.

The safety of the instrument for use as directed depends entirely on the accuracy of the mechanical adjustments, and the purity of the absorbent, and therefore none will be sold but those examined and approved by the Inventor.

N.B.—Medical advice on the subject is required in all cases before any anæsthetic is used.

The Apparatus may be obtained from MACKEY & Co., 1 & 2, Bouverie Street, Fleet Street, E.C.

\* Chloroform, Ether, Bichloride of Methyline.



The object and use of the apparatus is further illustrated by the following extracts from reviews :—

“DR. CROMBIE'S CHLOROFORM APPARATUS.—This instrument is a very ingenious and useful invention. The object of the inventor has been to make it possible for persons suffering from intense pain or insomnia to avail themselves of the benefits of those smaller doses (‘stimulant’ doses, we should call them) of chloroform, which will produce sleep without producing coma. It is notorious that an immense number of sick persons are in the habit of using chloroform with this intention, but that they usually take it by means of a simple handkerchief or lint, which, at any rate for self-administration, is a most dangerous method, and is already known to have caused several deaths, and suspected to have caused many others. In Dr. Crombie's instrument there is no danger of any untoward accident. The patient, lying comfortably on a sofa, or in bed, places the vessel containing the chloroform (the cap well screwed on) beside him, and puts the conical facepiece over the nose and mouth. He then proceeds to work the hand-ball with regular rythm : this directs a small quantity of chloroform vapour at each compression into the inhaler. Very soon a feeling of drowsiness comes over the patient, which renders it impossible for him to keep up the pumping movement, and he quickly drops off to sleep without the possibility of giving himself an overdose. We understand that this inhaler has been largely used for cancer patients, and other sufferers from painful incurable diseases, with great benefit. It certainly affords the only means we know of by which chloroform can safely be administered to themselves by patients.”—From *The Practitioner*, April, 1873.

“It cannot be denied that we possess in chloroform an agent capable of wide and safe clinical application for the purpose of inducing sleep and no more, and for the relief of pain, as in cancer, neuralgia, and other painful affections.

“It is with the view of placing in the hands of patients a safe means of inducing sleep by the self-administration of anæsthetics, that Dr. Crombie comes forward with the mechanical means of obtaining this object. The apparatus is composed of an india-rubber air-ball, a bottle for the anæsthetic, and an inhaler. The supply of anæsthetic vapour is dependent on the patient, who compresses the air-ball, and thereby causes the expulsion, by means of tubes, of a small amount of chloroform vapour into the inhaler. When sleep supervenes, the supply of chloroform, being dependent on the movement of the hand, is arrested.

“Dr. Crombie's apparatus appears to be a good one, and to offer increased facilities for the safe application of slight anæsthesia for the relief of pain. We have employed it in suitable cases and it has acted well.”—*British Medical Journal*, June 14, 1873.

“Chloroform has indeed, but more clumsily and less safely, been adopted by practitioners since its introduction for this purpose ; but it has always most properly been placed in patients' hands with dread and misgiving, and the results have been in several cases disastrous ; and no doubt the full therapeutic value of many anæsthetics for the relief of pain has not been taken advantage of for this reason. Dr. Crombie's clever mechanical contrivance recommends itself for fair trial under the surveillance of the medical practitioner.”—*The London Medical Record*, May 28, 1873.





## P R E F A C E.

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THE apparatus, whose use for the relief of pain and the induction of sleep is here described, is now well known to the medical profession, and, having met with the approval of the best authorities, has passed into extensive employment. It has safely afforded to those requiring such treatment relief or sleep which, by hazardous methods of administration, might at any time have resulted in fatal casualties.

The instrument, in its perfected state, holds the anæsthetic in a practically solid condition, while it is the anæsthetic vapour only, mixed with atmospheric air, that reaches the inhaler. This makes its use more simple and agreeable, and also serves to economise the anæsthetic more than is possible by any other arrangement.

It has been presented to the leading medical societies of London, as well as to several in the provinces, and, without exception, has been received with commendation.

The future will, no doubt, learn still further to appreciate in suitable cases this use of anæsthetics, and especially of chloroform—the most effective, the safest, and the best narcotic when it can be so used—in dealing with all the severer forms of suffering resulting from exhaustion and disease.

140, FINBOROUGH ROAD,  
WEST BROMPTON, S.W.

*January, 1876.*



# THE BUREAU

The Bureau of the Interior is now well known to the public as the department which has the honor of the management of the public lands and the regulation of the public lands. It is the department which has the honor of the management of the public lands and the regulation of the public lands. It is the department which has the honor of the management of the public lands and the regulation of the public lands.

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## INTRODUCTION.

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SOME surprise, as might have been expected, was at first caused by the proposition that the self-administration of chloroform and ether ought to be admitted into medical practice as the most effective and best remedy in the more painful attacks of disease and exhaustion. Against such apparently dangerous innovation it was naturally enough urged that the proper management of those anæsthetics requires all the skill of an experienced administrator, and how could they then, with any chance of safety, be confided for such a purpose to those who might be wholly ignorant of their *modus operandi*?

In reply to this, the pamphlet on "The Induction of Sleep," was published three years ago; not, indeed, to show how such a thing might be, because it already had been many times over and over again, before any mention of it was made public, but to explain that self-administration, as thus practised, was a totally different thing in every respect from ordinary administration. Let it be granted as in the case of ordinary administration that no one need be afraid, at the outset, to pour a few drops of chloroform on a handkerchief even from a bottleful, with the view of obtaining sleep, when they take care in the first place that the stopper is carefully replaced and the bottle removed to a safe distance. But when the inhalation is once commenced to keep the bottle hard by, and in a state of drowsiness, when the sense of relation is lost or confused, to add therefrom a few more drops a second or a third time, and so on, is a proceeding which no one possessed of any intelligence, and knowing anything of the properties of chloroform, can fail to see must be fraught with the utmost danger. By the method recommended, however, there is no sleepy trafficking of that kind with bottlefuls of chloroform, nor any hopeless effort required to measure out the successive drops. All that patients have to do is to



turn their faces to the inhaler, and a mechanism is provided for them by which, at their own will, they can supply themselves with enough of the anæsthetic, but cannot possibly do more. It was shown that the safeguard lay in the nature of the physiological process controlling sleep through chloroform whereby the administration is ruled, inasmuch as it is impossible for one who has gone to sleep to execute movements which sleep suspends. On the continuance of the movements the supply of chloroform depends; on their cessation it is cut off.

In consequence of this, chloroform so administered not only loses its danger but becomes the most trustworthy, the safest, and the best remedy for acute and severe pain or sleeplessness. The danger of opium, morphia, or chloral self-administered is not less than that of the reckless administration of chloroform. An overdose of any of these is quite as fatal, but, unlike chloroform, they do not present by their ordinary modes of administration the same facility for exact adaptation to the amount just sufficient for each case. Some time must elapse before it is known what effect a given dose of any solid or liquid narcotic so introduced into the system will produce. Consequently from too small a dose sometimes there is only additional restlessness brought about, sometimes only stupefaction, not sleep; sometimes, from too large a dose, the sleep may extend over many many hours, and the waking state remain for some time after a condition only of pitiable somnolence. In the story of human misery much may be compressed into a single sentence, and the above is an example, as many must know. With the inhalent narcotics, on the other hand, the tendency to sleep is developed *pari passu* with the inhalation, and so admits of being checked as soon as the desired result is obtained. This makes them the most effective narcotics, because the speediest, and the safest because the most physiologically measureable. There is also an additional advantage necessarily flowing from this.

For, in many cases of extreme restlessness and sleeplessness arising from anxiety and watchfulness, an exceedingly small quantity of chloroform is enough to bring on sleep, which is, so to speak, only waiting to be wooed. It needs only to be



provoked by the most gentle encouragement, and hence the sleep brought on is all the more natural. Indeed, I have often thought, from the smallness of the quantity required, that the steadiness of mind created by the confidence reposed in the agent is more than half the cause of its success. The little chloroform inhaled soon passes off—a consummation devoutly wished by all who have to employ artificial means to obtain repose. For to awaken without “a drag and a weight, and a dizziness in the eyes at morn,” and other no less mournful symptoms—the effects of the more permanent narcotics—is hardly less a boon than that of sinking without delay and without effort into slumber. In this respect, chloroform is the best narcotic.\*

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\* Among the chief sequelæ proper—that is the remote effects of opium and its class when continued for any time—the most distressing, besides the nervous symptoms, are those arising from the cutaneous stagnation, especially in the circulation in the extremities and at extreme points. Hence the cold damp feet and hands, the sense of creeping and numbness in the back so much complained of, and the heavy leaden countenance which, as poor Coleridge and De Quincey found, no forced animation can retrieve. The entire function of relation—inseparably connected with the cutaneous system—is, in fact, more or less clogged and congealed, and the surviving mental energy irresistibly tends to seclusion and the life of ideas, as is so conspicuous in the works of those two distinguished examples. This is unmistakably the consequence of the deep degree of narcotism, and its prolonged continuance under opium—leaving behind it, even when recovered from, the dints of its heavy impressure,—whereas, with chloroform, the sleep in the first instance is, in comparison, “airy light,” and when its immediate influence has passed away none of those sequelæ are to be traced to it. As much certainly cannot be said for the sleep induced by the expedient of alcoholic stimulants, but even they are superior to the quintessential laudanum, or ‘black drop,’ as it is commonly used for this purpose. As a notable instance we might contrast Byron with those above-mentioned, whose elixir lay in the former direction, with as marked a difference—not certainly wholly due to this, but greatly aided by it—in his impulsion to incessant activity in the outer world. The fact is well known in the humblest spheres, where the workman returns after his debauch to his occupation with an intrepidity more than is due to the necessity of the case. While vitality is not seriously impaired such excess sets it in the opposite direction—outwards, and, for this reason, that the organs of relation are then surcharged with blood. This, although it may become serious, is much less so than the remote condition arising from the narcotics proper. But, when sleep must be bought, the best and cheapest physiological purchase is made in the aerial stimulants of modern science. If Byron could have procured this “sweet oblivious antidote” for unrest which he often needed, it might have redeemed the most gifted intellect, the most exalted imagination, and the most heroic will, from the vulgar degradation of drinking.



It was feared, however, that notwithstanding these incontestable advantages, this facility for using chloroform safely might lead persons not needing such adjuvants to sleep into the abuse of them, and that even those whose sleeplessness or pain might justify their occasional employment would be apt to indulge themselves beyond their need. Such things may happen. There is nothing so good that it cannot be abused. Virtue itself becomes vice being misapplied, and the most earnest preacher of the Gospel could not promise that its issue would be for the benefit of all. I know not what more can be said. Certainly, however, this method of medication is not more open to abuse than any other, but, for several reasons, much less so.

Another objection applicable to all kinds of narcotics, however used, was the theory that pain so relieved tended to return, and might become periodic, entailing, consequently, a periodic use of the remedy. From all I have been able to find, the periodicity of pain generally depends on the nature of its physical cause, and not on the means applied for its relief, except when those means are inadequate. In such a case pain which might have been temporary under efficient treatment is, by insufficiency and negligence, prolonged, and may become periodic or habitual. The nerve-current, instead of being at once counteracted and checked, is permitted to gain strength by repeating itself and by constant liability to new irritation. Herein lies the misery of trifling with pain. On the other hand, there can be no doubt that when the source of pain is permanent there will be a return when the influence of the narcotic or stimulant is exhausted. And a wish will certainly be felt for a repetition of the ease-giving remedy, and that, too, with more importunity than if its benefit were a matter simply of hearsay and not of recent experience. This is only, however, the natural result of appreciation for good keenly realized, and not, as the theory referred to implies, a process of physical deterioration set on foot by the use of narcotics. Let the permanent source of pain be removed by the requisite treatment if it can, and the narcotic will no longer be thought of. In a word, pain which is not periodic by nature, and treated promptly and by a narcotic if required,



will not thereby become periodic, but so much the less that if neglected or simply tampered with, it may, as many pains do, become periodic or even habitual. If it was thought any encouragement would be given to the use of chloroform by self-administrants in general without any counsel but their own, nothing, at least, could be further from what is intended. This apparatus, involving the use of chloroform, is not meant for trifles, nor must it be trifled with. It is sought to be directed to the stern reality of positive pain and the intolerable wretchedness of actual sleeplessness. Any one so afflicted surely needs the advice of a competent person as to how he ought to proceed, and must take the responsibility on his own shoulders if he does not. By explanations and restrictions I have endeavoured to point out as explicitly as possible the persons who will derive benefit from its use, and this is all that can be done to indicate specific adaptation. It falls to those who are daily concerned in such deliberations to be the best judges of the fitness of individual cases. Than the narcotics or stimulants no medicines need to be dealt in with greater care—a truth which makes the art of the relief of pain one of the highest departments of scientific medicine. I do not mean that there the narcotics or stimulants are all and everything—only that in many cases it would be a very poor art without them. This renders it all the more important, however, that persons should not take such medicines at random, even to redress real suffering, on the mere strength of knowing something of them in a general way. And the injunction applies with equal force to opium and chloral, to soothing syrups and pain-killing powders—dread Lethe's rueful brood—as it does to the self-administration of chloroform.\* On the other hand, medical men ought not to be too

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\* The harm done by those wolves in sheep's clothing—the powders and syrups in question—cannot be overstated. They are declared in the current advertisements to be absolutely safe and absolutely innocuous; whereas, made up as they are of the most powerful narcotics and on the roughest guess as to dosage, they are, except by the rarest chance, as positively injurious as may be. How could it be otherwise, considering the infinite variety obtaining between individuals as regards peculiarities of constitution, not to speak of differences of sex, age, habit, and temporary variations. Each individual presents a complicated problem, the careful solution only of which admits of a more or less near approximation to the precisely requisite dose. However difficult



lackadaisical and slow in the urgent business of quelling pain, lest patients, as is known to happen not unfrequently, though they may surrender their diseases to treatment, take upon themselves that of pain, as "matter to be forwarded of dear expedience."

The controversy on the relative safety and utility of chloroform and ether for surgical anæsthesia which, in some quarters, has been of late maintained with so much unscientific impetuosity and partisanship, does not essentially concern this kind of anæsthesia. It is certain that, with chloroform as his basis, Sir James Simpson established in Europe the doctrine of surgical anæsthesia.\* There cannot, however, be the least

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to find, it is the precisely requisite dose that does good in medicine generally, and especially in dealing with narcotics. Yet people in their apparently sane senses can believe that it is granted to certain *soi disant* chemists and doctors to prescribe for the whole human race in all states and stages, every several man and woman, at a dash. The tailor has not yet arisen with clothes made up on general principles that adapt themselves with such universal felicity to all fits; but this would seem, in their opinion, only to show how far behind his profession is to that of our inimitable chemists, who can undertake a so much more difficult kind of fit for all with the easiest good grace in the world. I can imagine that persons affected with such hallucinations would deem it a simple and safe thing to take this soothing syrup or pain-killing powder that goes down at a gulp, in comparison with having recourse to an arrangement that looks as if the matter were serious. But so it is, and it is a most mischievous thing to represent it as otherwise whenever a narcotic has to be used, especially when it opens wide the door to the unsuspecting for the most dangerous abuse. It is beyond all doubt this and similar manœuvring with them that has brought an evil name to the narcotics, which otherwise, and in their proper sphere, are to us the most precious material elements in the universe.

\* In the January number for 1876 of the *American Journal of Medical Sciences*, there is a masterly analysis of the difficult and involved history of the discovery of anæsthesia in America, from the pen of Dr. Bigelow, of Harvard University, the only surviving witness of the events narrated. It is forcibly pointed out that the discovery consisted not in providing something that could simply produce anæsthesia, as it had long been well known that such a state could be induced by various equally well-known agents as an *occasional*, but *dangerous*, phenomenon. The problem was to find an agent that could do so in all circumstances, in all cases, and, moreover, with safety. Starting with this as his criterion, Dr. Bigelow relates, with judicial and critical impartiality, a most interesting but very melancholy story. The inspiration of discovery seems to have hovered like a dove around three men, Drs. Wells, Jackson, and Morton, skimming each of them with its very wings, until it finally alighted, we are told, on the last named. Wells and Jackson were in advance of Morton, the one with nitrous oxide, the other with ether; but, from simple faults of detail in their application, they failed to establish the



doubt that had surgeons entertained the beliefs which they now do as to pain and its influence, no such memorable distinction would have remained either for Simpson or for chloroform. It was not so much the material agent as the right doctrine that was wanting, and we know very well that some of the most distinguished men of the day strenuously opposed, not merely the agent, but the principle which it was destined to enforce. Majendie indeed, the then leading physiologist, speaks out *ore rotundo*: "That he doubts very much if there is any advantage in suppressing pain; that it is a trivial matter to suffer, and that a discovery, the object of which was to prevent pain, was of slight interest." Majendie was not much, perhaps, to blame—he simply shared the temper of his times; but when such opinions were enthroned at the source of medical science the contest was necessarily a hard one. Yet it was fought out successfully on the strength of chloroform. Nobody will deny that this is a fact that makes much for that agent. Yet from the known capabilities

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fact that either of these were *universal, inevitable, and safe anæsthetics*, and did not therefore reach the goal. Sometime about October, 1846, Morton, after long toiling with the devotion and courage of a hero, and in the face of every barrier that might restrain a man—threatened prosecution, defamation as a reckless quack and adventurer, and ostracism from medical society—gave to America "the sovereign anodyne for the moments and hours of human agony." With pardonable patriotism it is taken for granted that this was *the* discovery of anæsthesia over the claim maintained on our side the ocean. The most that can be said, we think, is that the events came so near as to make it impossible they could be derivative either way; but that Simpson did more to establish the doctrine of anæsthesia than Morton—owing to no fault of his—will not be disputed even in America. But that is not the point. Simpson was rewarded, not a tittle beyond his meed, but alas for poor Morton and his fellow-labourers! It was theirs to suffer on the mental rack for human good, and never meet with the smallest recognition; until now two of them—Wells and Morton—are dead, dying in the most melancholy circumstances; and Jackson it is feared, Dr. Bigelow states, has become a hopeless lunatic. Is this the whole of such men's destiny beneath the sun?

To their families they have been able to leave *their fame*—to feed or to famish on, let them answer. It will be a lasting stain on the great Republic if it will not, as Dr. Bigelow in earnest manner pleads, do something to cancel the debt of gratitude to the representatives of those distinguished men. England gave £30,000 to Jenner for vaccination; will America claim the honour of discovering anæsthesia, and refuse to pay a farthing for it to those who were ruined by seeking and finding it? This question ought to be sounded in the ears of Congress until the oversight, for it is an oversight, is justly and honourably rectified.



of ether it is equally certain that with what he had at heart Simpson with ether could have accomplished as much. It is with this, the preservation of the doctrine, not this or that particular agent, that we are most concerned. That it can be carried with equal benefit into the province of medicine, as it has been into that of surgery, is certain ; and equally so that both chloroform and ether are utilisable without danger in the manner here specified.

If there could be any doubt of the decided superiority of the anæsthetics in this function, it must be removed by the evidence we have in the conduct of those requiring such medication. Persons by no means indifferent to life nor its obligations, have risked themselves in the self-administration of chloroform by the most incautious methods, quite knowing at the same time the danger they might be thus incurring. The fact acquires additional strength, inasmuch as such procedure has generally been adopted in opposition to medical advice as well as the advice of friends. It is obvious the motive must be a powerful one to overcome a reluctance so strengthened on every side. Accordingly, as might be expected, fatal accidents are continually occurring from a want of the knowledge of the proper mode of administration. A leading London physician informed the author only a few days ago that, in his own practice within the last few years, not less than seven deaths had occurred from taking chloroform by direct inhalation from the handkerchief. The experience of others is, no doubt, similar. Two cases of death from an overdose of narcotics has recently attracted considerable attention from the social position of the unfortunate persons. The following article commenting on these, from the pen of a sensational newspaper writer, shows how a subject so melancholy, and yet so important, may, by frivolous and ignorant treatment, be represented in the falsest and most dangerous manner. It may be thought that the ephemeral nature of such an article hardly entitled it to the consideration and place it has received ; but we have noticed the same kind of comments repeated time after time, as if kept on hand as a ready-made commentary to any calamity of the kind referred to. It is in this way, as we



have endeavoured to explain, that false opinions are instilled into and fostered in the public mind with the most lamentable consequences, but for what reason we are unable to comprehend. The names of the persons referred to have been omitted; the italics are not in the original.

“The death of Lady ——— following upon that of Mrs. ——— under equally lamentable circumstances, has provided the medical journals with a text on which to hang one of their customary dissertations touching on the ‘incautious use of powerful drugs as alleviators of pain.’ The cause of Lady ———’s death was an overdose of tincture of opium. Mrs. ——— was supposed to have been suffocated with the fumes of chloroform; and in both cases the habit which the sufferer had acquired of keeping a supply of the anodyne beside them to which they could have recourse when pain attacked them with intolerable acuteness, *seems to have been dangerous*, to say the least. It is a truism to say that drugs which are poisons should be only handled with any freedom when the hands are skilled; and when an excellent medical contemporary gravely remarks that ‘the indiscriminate practice of self-doctoring generally cannot be too strongly discountenanced,’ we feel that the opinion has that inevitable touch of the professional which may be something of a platitude, and even a selfish one, without ceasing therefore to be useful. But, after all, can medical science, which, we are told in numerous annual lectures and at scientific congresses, is always active and always gaining fresh triumphs—can it do no more than tell people maddened with pain that they run a serious risk in relieving their agonies by the only means available? Since Dr. Simpson invented or utilised chloroform we seem to have stood still; *we have not discovered the mode of rendering it safe in uninstructed hands, and, what is much worse, we have not discovered any really new anodyne which may be perfectly safe whether the stopper escapes from a phial or not, and whether or not the trembling hand of the sufferer convulsed with pain lets fall a few extra drops of the tincture or the ether.* Yet, inasmuch as we cannot always have a doctor at our elbows to measure out the dose with mathematical and cold-blooded precision, *some such revelation of science is what we want*, rather than barren lectures on caution. Surely the numerous experiments of the last thirty years might have taught us something more of the ‘mystery of pain,’ and the means of assuaging it. What has vivisection to say for itself in the matter? Have the hecatombs of dogs, cats, and rabbits, been tortured to no purpose? We are told, in answer to indignant remonstrances against practices which make humanity shudder, that such experiments do great things for science, but we ask in vain for the disclosure of results at all commensurate with the harrowing process. If the nerves of unfortunate animals are to be still anguished, and the torture-chamber of the physiologist to become an institution, at least let us see that humanity gains something in one way, however slight, for what it loses in the other.”



On the customary dissertations of the Medical journals as to caution in regard to powerful drugs when some startling death occurs from their reckless use, nothing need here be said. We could only speak in their praise if they sought to caution against abuse and recklessness, while they did their utmost to point out how such drugs might properly be used when necessary. It is only too true, however, that these sad occurrences are sometimes made no more than occasions for the display of what is meant to pass for sagacity, and prudence, and philosophic advice, and so on ; for such discourse in fact, as is very easy, and looks very safe, and reads well, to all people of quiet nerve and tranquil pulse. They turn out accordingly very barren lectures indeed, because people at their ease have no concern with them, and to those who are under the scourge of pain such speeches are as wind : the professional interdict then goes for nothing, and the tragedy is repeated. And so it will be to the end, wherever physicians cannot rise to the situation of their patients and place fitting material means, not simply morals, at their service. The occurrence of such cases shows that there is much need for more thoughtful consideration of the nature and use of the agents that relieve pain, but it does not by any means authorise their being entirely proscribed except when a doctor is in immediate attendance. We are quite sure nobody is, or ever was, guilty of "the indiscriminate practice of self-doctoring generally" any more than of "the professional selfish useful platitude" of the commentator, which occurs in print only because a heap of incongruous words may at any time be shaken from the dictionary. As to self-doctoring, when it means taking medicines without medical advice, it is manifestly unwise whenever such advice is required and procurable. It cannot but be, however, that many must, as circumstances determine, be their own doctors, at least between professional visits—and that, especially in regard to pain when it becomes inordinate, and it would, therefore, be well if the highest as well as the humblest intellect were on its own behalf to obtain as correct information on the subject as it can. We are in possession of the means to relieve pain, however severe, and to know this



and be forbidden their use just at the very time they are most needed, will never be acquiesced in by those who are the victims of severe suffering. The proper course is, certainly, to show how such suffering may most fittingly be provided for.

Thus far the writer has some apology for his peculiar remarks. But, lamentably ignorant of the actualities in this department of Medical Science—the treatment of pain, namely—he exhibits a still more pitiable conception of its possibilities, and therewith proceeds to instruct his readers. Not knowing what already is, he is still more at sea as regards what might or may be, but assumes that it must be as he thinks. Thus he expresses himself dissatisfied with opium and chloroform, and those other poisonous sleep stuffs that cannot be made, he thinks, and certainly have not the sense themselves to stop short simply at sleep, but go on, when taken to excess, to produce death. Why should not the extra quantity taken, whether it be laudanum or ether, be as harmless as water or air, and only that portion which is required to produce sleep be operative? If Nature had so ordained such suspension of nature, it would doubtless have saved those who take more than enough, only in regard to these narcotics, at least, it is rightly recognised that Nature has ordained the contrary. There is, therefore, demanded of Medical Science the invention of a *new* anodyne that humanely and intelligently shall suspend its properties and cease its action, however much may be taken, as soon as the desired sleep or relief is attained. “We have not discovered any really new anodyne which may be perfectly safe whether the stopper escapes from a phial or not, and whether or not the trembling hand of the sufferer convulsed with pain lets fall a few extra drops of the tincture or the ether,” “Yet some such revelation of science is what we want.” When it is remembered that those comments are raised in connection with the death of a lady who was found, several hours after the accident, with the bedclothes still saturated with chloroform, it will be easily understood what is meant by the stopper escaping from the phial, and the extra few drops of ether that may fall from the hand convulsed with pain. This is a simple euphemism for unlimited quan-



tities, as we all know that a hand convulsed with pain is as likely to let fall an extra ounce as an extra drop. So here is required a brave anodyne, not less obedient to the wishes of the sleeper than the fine spirit Ariel to the will of the mighty Prospero. They shall simply have to say "make us sleep and no more," and so pour out the bottleful, if they choose, under their nose! Such an anodyne would certainly be perfection, and could very fittingly take the place of the doctor, at least when no doctor is to be got. The writer is right if the anodyne were to be got; but, without presumption, such an anodyne lies deeper than the ruins of Nineveh, and more remote than the sources of the Nile. It may be searched for, of course, but never found, because it does not belong to our planet. Ask an engineer to invent a steam-engine that no blockhead shall be able to mismanage; ask anybody to create a force which shall still be in the right however it may be misapplied, and nothing more unreasonable is preferred than this new Anodyne. *For an anodyne is a force.* If it were rose-water we might sprinkle it on our handkerchiefs or bathe in it and fear no evil; but there is little to do when rose-water can do it. The only conceivable way in which a *real* anodyne could proceed to please this writer would be, when taken in excess, to graciously remove itself away by walking out of the stomach if taken after the manner of laudanum: or, if inhaled as chloroform, to rise from the over-saturated handkerchief, creep back into its phial, and politely pull the stopper on after it!

The transition *under increasing dosage* (whether by accident or design) from the waking state, to somnolence, to sleep, to stupor, to coma, and to death, is a progression as sternly certain in regard to any anæsthetic or anodyne that ever has or ever will be invented as is the fall of an unsupported body through the first, second, third, or through every foot between it and the ground. This is the result of the fundamental principles of our physiology. If an anæsthetic can produce the first step—in virtue not of imagination, but of real narcotic properties—if it can produce somnolence, its further introduction into the system will go on to produce the last—death. As has been well observed by M. Claud Bernard,



“anæsthetics are various, but anæsthesia is the same.” The only method for safe and efficient administration is to employ such an arrangement as shall make somnolence, or sleep itself, the cause of arresting the further inhalation of the narcotic in some such way as the method described in the essay. The author is not aware that any other method has ever been proposed, and must be allowed to say in behalf of his that it is certainly worth knowing for those who require such medication. But even the apparatus in question, as has been already pointed out, is not to be used by anyone who does not fully understand the directions given, and in every such case a personal explanation from some one who does must be first obtained. Those who will procure this are suitable subjects for chloroform or ether, may apply those most beneficent agents with the utmost security, to the relief of their pain or sleeplessness. The writer professes not to know that this is possible, but asserts, to the contrary that, since Dr. Simpson introduced chloroform as an anæsthetic in surgery (for he did not invent it), we appear to have stood still, nothing having been done to extend its application to the pains of disease. These are no less severe, and are certainly much more extensive, than the sufferings caused by the necessary inflictions of the surgeon who is happily called upon to operate only on the few. It would be a serious reflection on the art of Medicine, such being the case, if during even less than thirty years it had made no attempt to utilise anæsthesia. It was the lot of the writer to live in the midst of much suffering for several years, and he is convinced that no humane mind in such a situation, and knowing what chloroform can do, could do otherwise than strongly wish that some means could be had for bringing about the right application of so beneficent an agent. The heart must be touched first, and then the head will operate in due time, at least we know it was so with Simpson. We are told he resolved to abandon the profession altogether if some means could not be found to alleviate the sometimes severity of its inflictions. Had he, on the contrary, resolved to harden himself for his work after the model of early times, in order to be a good and steady surgeon, it is absolutely certain the great doctrine of surgical anæsthesia



would have remained for the more sympathetic souls of the future. And so if medical journals in our day, as the writer asserts, can content themselves with all that they know of human suffering, to preach only barren lectures on caution, in the bleak and dismal hope of matching pain with "platitudes" and soothing agony with words, it is very certain the doctrine of medical anæsthesia will, so far they are concerned, progress very slowly in the profession. For our own part we do not at all believe this report, as in many cases at least we know the contrary to be true, although it may be that adequate attention is not given to the great subject of Pain. To call, however, the absolute proscription of anodynes caution is surely a misnomer, as to tell one who must travel by rail that he must not for fear of accidents is not caution but nonsense. So if it be true that never yet philosopher could bear the toothache patiently, a physician at the bedside of a sensitive subject under the yoke of intolerable suffering, entirely proscribing anodynes, on the plea of caution, and delivering himself of a bosomful of medical stoicism, may with difficulty be imagined, but is surely much too ridiculous for reality.

Then the writer professes to wish to know something more of "the mystery of pain" than Science has yet revealed, which would be very proper indeed if in the first place he had learned as much as Science has already revealed. To require, however, to be royally initiated into the refinements and subtleties of analytical geometry, and keep braying on the donkey side of the *pons asinorum*, would not be considered the best way to advance in mathematics. It is very nauseous to hear people talk in pompous sublimity about the mystery of pain, or the mystery of anything, who are as shamefully destitute of information on the subject as if never a book had been written or thought expressed on the subject. Such, however, is the common cant of all who are too indolent to learn, or cannot, and must nevertheless pass for wiser than anybody. There is, in one sense, as much mystery about the nature of a sugar-plum as there is about the nature of pain, for where nothing can be comprehended everything must be equally mysterious. But with most people the conditions



necessary for the production of a sugar-plum are, fortunately, no mystery, nor is it otherwise in regard to the production of pain. If the former can be made to disappear with somewhat greater felicity than the latter, the fact is due, not to disparity in point of mystery, but to a difference in the facility of applying the appropriate agency in the two cases. But what can any one expect to know about the removal of pain by old or new anodynes whose highest research on the subject has been to read "barren lectures on caution"? It is long ago since Cicero wrote "*De Dolore Tolerando*" with the view of showing how pain ought to be put up with manfully and religiously. There was then, perhaps, the very significant reason in the background that, anyhow, it could not be avoided. Things have, however, greatly changed since his time with the introduction of agents and appliances that, as regards pain having a physical origin, have obviated the necessity of the Stoic's philosophy. Yet it would surprise a vacuous brain dozing over "the mystery of pain," with what excellent understanding the old Roman takes his views on the subject, and how he derives from it lessons of practical wisdom that are as high as heaven above "selfish platitudes." Nobody with the barest rudiment of an idea on the nature of pain and insomnia could put forth such a plaint as this for a new anodyne. Without going into any mystery whatever, it may be stated, and must, we should think, be a self-evident proposition, that the qualities of bodies in relation to the human organism are all relative to the modes and degrees of their application or influence, none possessing in such relation invariable or absolute properties. And this is true, without exception, of the agents that cause and cure pain. Thus, for example, "He that will consider," says Locke, "that the *same fire* that at one distance *produces* in us the Sensation of Warmth, does at a nearer approach produce in us the far different sensation of Pain, ought to bethink himself what reason he has to say that the Warmth that was produced in him by the fire is actually in the fire; but the Pain which the same fire produced in him in the same way, is not in the fire." Neither the warmth, as a sensation, nor the pain is in the fire, but each is the result of a definite rela-



tion of a given cause operating on the living body. The writer understands so little of all this that he would actually have some absolute substance, "Sleep," bottled up in the shape of an anodyne, "which would be perfectly safe whether the stopper escaped from the phial or not," because, being absolutely "Sleep," it could never lead farther on. This is the invention he modestly asks from Medical Science!

Sir Arthur Helps, it appears, imagined that in *Realmah* there *was* a certain blue stuff of "Sleep" that could be bought and sold there; and some very foolish people thought when chloral was brought out that here was the very thing; but, too flattering sweet to be substantial, *comprensa manus effugit imago!* When fire can be obtained that will give warmth only, but never pain, however we may heap it over us or walk into it, then such a sleep-stuff may be attainable in reality as well as in *Realmah*; when, that is to say, the nature of man and the universe is thereto conformably rearranged!

It is most unjust to promulgate such false and dangerous opinions, and that, too, with persistency, since, as is well known, wrong ideas on the subject of pain and its relief cost not a few their lives and very many a degree of suffering that is not easily understood by description. There are persons who already profess to sell "absolute sleep" in the powders and syrups referred to, successfully deluding the unthinking masses. It is not the honourable part of a newspaper, although it cannot refuse such advertisements, to insinuate in their favour by professing to believe that such products are the proper aim of scientific medicine; or it surely might distinguish itself from its contemporaries with better effect than by re-recording misfortunes that have already been told in every newspaper throughout the country by making them the text for leaders that disgrace the writer's profession. If such lamentable accidents must be kept before the public mind, we have a right to protest, as the most effective means of preventing their recurrence, that neither the nostrums of quacks nor the barren lectures and selfish platitudes of such journals as deal in them, be held out in this department as the *ne plus ultra* of human knowledge and invention.



THE  
INDUCTION OF SLEEP  
AND  
INSENSIBILITY TO PAIN.

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AMONG the agents that relieve pain and produce sleep the speediest and most effective are, beyond all doubt, the inhalent narcotics Chloroform and Ether. These two consequently respond the most bounteously to the heartfelt petition of those who are suffering much, and suffering acutely. The severity of the endurance is mitigated one-half by the simple arrival of means known with certainty to possess the power of quickly overcoming it. On the contrary, suspicion of insufficiency, or even of slow performance in any such administration, makes it, in the first instance at least, only a new trouble, contributing its increase of misery to the situation, and tending to conspire against its real utility.\*

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\* It is very far from my intention to in any way impugn the value of the old and excellent narcotics, opium, conium, belladonna, henbane, &c., or their newer allies, cannabis indica, hydrate of chloral, &c., all of which, singly and in their various combinations, I have had ample facility for putting to the practical test of experience. It is willingly recognised that opium, with its various derivatives, is well worthy of being named, *par excellence*, "the gift of God to man," and that some of the others, as well as certain drugs that are not narcotics, are no less valuable in their own sphere. In consequence of this, there is scope for a wider practical basis to the science and art of the relief of pain and of euthanasia, than if its ministrations were confined to any single agent, however beneficent. The importance of such an art is best understood



This consideration, then, naturally raises the question why Chloroform and Ether, thus holding the first place as remedies for acute suffering in virtue of the qualities specified, are all but neglected for such purposes except in one special class of cases. Setting aside operations, surgical and obstetrical, it is very seldom that any occasion, be the suffering what it may, is recognised as an occasion for delivery by the speediest and most efficient means. This decision does not arise from any fallacious presumption regarding the inferiority, in point of severity, of pain produced by disease to pain resulting from operation; for our sensibility in that direction is, and always has been, acknowledged to be as great as it possibly can be.\* Yet, manifestly, pain ought to be remedied on the principle of its severity and urgency, not on the principle of its remote origin, whether from instruments or disease. The contrary practice is due to several causes: causes understood to be sufficiently influential to prevent the writer from anticipating the immediate reception of the more consistent and advantageous practice. Immemorial habit has associated the relief of suffering inflicted by disease with

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from the fact that there are certain stages of disease when active interference, aiming at a reversal of the physical necessity of dying, is to be regarded in the light of science and humanity alike as unpardonable; but that even then the plaint of the sufferer, expressed or unexpressed, is still, as in the language of Petrarcha:—

“Morte o mercè sia fini al mio dolore!”

It is a happy thing that there are provisions meet even for this sad state, and nobody can doubt that the more carefully they are investigated the more beneficial will be the result. It cannot therefore be thought, that it is with any scepticism in the value of such inquiries, worthy of far more attention than they have yet received, that I seek to advance the superior claims of chloroform as an agent for the relief of acute and severe pain. Being directly introduced into the circulation through the lungs, it rapidly yields the relief desired, and is susceptible accordingly of exact limitation to the necessity of the occasion, since its further inhalation can, and ought to be, immediately discontinued. It is very difficult, if indeed possible, to regulate with the same nicety any solid or liquid narcotic introduced in that form, and hence the greater liability to a superfluous dose, that is, a dose exceeding the necessity of the occasion. It must be observed, that although using the generic term *anæsthetic*, the remarks in the text mainly refer to chloroform, which far exceeds in every way any of the rest for the purposes here specially in view.

\* Toothache, gastralgia, tic, nephralgia, gout, &c., may be as excruciating as any operation.



certain solids and liquids, and this itself must so thoroughly link many to the use of pills and mixtures that they never could break away to betake themselves to the employment of new, although superior, methods. But more than this, the administration of Chloroform has hitherto implied the personal superintendence of the physician, and that means, according to circumstances, loss, trouble, impossibility. The superior facility of prescribing is consequently a considerable offset against the comparative inactivity or inadequacy of the prescription. *The object of the Self-Anæsthetic-Administrator is to reduce the use of chloroform and ether to the same level, as regards facility, as opium and morphia; that is to say, to make them prescribable.* This is possible, because with it the sufferer himself becomes the administrator, and any one who is a fit and proper subject for chloroform can therewith put himself to sleep with greater safety, and infinitely more comfort, than can be done by another, however skilful.\* The obstacle, therefore, on the score of impracticability is removed. But there are yet other alleged impediments in the way of advancing those anæsthetic agents to their proper place as the chief remedies for severe pain. First, they are called dangerous agents; secondly, they are unsuitable in some cases; thirdly, undue familiarity with them would be physically and morally injurious. In the second part of the Essay I have endeavoured to show that the *danger* attaches not to the agent *per se*, any more than to any agent in human use, but to the administrator, or the way in which his ideas on the subject lead him to employ the agent. When the purity of the anæsthetic is ascertained with certainty, a matter of no diffi-

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\* Just as feeding oneself may be called a natural arrangement in comparison with the conventional arrangement of being fed by another, so with this method for the administration of anæsthetics, which puts the spoon, so to speak, into the hand alone capable of accommodating the supply to the involuntary processes that ultimately preside over its destination. The proceeding implies some intelligence to begin with, and the preservation of a modicum, at least, of that intelligence throughout the process: but very few are so hopelessly stupid as not to understand the simplest explanations, all that are here required, and chloroform in inducing sleep does not so disturb the mind in persons who will derive any benefit from its influence as to render them incapable of directing the necessary movements until sleep arrives.



culty whatever, the safety or otherwise of the administration depends upon :

- (1) The Vital Condition of the Patient.
- (2) The Method of Administration.
- (3) The Degree of Anæsthesia Induced.

It is enough to remark here that chloroform, although in its potential aspect a terribly dangerous agent, just as gunpowder is, when restricted by appropriate arrangements to specific effects, becomes not only harmless, but is instrumental to the highest good. As in every relation of mankind to the forces and materials of Nature, it is not the force or material *per se* that preserves or destroys, but always as it is directed and applied. The most powerful agencies, whether natural or artificial, are, in consequence of the attainable magnitude of their effects, the most valuable and essential to the life of the world ; and Nature is as likely to suspend her chemical and electrical laws to save us from the possibility of thunderstorms and volcanoes, or the fear of them, as man to abandon the useful giants of his own creation, because a misadventure may sometimes, fairly or unfairly, be attributed to them. The purport of these remarks is not unduly to magnify chloroform over the other recognised anæsthetics, since the method which it is my principal object to explain is applicable to all of them that are fluid ; but as much as possible to emphasize the fact that the strength of chloroform, were it even greater than it is, is not the quality in it which we have to fear. The paramount consideration is the way in which it must be handled, a consideration that might seem too obvious to require mention, since it is tacitly assumed in regard to every agent in use, were it not that it has been called in question at present by those who are personally ignorant of the properties of chloroform, and equally ignorant of its history, and are yet not restrained by their ignorance from asserting that they cannot be other than most pernicious. The law of progress determines that, until the discovery of a still more powerful anæsthetic, we shall endeavour in this department, as in every other, to make our strongest giant our most useful servant.

As regards inadaptation to certain individuals, this must be



admitted once for all, and that not in consequence of advanced diseased conditions, but certain special peculiarities which it is not always possible to estimate beforehand. As Pindar remarks of Music, so it may be said of chloroform, those who are not soothed by it are perplexed, disturbed, irritated ; the perplexity, disturbance, and irritation in this case being considerably more demonstrative than that so exceptionally excited by the concord of sweet sounds. Such persons are not suitable subjects for chloroform, however they may be for any other form of narcotic. But their disqualification is no plea for disinheriting others who are not similarly constituted.

The argument against the introduction of chloroform as a narcotic for clinical use as well as for operative measures, on the ground of familiarity leading to abuse, is one which it hardly concerns us to notice. It is no wish of the writer to see the reign of *Nepenthe* needlessly extended, for he is ready to admit the evil consequences of too great indulgence in narcotics of any kind, as any one must be who at all considers the physiological and psychological results, immediate and remote, of such practice. But the question of abuse ought not to be allowed a hearing when the question under discussion relates only to the matter of use. Whoever considers what pain is when it overrules every effort of human fortitude, and extinguishes the capacity for every experience but its own, will not be slow to recognise that the agent of mercy in those circumstances must be endowed with properties that are soon-speeding and powerful. For such extremities, not infrequent in the progress of disease, the best remedy is chloroform when its exhibition is not contra-indicated by the existence of unfavourable conditions. It is worth observing, too, that many persons who entreat to have chloroform, when they are so circumstanced, entertain a great repugnance to it when free from pain. How far this is the general experience I am not prepared to say, but it is at all events not exceptional.

The apparatus I have devised for the self-administration of anæsthetics permits the patient to put himself asleep, while a dangerous overdose is impossible, in consequence of the prin-



ciple on which the supply of the anæsthetic depends. An india-rubber air-ball, communicating through a tube with the air inside the chloroform bottle, when compressed by the patient's hand causes the expulsion of a little chloroform vapour through another tube dipping into it. This is received into a conical inhaler placed conveniently for inhalation by the patient. The compression of the ball being at the will of the patient, without which no chloroform vapour can possibly reach him, so is the anæsthetic condition of atmosphere which he inhales; and as a single compression makes only a feeble alteration, the patient can accommodate this chloroform atmosphere to his capacity for respiring it, a condition of paramount importance to its agreeable and safe inhalation. All that is requisite is simply to provoke sleep, that is, to produce the tendency to sleep; and when this has been effected, there is a strong instinctive inclination to cease all movements, which the patient is naturally not disposed to resist, and consequently discontinues the further compression of the ball. Besides this, there is a physical impossibility of taking too much, because the voluntary muscles become paralysed, that is, incapable of any movement when sleep begins to supervene; and as a matter of course, no more chloroform can be inhaled by this method of administration. When all the conditions favouring sleep are observed, that is, when the patient is in bed, comfortably warm and excluded from noise and too much light, and wearily longing for sleep, even although suffering great pain, an incredibly small quantity of chloroform is sufficient to produce it. For the simple induction of insensibility to pain a still less quantity is requisite, although repetition may sooner be necessary.\*

Besides extending the clinical use of chloroform, the instrument will be found useful when the agent has to be exhibited

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\* It must be a very familiar experience to find how the simple attitude of bodily repose, when maintained for a short time, not only relieves but frequently removes even acute pain. The stoic can hold out *suis viribus*, in determined tranquillity, until he feels the tumult of throbbing ebb and die away. The more feeble need some material assistance to enable them to lie still in such an attitude, although when it is attained the same result will follow. Rest is the remedy, and only needs to be made possible.



at obstetrical operations, when it is exceedingly difficult and harassing for one person, as in the country is often necessarily the case, to attend to the operation and superintend the administration at the same time. At surgical operations, also, especially for children, it may be used with advantage by the chloroformist, as it supplies a means of slowly increasing the chloroform atmosphere as the patient gets used to it, and afterwards of maintaining it of the same quality; the quantity of chloroform vapour passed into the inhaler, which of course does not need to be removed, being always as nearly as possible the same and subject to exact regulation.

Mr. Macnamara has pointed out to me how the apparatus may be advantageously used for the application of chloroform vapour as a local sedative to painful wounds, such as ulcers and open cancerous sores. In India he has employed the vapour in this way with great benefit, but his difficulty was in preventing the anæsthetic in the fluid state from reaching the wound, in which case severe pain would be produced. With this apparatus such an accident cannot happen, while the vapour can be applied continuously and straight down on to the surface of the wound.

It is well worth the consideration of all who have to deal with the long suffering arising from such diseases, where any new expedient to foil the ingenuity of pain must surely be welcome.

A few whiffs of chloroform vapour directed into the cavity of a painful tooth is sometimes effective in affording relief, and for this purpose the pointed shape of the chloroform tube in this apparatus presents the proper facility.

There can be no doubt that the local use of the anæsthetics in this diluted form has wide clinical application, for although as M. Claude Bernard, in his recent work on "Anæsthetics," justly remarks, there is no such thing as local anæsthesia in the sense of entirely depriving a part of all feeling, this is a very different thing from the purpose aimed at by local sedatives, whose use and value have been recognised on all hands *ab ovo mundi*.



## PART II.

The dread of chloroform as a narcotic is just in regard to the *administrator*, unjust in regard to the *agent*. Chloroform allays pain or promotes sleep, but it also overwhelms consciousness in stupor and coma, and inevitably conducts to death precisely according to the extent it is introduced into the system. Herein it only resembles every humanly utilisable agent, which passes from the production of good to evil, just as it is directed.

With the administrator rests the grave responsibility of the result, who, in every case, needs to be assured, in the first place, of the purity of the agent on the one hand, and of the vital condition of his patient on the other. Chloroform being a definite chemical compound, and consequently invariably answering in the same manner to the same chemical tests, which are easily applicable, its wilful adulteration would be too hazardous to be profitable, and its accidental impurities are readily detected by the manufacturers themselves, several of whom exercise great care in this particular. Under such circumstances it is obvious the article itself may always be obtained and proved as thoroughly trustworthy as any definite and invariable product can be.

The vital condition of the patient is ascertainable with an equally high degree of certainty in regard to the circumstances that would determine a fatal result under anæsthesia. The pre-existence of really critical conditions is not veiled by any impenetrable mask, and though the origin and advance of fatal lesions may be rapid, yet not so rapid that the patient, who is sound at the commencement of the anæsthetic process, should succumb through an intercurrent malady before he again returns to consciousness.

Diminished respiratory, cardiac, or cerebral power to the extent of imperilling life on the inhalation of chloroform, is declared by very unmistakeable characters. The patient is seriously disabled in the execution of ordinary *movements*, and is deprived of the capacity for *sleep* in its normal con-



tinuance and degree. The registration of impeded movements, voluntary and involuntary, the inevitable consequence of organic disease, is carried out by the automatic machinery of the system with great accuracy and legibility. When it attains a high pathological significance it is difficult to imagine how it can be overlooked, and it is to be borne in mind that it is only when it does so that a positive signal is raised against the employment of chloroform. Were the minor stages of disease in important organs also disqualifying conditions, the legitimate range for anæsthesia would be very circumscribed indeed. But the measure of vitality, revealed by careful inspection and computation of the strength of the functions, is much reduced when it is imperative, on those strictly intelligible grounds, to interdict the administration. It is quite another question, when the safety of administration has been satisfactorily ascertained, in what manner and to what extent it is to be proceeded with. The chemical purity of the agent, and the vital condition of the patient, are the preliminary investigations, the *method* and *degree* of anæsthesia require to be authorized in the same way by rational and definite principles.

As concerns the *method*, our object being to produce sleep, it is essential to follow the regulations of Nature conducive to that result, bearing in mind that the anæsthetic sleep is not sleep upon new principles, nor sleep invoked by the operation of a different machinery from that which yields it on other occasions. Now, it has always been recognised that the external conditions favouring the advent of sleep are provisions for *rest, quiet, shade*.\* The principle is simply the withdrawal of the senses from their natural stimuli, leaving the attention awake only to reflection which, as a less powerful and less varied stimulant than sensation, tends, according to the law of relativity, to become inoperative,

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\* All these external conditions are now most admirably provided for at St. Thomas's Hospital where the patient is anæsthetised apart in a shaded room whose temperature is carefully regulated. This is the greatest advance that has yet been made in hospital practice in the art of administering anæsthetics.



and so consciousness falls more or less into abeyance. The physiological condition favouring the advent of sleep is that degree of exhaustion which enfeebles the functions without causing pain, and changes the quality of the blood within certain limits. The part played by anæsthetics in inducing sleep is that of effecting the last-named condition, viz., an alteration in the quality of the blood. Now, it is very certain that, in comparison with all the other conditions, this is supreme. Sleep must come whether it be wooed or not by other inviting circumstances, and not only so, but in spite of every opposing circumstance, if this spell is exercised with persistence. Here is the giant with the giant's strength; but to use it like a giant is most unwarrantable. If there is any occasion when the golden rule of medicine and surgery ought to come out higher in relief than ordinarily, it is over the patient about to become the subject of anæsthesia. *Arte non Vi.* The principle enjoining the minimum quantity of any narcotic takes rank as an axiom in rational Therapeutics, and must strike even the uninitiated understanding as a self-evident point of prudence. It is only a corollary from this that every condition favouring the occurrence of insensibility or sleep be provided for, and every condition antagonistic to it be withdrawn within the limits of possibility, when an anæsthetic is to be administered, so that the quantity required may be the smallest the case admits of. To borrow a phrase from mechanics, the resistance is the mental excitement of the patient, the power is the anæsthetic agent. The greater the degree of excitement, the greater the anæsthetic power necessary to overcome it. Reduce the excitement of the patient to a minimum, the least possible amount of the narcotic only has then to be administered. I freely admit the difficulty of *preparing a patient for sleep* according to the terms mentioned on many occasions before giving chloroform at operations. Rest and quietness, not to go further, are not always compatible with the surroundings, and there is oftener than otherwise no means of procuring healthy exhaustion and its concomitant conditions. But when unfortunately no antecedent measures are practicable to allay excitement, it is surely most indisputable that every precau-



tion should be taken to avoid producing it as the administration proceeds. Here, indeed, we come upon a point of cardinal importance, not only affecting the fulfilment in regard to chloroform of the first law of narcotism—as I think the principle advocated may not unfairly be named—but touching the very foundation on which chloroform and ether, and their similars, rest their claims to be considered anæsthetics at all. It is a mischievous thing when avoidable excitement requires to be drowned in superfluous narcotism, and is to be denounced when the contest ends far short of the fatal point toward which it eternally gravitates. But, besides that effect, such excitement under the circumstances means *pain*, and if—as nobody conversant with the physiological properties of chloroform will deny—excitement may be carried to the highest pitch within the compass of man's nature under its influence, we have to guard against converting an agent only justifiable on the ground that it relieves pain, into an agent unparalleled in the severity of its inflictions. When the administration of chloroform or ether is productive of pain, who can say that an anæsthetic is being administered?

Dependent on those obvious truths, one of the grandest errors that it is possible to conceive practicable in the method of employing chloroform or any other existing anæsthetic is that of beginning by compelling the patient at once to respire a highly charged anæsthetic atmosphere, and of continuing by entirely ignoring every indication he manifests for a momentary respite from the process. Such treatment inevitably unsettles every effort at mental or bodily composure and very soon becomes the cause of unmitigated suffering. It is, therefore, a complete and merciless annihilation of the whole spirit and purpose of anæsthesia as well as a proceeding fraught with the most imminent danger to the life of the patient.

The chief end and aim of this benign agency always is to lessen or annul the sufferings of those who otherwise must suffer beyond the common endurance, and however it may aid the purposes of the surgeon in other desirable ways, would lack all sanction if it failed in fulfilling that great object.



But it does not simply fail thus far, when stringent disregard of the patient's entreaties for moderation is enforced ; it is made, in every such instance, an instrument of infliction, that in the relative significance of degrees of suffering must be expressed, not as pain, but as agony. The patient has in truth to go through the horrors of impending suffocation, as any one will find who chooses to submit to the ordeal. Yet the instrument of the surgeon in operation on the most sensitive tissues of the body, or the severest pangs of disease, do not rise to the incomparable severity, and cannot produce the terrible effects on the mind, that threatened or impending suffocation does, for life is then in the most desperate of all situations, and most palpably so to its possessor, who feels with the full force of all the vitality that is in him, as if the mortal struggle were approaching with the irresistible certainty of fate. Hence the violent efforts that are made to escape from the predicament, efforts that are as deaf to reason as the winds or waves, and sometimes as difficult to control as those of a fury might be supposed to be. Yet what a strange interpretation of this phenomenon to call such conduct irrational ; on the contrary, no being endowed with life and the power of movement, however meagre of intellect, can act irrationally on the spur of such encounters. It is the last charter of existence to fight for breath, hence every remnant of energy is pressed into the contest. The administrator is responsible for bringing matters to such a pass ; and although he may succeed in spite of all hazards in overpowering the senses of his patient and rendering him insensible to the pain of the coming operation, it is done by such a process as presents the most striking example of killing for kindness that perhaps the world has ever discovered.

The total exclusion of oxygen from the lungs for two or three seconds, whether caused by occlusion of the trachea as in strangulation, or by the inhalation of a non-oxygenated atmosphere, produces nearly the same physical condition, and entirely the same mental experience, the feeling, namely, of instant suffocation. Chloroform or ether, but especially the



former when inhaled without an accompanying sufficiency of pure air, immediately originates this terrible sensation, and it is not surprising that the feeling should be most intense at the outset. The passage from one condition of atmosphere to another, if rapid, even when the change is very slight, is keenly appreciated by the lungs; and no wonder, therefore, that a change so great as that from pure air to chloroform vapour should excite great disturbance and alarm, especially to persons totally ignorant of what is going to follow. The sudden recoil of a person who puts his nose to the mouth of a bottle exhaling strong ammonia vapour is considered very natural, and yet a highly concentrated dose of chloroform vapour is about as irritating and as suffocating. These simple facts, however, are certainly lost sight of when the chloroform is held on to the patient in large quantities, and the struggling indicative of its effects accepted as a matter of no moment and beneath notice. The explanation, apparent though it is, cannot be suspected, or there would be no room for the preposterous belief that all the movements of persons undergoing anæsthesia are simple extravagances as wild and worthless of regard as the tossings and turnings of a feather in the wind. As soon as a patient inhales the first whiff of chloroform, the doctrine teaches that he is no longer to be considered a rational, far less a reasonable, being; but every utterance that escapes him, every effort that he makes, is to be treated as a mere hysterical ebullition, so that those almost unmanageable wrestlings and strugglings often witnessed nearly at the first approach of chloroform are thought as natural to some persons as the extraordinary performances of the new dancing jack under the potent influences of steam. And even when the fact of choking or suffocation is recognised, its significance as an infliction on the patient is strangely underestimated or not estimated at all. Looking to the heaven of relief before him, little or nothing is thought of the purgatorium through which he is to be borne; and hence the rule still is, as before, to push on with the administration of the anæsthetic, regardless of any outbursts of opposition; notwithstanding what such outbursts may mean. Anything fuller of meaning than a terrible struggle to escape from such



a position is simply impossible to imagine. True, there may be no real cause for alarm, that is, just as a man whose mouth and nostrils are held tight until he gets blue in the face, may rally and resume the thread of existence without any patent bodily detriment, when relief comes just at the proper moment, so also this experience of suffocation from chloroform or ether may be only a momentary one, in hands too scientifically perfect ever to allow its becoming an accomplished reality. If, therefore, the patient could be but as calm as the operator, and by some overmastering grasp of his involuntary impulses keep instinctive movements in check, the mental endurance might not exceed that of a horrible nightmare.

But, more than the passing struggle with suffocation, "the main force practice" is eminently dangerous to the life of the patient. If terror alone is a sufficient cause of death, as is generally believed, could death from it conceivably occur in more likely circumstances than when a person feels impending suffocation and every movement of his body is manacled as in a vice "by main force?" Sudden death might very easily result from the mere mental state of a person so environed by restraint and choking vapour. And when we consider the purely physical agencies operating at the moment in the same direction—irritation of the lungs directly, and of the heart through the nervous system—tending to produce asphyxia in the one case, and syncope in the other, death under such treatment has no plea to rank among the mysteries, at all events for want of "sufficient causes." Yet it does not take the tenth part of a moment to make an effort in avoidance of a source of irritation in breathing, and consequently were the individual permitted to follow the instinctive promptings of nature, such effort might be enough to save him when nothing else could. Chained and fettered, on the other hand, moving only at such times and in such degrees as the will of another determines, it is only too natural that such an unnatural arrangement should terminate sometimes in the fatal catastrophe of death. So much then for what is diametrically opposed to the purpose of anæsthesia, and most manifestly hazardous to the life of the patient.



In the happy reverse of all this, the attainment of the noble aims of anæsthesia, insensibility to pain with safety and without discomfort, by the use of existing anæsthetics, and especially of chloroform, requires a more natural method of administration, and more enlightened construction of the psychology of narcosis. I do not know that it is a very prevalent opinion that a person of ordinary intelligence must be regarded in the light of a lunatic from the moment that he begins to inspire chloroform; but it is undoubtedly too much the habit to deny the patient from the first all but a very scant measure of intelligence under the impression that the anæsthetic must very soon derange all that, even when there is a fair proportion to begin with. The anæsthetic of itself does no such thing, although unfortunately it may easily be made to do so, and mainly by injudicious methods of administration, partaking in some degree of the "main force system," which has been so strongly condemned. The process of falling asleep under chloroform is not essentially different from the usual process when disturbing causes are not interfering, and takes place without any derangement of intellect, beyond that transient flickering of disjointed ideas immediately preceding sleep, the same as naturally. The perfect tranquillity with which I have seen many patients go to sleep under its influence when the process of administration was left entirely to their own management indicates the absence of all mental derangement. It has been forgotten in estimating the mental effects of anæsthetics how very stupid many people are when they begin to get drowsy naturally, and how slow they are in recovering their senses when first aroused from sleep. Our notions on the subject also have chiefly been drawn from the case of persons about to undergo operation; on whose minds, for weeks or months, painful apprehensions have been preying, and whom an observant nurse often finds battling with their fears, like Richard with his ghosts, even within the curtain of sleep. It demands all their waking vivacity to chase away the tormenting thought; so when they begin to sleep it becomes predominant, and need not therefore surprise us, when on the eve of fulfilment it sometimes breaks out amid the



gathering dreaminess of realities in exclamations: "Bind up my wounds," or in sounds less articulate. The newness of the situation, too, the presence of a crowd of witnesses, and other circumstances, must go for a good deal in rendering sleep before an operation, under any condition, somewhat less placid than ordinarily. But, more than any or all of these, I believe the *terra incognita* that lies before the patient in the chloroform sleep itself is the cause of wakefulness and distraction on the route towards it. To tread new paths into so mysterious a region calls up many strange forebodings in human minds, ever apprehensive of evil on the side of the unknown, and, with fearful fancy on the alert, it must be confessed the initiatory train of sensations, especially if there be anything like "main force" in attendance, may not be reassuring. The subject for chloroform is not, as a rule, the philosophic Cato, with a bosom void of fear, calmly soliloquising on the brink of the great Unknown itself: "Through what new scenes and changes must we pass;" but much rather the startled Juliet, overborne by the certain calamity of coming events, and yet shrinking from the means of escape because of its many vividly-conceived mischances. I wish to give some prominence to this point because some people seem to think the patient should take chloroform with as much composure as they are prepared to give it; but this is hardly possible unless pains be taken to inspire confidence. The mental struggle naturally arising out of the circumstances is plainly depicted by the countenance as well as by the remarks of many before giving themselves up to this slumber-compelling vapour, and it is very manifest that the arguments in word and manner of a skilful administrator are most powerful in allaying their fears. But more than this, some intimation of the usual experience met with during the process of administration is much calculated to remove apprehension, where we have any intelligence to work on at all, as it is the most certain method for defeating or keeping surprisal in check. Of course where there is no intelligence, premonition is out of the question, but there it is not really wanted, as it is the existence at least of some intelligence that creates apprehension. And even if present only in a minor degree it is



too valuable a property in this as in any other instance to be ignored. Forewarned forearmed, although there is really nothing in the usual experience to occasion any alarm. On the contrary, the inhalation of chloroform, when properly directed, is from first to last a most agreeable, not to say delightful experience.

The first effects are the sensations arising from the action of the vapour on the nose, mouth and lungs. The olfactory sensations are pungent only when the vapour is supplied in too great strength, in which case the eyes suffer as usual, whether they are closed or not; otherwise, chloroform has a pleasant odour, not comparable to anything else, but distinctly of the sweet rather than the aromatic class. The sense of smell, however, is soon exhausted, for in less than a minute, if the inhalation is continuous, the vapour loses its power of affecting the organ. In some persons, in fact, it is only the first whiff that produces any smell at all, so that if one were to breathe the vapour from a narrow-mouthed bottle, when it would pass through the nostrils only, they might forget the fact that they were inhaling it until reminded by distinct symptoms of excitement or drowsiness. Hence the danger of such a proceeding if the supply were unlimited, but, under suitable direction, there can be little doubt the *nostrils*, in consequence of the agreeable feeling first developed, and their subsequent insensibility, are the most appropriate channel for the inhalation. For, as the vapour passes through the *mouth*, although being sweet, it is sufficiently agreeable at first to those partial to that kind of taste, yet ultimately it degenerates and produces a tendency to the accumulation of saliva, the peculiar characteristic of nauseating tastes. This, indeed, is the only disagreeable event occurring throughout the ordinary experience in going to sleep under chloroform, but it amounts to very little in reality, being overcome by the inducement of other feelings of a powerfully agreeable character as the administration proceeds, and would be much overrated if judged of by itself, as our exposition requires it to be noticed. It may be avoided, however, if necessary, by learning to inhale through the nostrils.



The respiratory sensations are extremely pleasurable, when of course no touch of stifling, far less of choking, is permitted to supervene, to in any degree threaten discomfort or danger. Vapours of this kind are to the lungs what vinous alcoholic beverages in stimulant proportions are to the stomach, and introduced with a due proportion of fresh air are directly exhilarating, and give an impetus to the natural play of the organ. This is the essential element of human pleasure throughout. It particularly needs to be noticed, however, that the air ought to be fresh air; for air deprived of this physiological quality, even although pure in its chemical composition, lacks an important element in contributing to this sense of pleasure. The air of the common fire-bellows, for instance, has a very different whiff from the fresh air from which it is drawn, simply from being in contact with musty leather for a moment or two. When the chloroform, therefore, evaporates from a handkerchief or any surface permitting an immediate mixture with the external air, it is much to be preferred to confined air both in point of pleasure and of wholesomeness. In order, however, that the respiratory sensation may be agreeable, the most important condition is that the patient be allowed to inhale the anæsthetic atmosphere according to his capacity for its influence, instead of having it forced upon him according to abstract principles, or, what is infinitely worse, no principles at all. The law of the œsophagus determines that each individual shall be the best judge—perhaps the only reliable judge—of how he shall swallow his food, and the law of the trachea no less vigorously demands that the man himself shall be the one person to regulate his respiration when such regulation is necessary. It is very necessary, as already remarked, on so great a transition as that from pure air to ether, or an atmosphere of air and chloroform. The adaptation of the lungs to any new atmosphere is always, except under compulsion, guided, in the first instance, by an intelligent instinct, as much so as the determination of the bolus that can be swallowed, and the rate as to how they shall succeed each other. In one sense the inhalation of new gases or vapours touches the comfort and safety of the individual much more directly and acutely



than the introduction of food into the stomach. Their subtlety for mischief, in fact, is as much greater in degree than incautious spoonfuls of food, as respiration is a more delicate function than deglutition, while the lungs are guarded against the influx of solids and liquids, but not against vapours.

With all respect to those who believe in "a generally respirable admixture of chloroform and air," that is, such a mixture as can be inspired by any one, it is impossible to believe that the specific capacity of individuals can be thus subordinated with comfort, however it may be with safety, to any fixed combination. It much concerns the most gratifying results that the peculiarities of individuals be carefully attended to, and when it is not possible to allow all the ease and freedom that self-administration implies, there ought most undoubtedly to be a clear understanding that the administrator is to follow the expressed requirements of his subject, and not on any account to erect himself into a divinity, presiding with autocratic authority over the delicate susceptibilities and necessities of another man's respiration. If these simple rules are observed, the sensations arising from the parts immediately affected by the inhalation of chloroform, as well as the subsequent feelings due to its further influence on the system, will be found, to say the least, not disagreeable. Of those more remote effects it is enough to say that, being simply the result, like the sensations, of an increased activity of the faculties, they are in like manner pleasurable. They are of course of the nature of excitement, but being rapidly induced, and rapidly subsiding again in sleep, it requires no great effort, during their transit, for the mind to retain its ordinary equanimity, as far as outward expression goes, although there are no doubt light-headed mortals who, never having learnt to know what self-control means, are not likely to learn it for the first time under the influence of chloroform, and consequently are apt freely to expatiate on their unusual flow of thoughts and feelings.

But although it is true that a highly nervous subject, liable to be upset by the least disturbance, may find it difficult to control the exuberance of their feelings



during the transient stage of excitement, even they will profit by having been previously informed that this is a thing to be, as it is, undeniably enjoyable, enjoyed without any misgiving, and that all they have to do is to think of going to sleep. Beings of a firmer order of mind will meet the exalted sensations and ideas with corresponding tranquillity when it has been explained to them that this is simply the result of an increased activity of their faculties such as they have perhaps before felt when they may have had more than one glass of wine. Whoever can take kindly to those sensations in serenity and confidence is a proper subject for chloroform, when it is required, and will very soon go to sleep, enjoying even the pleasing sensations of sinking into slumber. But those, on the other hand, who will do their utmost to keep awake, who strive with all their might and main to drive sleep far from them, and surrender their consciousness as if it were their life, are persons very precarious to deal with, and have obtained a very doubtful advantage when their consciousness, and not their life, have finally been put under. The fact that many persons do try to keep awake through fear, as long as they can, is notorious, and this is mainly the consequence of their having no idea how they ought to behave themselves. They have in fact to be taken every inch by storm, instead of freely surrendering themselves to an ally and a friend. The consequence of such opposition is the certainty of an overdose of the narcotic, and even when not fatal this must in the very nature of things be highly injurious. But it may even be fatal, for it ought to be taken in here that the patient inhaling chloroform comes to feel precisely the same sense of heaviness as the man who has exhausted the power of his muscles by a hard day's work, and inclination goes then just as in the latter case, if it be not opposed, harmoniously with the surrender of what capacity remains; that is, inclination seeks rest and sleep. But in either case, and as much in one as in the other, by an effort of the will, stimulated from within or without, this sense of heaviness, representing actual exhaustion, can be overcome, and voluntary movements performed, and the struggle can be kept up indefinitely; but the consequence is, that when addi-



tional labour or additional chloroform has finally drained every remnant of energy, and sleep at last triumphs, it is not sleep in the ordinary sense, but something much more profound, perhaps stupor or coma. It has occurred for men so to exhaust the vital powers in voluntary movements as suddenly to fall down and expire; and oftener, perhaps, to exhaust them to such a degree that when they did lie down to sleep, it was, not to rise again. The excessive pain attendant on such efforts is a sufficient safeguard in all but very exceptional circumstances, and it might be thought rare to find any one so perversely opposed to give in to the influence of chloroform as to succumb through such resistance; but yet it is very far from impossible, considering what fear is equal to, and it always represents a dangerous tendency, and strongly inculcates the rule of not allowing any one to go to sleep under chloroform with their vital forces seriously exhausted, as well as admonishes the patient to give way to the first promptings of sleep. The curious notion that *the necessity of breathing* is what prevents our natural slumbers from passing on to the deep sleep of total insensibility and death is a seriously fallacious one in connexion with this subject. The necessity of breathing can do no more for us in keeping up life when the vital powers are exhausted, than the necessity of food can feed us. It is a very nice balancing of Nature's, when she sends us so far into the realms of unconsciousness as in natural sleep and no further; but this is not effected by the appointment of any special guardian to watch over our slumbers. It is not, so to speak, *in somno*, but an *ante somnum* arrangement, dependent as it is on a certain degree of exhaustion, and, therefore, in great measure amenable to the will of the individual during his waking hours.

In concluding our observations on the *method* of administering anæsthetics it ought to be noticed as a matter of the very first importance in point of safety that the *patient should always be comfortably warm before the process is commenced*. Compared with any other circumstance in disposing to sleep, or in helping the action of chloroform, warmth is simply colossal. If the feet and hands are cold, or any chilliness



whatever exists, the patient by an overdose may be numbed into unconsciousness ; but it is like the winter-sleep of the animal in the arctic regions—obtained by next to extinguishing the functions of life. When, on the other hand, the circulation is in good trim, and a feeling of warmth pervades the system, a few drops of chloroform go to produce that grateful sense of fulness and calm which is the immediate precursor of sleep. Although temperature is often lost sight of in the administration of chloroform, and to the imminent risk of the patient, it must strike even the uninitiated that there is a vast difference between the condition of sleep in the two cases. Hence the importance of the instructions relative to moderately heating the bed and bedroom of the patient, and to attention to the state of the latter in that respect before commencing the inhalation. In facilitating the diffusion of an agreeable sense of warmth through the frame, the spinal bag, filled with warm water, is of great assistance. Cold, as is well known, is always antagonistic to sleep, and therefore the cold patient is more difficultly got over, while the degree of congestion that it implies renders the exhibition of the anæsthetic correspondingly dangerous.

In recommending attention to all the conditions favouring sleep naturally : quietness, rest, shade, warmth ; in denouncing measures calculated to cause excitement and fear ; in advising some preliminary explanation to remove misunderstanding and inspire confidence ; and in insisting on relieving the patient from restraint and allowing him to take in the vapour as he feels able, I think I am only humbly appealing to principles of common sense, which is nevertheless the *fons et origo* of the best and highest Science.

Next, to determine on the *degree* of unconsciousness necessary for the extinction of pain demands as careful consideration as any of the points already discussed. In the case of self-administration Nature manages her own business, taking what is necessary for inducing sleep or procuring relief, and therewith desisting. But at the hands of another, and during a severe operation, the preservation of the happy medium—insensibility to pain with safety—is a matter of much nicety. Consequently, when the administration is of the bold and



heroic type, prompted by daring without discretion, suffering is likely to be extinguished, but the risk is in proportion. On the other hand, when the administration is of the pusillanimous order, the sufferer is deprived of his much-needed antidote, and the great remedy descends into the merest sham. Instances of both kinds are only too numerous at hospitals, as well as in private, and of the latter perhaps even more than the former. Each has its theory, like every other practice, whether we allow it or not; only the theory, unfortunately, does not always need to be a scientific theory. So in regard to the very fearful, as well as the very fearless, type of administrators, their guiding theories can hardly be called scientific. Thus I have heard it maintained that there were persons to whom a single whiff of chloroform would be fatal, and that when death did occur from chloroform it was usually at the first whiff. This statement, to quote the expression of a well-known character, is "Prodigious!" but it discloses the state of mind in which some persons assume the office of administrators.\* It appears, according to them, that the interpretation of the singular occurrence is all to be found in the charming word "idiosyncrasy," which, like its *confrère*, *lusus naturæ*, has been invented by philosophers, as Dean Swift says, to the unspeakable advancement of human knowledge. Practically, however, there must be fear and quaking enough to mar all when exaggerated and baseless notions such as these come halting in the way, professing to do something, but far more suspicious lest they do something else. If, indeed, the patient escape without increase of suffering this is all he can expect from the mock administration of chloroform. For our own part, we are disposed to think that to be so near death and not know it as to die from a whiff of chloroform, to have so arrived at the utmost limit of a mortality inscrutable alike to consciousness and science, very closely resembles the fate over which Cæsar used to sigh: *Sibi et suis*

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\* It is a fiction founded on the fact that instantaneous paralysis of the heart, as already explained, may occur when the patient is at once overwhelmed by an atmosphere of pure chloroform vapour—a terrible warning, therefore, to begin as well as continue the administration with a single eye to the requirements of human respiration.



*euthanasiam similem.* At the same time it ought to be distinctly understood, that to die from a whiff of chloroform is just as feasible as to die from swallowing a bread pill, or "of a rose in aromatic pain." There is no evidence of such a thing ever having occurred, and it is quite certain that a whiff of chloroform might be inhaled by any one, even in the most advanced stages of organic disease, without hastening in any appreciable degree the period of life. Dr. Lauder Brunton has recently given the physiology of the cause of death from shock as it may happen under imperfect anæsthesia at operations. His experimental investigation is in full accord with the views here stated, except in so far as it is to be explained by the physiological difference between man and the lower vertebrata—the subjects of his direct examination. Thus he clearly shows the danger a person is in under inefficient anæsthesia when very severe pain is to be inflicted, as in the extraction of a tooth, by the reflex irritation which may then be conveyed to the heart with the effect of arresting its movement through the branches of the fifth nerve connected with the cardiac centre—such centre being still active as uninfluenced by the anæsthetic. But when anæsthesia is carried to the extent of so far disabling this centre, such reflex action is prevented while the heart still continues to beat in virtue mainly of its own ganglia. Hence the superiority, as regards safety, of a sufficient dose when a very painful operation has to be performed. It is quite obvious, and yet it cannot be too often repeated, that here the cause of death is not anæsthesia but the want of it; for the same reflex action is fatal whenever it comes into operation, and, in our opinion, it may do so quite as readily without as with a small dose of chloroform. This last Dr. Brunton is inclined to doubt, as, according to his view, when the cerebral centres are anæsthetised, the reflex centres, if so excited, being still possessed of their normal vigour, and *ex hypoteci* free from the controlling or inhibiting influence of the cerebral, act with additional force, and so are more likely to paralyze the heart. This doctrine, however, it founded on a belief which however true in regard to the lower classes of animals, such as the frog, we are most positive is not true, to the same extent at least, in regard to



man. As is pointed out under the next head, in applying anæsthetics to man we cannot count the various functions as they go, one, two, three. There is here no such nice analysis as in those lower animals in the successive extinction of the faculties. The cerebral centre in man cannot be completely paralyzed and the ganglionic centres remain intact. That they are affected in the order Dr. Brunton states is beyond all cavil, but not in man one after the other as so many separate entities. Here they are bound together with a chain that, like that of Alpine travellers, pulls upon all. The conclusion is that a small dose, although at an operation useless and injurious, cannot fairly be regarded as the cause of death, except in the sense of not preventing it, when such occurs in the circumstances. On the other hand, a dose which would completely paralyze the cerebral and ganglionic centres in man so as entirely to separate the heart, physiologically, for the time being, from the central nervous system, and leave it dependent solely on the motor energies of its own ganglia, would, in the author's opinion, be hazardous. We have to think of the respiration as well as the heart, which has no autonomy of movement apart from the cerebro-spinal system, and we doubt much if even the latter would be in a safe state supported only *suis viribus*. But although I make these reservations to the doctrine as applied to man, I am not behind others in admiring the most scientific investigation and the best exposition of the physiological mechanism of shock that has hitherto been advanced. It requires to be particularly noticed, however, that Dr. Brunton refers, in speaking of small doses of chloroform, to their effect in connection with painful operations, which is an entirely different relation to what Dr. Anstie called, and what I call, small doses, when the object is simply to relieve pain or induce sleep. This might appear as good as self-evident, but the author has lately met with several physicians whose minds were manifestly preoccupied with what had lately been said as to the danger of chloroform in small doses, forgetting that the danger there lay in the operation, and not in the chloroform, or, at the very most, in the operation associated with the chloroform—certainly not in the chloroform by itself.



The opinion, on the contrary, that mostly favours recklessness has a more scientific air about it, but is equally erroneous with the last. The mistaken conception, originating with Bichat, of a physiology of animal functions, and a physiology of organic or vegetative functions as two fundamentally distinct and separable departments in the general physiology of man and animals, has led to the belief with some that our life may be bisected into the divisions animal and organic, so that the animal functions may be wholly suspended without any detriment to, or diminution of, activity in the organic functions. The error has undergone much modification since it was first put forth by the French physiologist, whose mode of representation was fanciful, although extremely crude and eccentric. "It may be said that the vegetable is the outline, the canvas of the animal, and that to form the latter it is only necessary to clothe this canvas with an apparatus of external organs.\* A man would thus be a vegetable plus a nervous system, senses and muscles, and might be reduced again at any time to the state of a vegetable by the suspension of the action of those superadded parts. Dr. Carpenter says that the distinction between animal and organic functions, although a fundamental distinction in physiology, has seldom been given accurately, and is one on which much confusion prevails. If it be a fundamental distinction, all that can be said is that physiologists get on pretty well without much attention to their fundamental principles. The usual method of dealing with the subject in books of human physiology, is first to draw the distinction with great precision, marking off so many functions as belonging to the vegetative, and so many to the animal system, and then directly to cancel it by explaining that they are all bound up together, animal and organic, in inseparable connection. The natural inference even for this is, therefore, that the separation is fictitious and the connection real. The fact is the terms may be adopted by the anatomist, although even he might without much difficulty find more suitable ones, but they are altogether inadmissible in physiology; for the physiology of the human

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\* Bichat, "Sur la Vie la Mort," p. 4, § 1.



body, unlike its anatomy, admits only of an ideal partition : in reality it is one and indivisible. The language of everyday life recognises in a rough way the principle which anatomy carries out to the extreme limits of scientific investigation. Thus we speak of the head, arms, legs, skin, &c., as constituent members or elements of the body, and therefore parts into which it may be divided ; and anatomy does no more in its minutest researches than endeavour to discover how far this mechanical division of organs and structures may be carried. Here it will be observed, therefore, that the principle or axiom that forms the basis of anatomical science—the divisibility, namely, of the body into separate and distinct parts, has the sanction of universal consent, as expressed in language everywhere adopted, and familiar to all mankind.\* The resolution of the life of the body, on the other hand, into two or more lives, an animal and a vegetative, or a greater number of fragmentary and independent lives of equal or varying degrees of importance to the aggregate, has manifestly never been taken up in the same way, for there is nowhere discoverable in the common current of human thought the least attempt to break up this unity into sections. Rather, if we consult the common belief and the general practice consequent thereon, we shall find that mankind have always been most positive as to the singleness and indivisibility of what they recognise in themselves as life. Now there can be no stronger *à priori* objection to any special doctrines of science than that they are not only not countenanced by any vestige of common approval, but are face to face at at the very outset, and in the directest manner, with the most deeply-rooted persuasions of the race, for it can be very easily demonstrated, as in the case of anatomy, that all the fundamental positions of science, that are genuine, and on which the greatest and most

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\* Das Studium der systematischen Anatomie muss dem Studium der topographischen vorangehen : die systematische Anatomie setzt ihrerseits wieder eine Kenntniss der Regionen voraus, die wir glücklicherweise zum grossen Theil schon aus dem gewöhnlichen Leben mitbringen."  
—*Henle, Einleitung, Handbuch der Systematischen Anatomie.*



useful structures have been raised, were held primarily, and are always maintained as standing points in the philosophy of the vulgar. As much might be inferred from the mode of the formation of our knowledge; but independently of that, we have this induction from facts to which as yet there has been no proved exception.\* This dissection of physiology therefore into animal and organic functions, without going more minutely into the question, may be safely set aside as erroneous, and with this explanation it will be more easy to understand the danger of the practice founded on it in regard to anæsthesia. If the administrator conceives it possible to realize this analysis, he proceeds freely to narcotize the patient until all signs of voluntary movement and consciousness (animal life) are paralyzed, believing that the movements of the heart and lungs (organic life) continue with as much vigour and certainty as before. Now the truth is, the facts as they occur in Nature point to the very opposite conclusion: that is, when a man is no longer sensible to any feeling or capable of executing any movement, the vital activity of the heart and lungs are on the point of failing, and for ever. There is a constant and direct relation, as the most familiar facts show, between the rapidity of cardiac pulsation, of respiration, and of mental and bodily ac-

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\* See A. Comte, "La Philosophie Positive," vol. i. p. 796; also Whewell's "History of the Inductive Sciences."—Of course if the exception were proved, our *à priori* objection would necessarily fall to the ground; but that this distinction is not only artificial but arbitrary is obvious from the fact that it is not now founded on any intelligible principle. Bichat proceeded on the principle that whatever functions in man were not organic were animal; but this, although apparently logical enough, did not enable him to decide where to place "reproduction," which, from various reasons, he could not make up his mind to include in either class. It is the usual plan now to call reproduction an organic function, while respiration is regarded as the doubtful or epicene function; but why, it is impossible to say. A. Comte, in his celebrated work, following Blainville, argues that consciousness is the criterion, those functions being organic whose operation is not attended by consciousness, and those animal whose operation is attended by consciousness. If this be not the distinction, he says, there is none. There is, however no such distinction, there being no function in the body whose operation does not involve consciousness. For a systematic exposition of the so-called organic sensations, the reader is referred to Professor Bain's work on "The Senses and Intellect."



tivity. Thinking and running, just as they increase in vigour, make the heart and lungs go also with increased speed, and as those diminish so do these. In sleep, it has been asserted that there is a temporary arrest of all consciousness and voluntary movement, and that involuntary movement continues just as before; but this is a grave mistake.\* More accurate observation shows that here also it is simply a matter of degree, in which both kinds of movements are alike diminished only. "The unconscious cerebration" of Dr. Carpenter is a way of expressing the subauditer of ideas and emotions that haunt the sleeping brain, and the still lingering tonicity of the muscles during sleep proves their capacity for movement, as in an irregular way they are actually seen to move. I have narcotised some of the lower animals with chloroform until within an ace of extinguishing life, but I have never been able to satisfy myself that their sensibility even at this juncture was beyond stimulation, although the response to the most exquisitely painful stimulants was certainly extremely feeble. Enough has perhaps therefore been said to show that an attempt at the complete and total extinction of sensibility is a very dangerous attempt, since when one is totally insensible to the most violent stimulants they are very near indeed to the confines of nonentity. There is no need, however, on any grounds, for carrying insensibility to such a pitch. All that humanity calls for is the reduction of suffering to such a degree that it shall not seriously affect the patient at the time, and consequently shall not retain any hold on the memory when it is past. It is possible to annul the pain of a continued and severe surgical operation by maintaining a state of unconsciousness very little more profound, if any, than that of natural sleep; the proof of which is *the easy and speedy return to ordinary*

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\* "Die Ruhe der Organismus ist nur scheinbar, und selbst die Werkzeuge des animalischen Lebens, Muskeln, empfindende Nerven und Dendkorgan, äussern eine ununterbrochene, wenn gleich ausser der Reizung schwache Thätigkeit, welche Theils bei genauerer Beobachtung direct wahrgenommen, Theils auf Umwegen erschlossen werden kann." S. 110; Henle, *Handbuch der rationalen Pathologie*.



*consciousness*, when the administration is suspended; and yet the patient, on recovery, has scarcely any idea of what he has gone through, and will hardly believe that the operation is over, notwithstanding certain manifest indications of sensibility during its progress.\* This is what I venture to call the *beau idéal* of anæsthesia, as it is at present practicable, with existing anæsthetics. "*Est quædam prodire tenus; non datur ultra.*" It is no victory to extinguish every remnant of mental existence, even apart from the consideration of danger, if the return to the ordinary state from such profundity of narcotism must be through days and nights of sickness, prostration, and lingering lassitude; as, on the other hand, without a certain degree of sleep through narcotism, the sufferings of the operating theatre and of severe diseases cannot at present be effectually relieved, nor are there any solid grounds for entertaining the belief that insensibility to pain only, while all the other capacities of the mind remain intact, is a possible attainment of any future anæsthetic. Brown Séquard thinks he has discovered eleven different sets of nerves, each of which is "absolutely distinct one from the other, as regards their special functions," and among these, one set are conductors of impressions of pain.† Even were this a fact, and that requires a great stretch of imagination even after the most willing consideration of the arguments advanced on behalf of it, to paralyze those conductors of painful impressions without affecting any of the other sets, with all of which they still would be puzzlingly interwoven, would be a difficulty hardly to be overcome. It must not be thought that there is any pretence made, in the works of the cele-

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\* Such movements are usually known by the name of "reflex;" but although independent of the will, it is a mistake to suppose that they are entirely divorced from consciousness.

† "Lectures on the Diagnosis and Treatment of Functional Nervous Affections," 1868, p. 10.—It is said that a certain Alphonso of Arragon dared to think the fabric of the heavens might have been constructed on a simpler plan when the orrery was exhibited to him,

"With centric and eccentric scribbled o'er,  
Cycle and epicycle, orb in orb."

Much of the doctrine regarding the nervous system at the present day, like the astronomy of the Middle Ages, is sufficiently involved to make one heartily sympathise with Alphonso.



brated physiologist referred to, in favour of such a consummation; but there is an idea afloat among certain optimists that an anæsthetic is discoverable capable of entirely annihilating the sense of pain without in any degree touching the other senses. Well, what the future may do with new and superior agents will be disclosed by the future; the present seems mostly to have to guard against the fallacy of supposing that the newest compound must be the most perfect. The relevancy of the discussion, however, lies in the fact that with our present anæsthetics the sense of pain is the first to succumb under their influence, although not without involving other mental faculties in its train. This is by far too important a fact to let pass unnoticed, much more when in danger of being distorted by misleading opinions that in some degree resemble it. The order of subsidence of the faculties under chloroform is manifestly as follows: 1st, Consciousness of pain; 2nd, Voluntary movement; 3rd, Intellectual consciousness; 4th, Reflex or automatic movement. The proofs in behalf of this position are most conclusive, consisting of all the ascertained facts on the subject. But it is not to be understood that those functions disappear one after the other in the order named, like so many gas-jets turned off in succession; in which case we should always cease our administration when the first was screwed out, and allow the others to burn as brightly as before. The actual process is more analogous to the advance of the tide over four reefs of unequal height situated at the same sea level. When the lowest is submerged (consciousness to pain) all the others have descended in the water to a corresponding degree, but are still discernible in their proportional order of magnitude. In other words, by a merciful arrangement of Nature, the first attribute of mental existence that is neutralized by the approach of unconsciousness, whether it be through the advent of sleep, naturally or artificially induced, or of death, is the sense of pain: but this is attended by a diminution in the strength of all the other faculties and functions, mental and bodily.\*

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\* Goldsmith has devoted an eloquent chapter to this subject in his "Vicar of Wakefield."



When the patient begins to lose the regular command of his voluntary muscles we may be certain, as is generally assumed, that his sensibility to pain is gone. Yet up to this point and beyond intellectual consciousness, a certain perception of his situation and surroundings still remains, so that he can conceive to do what he cannot do as at other times—a fact as old and as well known as alcohol. But effort of any kind is too troublesome under the circumstances to be continued, and therefore sleep naturally and speedily supervenes.

A full statement of the proofs in support of the order of paralysis as explained cannot be entered into here, but it may be remarked among things familiar to any one at all acquainted with the subject that patients may sometimes be got to execute certain movements, although with apparent difficulty, immediately before an operation is commenced, by the pain of which they are not at all affected. More frequently can they recall remarks made at a time when their insensibility to pain has led to the belief that they are equally insensible to sound.\*

The practical result of such knowledge is to restrict the administration of anæsthetics within the limits of perfect safety, since pain can be successfully extinguished without leading the patient up to the gates of death. That anæsthetics may yet be discovered that shall effect the elimination of pain with greater nicety is a very reasonable expectation. In the meantime it behoves us to make the best use of those we have, since they have already done so much and can be made to do so much more for the alleviation of human suffering.

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\* A patient was asked, when under the influence of ether, to hold up her hand, which she did just as the operation was commenced for removal of the mammæ, and yet gave no sign of suffering nor complained of having felt any afterwards.



## Extracts from Reviews.

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“DR. CROMBIE’S ingenious little instrument for the production of sleep and insensibility to pain—such as neuralgia and the like—by the inhalation of anæsthetics, is now well known. The great value which he claims for it is, that by its means the use of the anæsthetic may safely be left in the hands of sufferers themselves. . . . Dr. Crombie’s pamphlet contains some general remarks on anæsthetics which are good in themselves, and which are expressed in accurate and elegant English.”—*Westminster Review*, October, 1873.

“Dr. Crombie remarks that when all the conditions favouring sleep are observed—that is, when the patient is in a bed comfortably warm, and excluded from noise and too much light, and wearily longing for sleep, even although suffering great pain—an incredibly small quantity of chloroform is sufficient to produce it. The accidents which have occurred through the administration of chloroform seem to have been due to the administration of the drug in excess, and attempting to produce total unconsciousness—an unnecessary proceeding, as it is not needful to reduce the vitality so low in order to induce insensibility to pain. The following passage, which is also of much general interest, gives the result of Dr. Crombie’s observations on this point,” &c.—*Iron*, March 21, 1874.

“Everyone who has had the misfortune to suffer from the want of sleep will, we are certain, fully appreciate the information which this able and interesting essay contains. The subject which the author, Dr. Crombie, has endeavoured to elucidate and render intelligible to the plainest capacity is one of great importance, and it is, moreover, one wherein the rich as well as the poor, the young as well as the old, are equally concerned, since all of us are liable at any time to be attacked by illness or exposed to personal injuries, whether of a serious or modified character. . . . There are many other points which we should have wished to bring under the notice of our readers; but they must be content for the present with what they have already got—strongly recommending them, however, to study the essay carefully for themselves. They will find much to recommend the judicious administration of chloroform in all cases where insensibility to pain is required.—*The Reporter*, July 11, 1874.

“The method of administration and the degree of anæsthesia produced is provided for by an ingeniously-constructed apparatus, devised by Dr. Crombie, which is, so to speak, automatic in its action. . . . In view of the growing consumption of chloral hydrate, and the rather numerous accidents from its use, it would be well if more attention were paid by the public to the arguments of Dr. Crombie.”—*World of Science*, Dec. 4, 1874.



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