

JOHN ASHHURST, JR., both published at the close of 1878. Dr. ASHHURST believes that from the outset the patient should take light and easily-assimilable food in small quantities and at frequent intervals. He prefers *milk* in teacupful doses every few hours; and later, beef essence and strong broths. Weakness of the pulse, and especially delirium, is an indication for *alcohol*, whisky or brandy, \bar{z} iv-vj, or wine O ss , in the twenty-four hours. Dr. AGNEW is a more rigid dietician. He strongly condemns "the modern plan of stuffing patients from the very inception of the disease." He considers that cold water, barley water, or water diluted with milk, supplies all that is needful at first. When the febrile disturbance subsides, then beef tea, animal broths, milk, eggs, &c., may be given.

II. ANÆSTHETICS

GENERAL ANÆSTHETICS.—*Alcohol—Bonwill's Method—Carbon Tetrachloride—Chloral—Chloroform—Ether—Ethidene Dichloride—Ethyllic Bromide—Methylene Bichloride—Nitrous Oxide—Anæsthetic Combinations.*

LOCAL ANÆSTHETICS.—*Alcohol—Carbolic Acid—Carbon Bisulphide—Carbonic Acid Gas—Chloral Hydrate—Ether—The Esmarch Bandage—Ice—Iodoform—Menthol—Morphia—Potassium Bromide—Rhigolene—Saponin—Anæsthesia of the Larynx.*

GENERAL ANÆSTHETICS.

ALCOHOL.

The vapor of heated alcohol was used to induce anæsthesia in surgical operations before the discovery of ether or chloroform. The insensibility of the drunkard also suggested its internal use for the same purpose.

Of recent years it has been extensively employed by Prof. JOHN LYNK, M. D., of Cincinnati. He depends upon it almost entirely in his surgical operations, believing that it leaves the functions, especially those of the heart, in a more normal condition than chloroform. He advises the patient to drink freely of whisky, in the case of a robust male to the amount of about a pint. Very little chloroform is then needed, or, in minor operations, none at all. (*Cincinnati Lancet and Observer*, May, 1876.)

Although it is probable that this method will not receive the general sanction of surgeons, the value of a small amount of alcohol taken shortly before the inhalation of chloroform or ether cannot be denied, and should generally be remembered and acted on.

BONWILL'S METHOD.

This method is named after its discoverer, W. G. A. BONWILL, D. D. S., of Philadelphia. The anæsthesia is produced by rapid breathing of ordinary atmospheric air.

To produce the proper effect, the patient must open the mouth, breathe freely, quickly, and deeply, and after a few seconds or minutes, of such steady, continuous breathing, the symptoms of partial anæsthesia supervene, as is evidenced by the absence of feeling on pinching or pricking with a pin. At this stage any operation should be made. The anæsthetic effect passes almost immediately away, and the patient feels no pain in the operation if done dexterously and without hesitation.

This method is said by some to be one of the simplest, and at the same time one of the most beneficial plans in small operations about the eye and the like, that has been presented to the profession; its application being very easy, requiring no recumbent position on the part of the patient, calling for no apparatus for its administration, and being perfectly free from any of the disagreeable effects of ether and chloroform.

On the other hand, Dr. HENRY GIBBONS, Jr., of San Francisco, (*Pacific Med. and Surg. Jour.*, Oct., 1880,) condemns it as dangerous and tending to asphyxia.

CARBON TETRA-CHLORIDE.

This substance has been employed as an anæsthetic by various European surgeons.

Dr. PROTHEROE SMITH (*Lancet*, 1867,) found it useful in removing neuralgic pain; in mitigating the sufferings of labor, without hindering the parturient efforts; and in inducing sleep in nervous exhaustion. He claims that it rarely produces nausea or sickness, is pleasanter to inhale than chloroform, and produces anæsthesia with a less amount of muscular spasm and rigidity.

Mr. ARTHUR ERNEST SANSOM says that as far as its earlier stages are concerned, it is all we want; it is stimulant, anodyne, hypnotic; and it produces no adverse sign. But for the anæsthesia necessary for the performance of surgical operations, as well as for any prolonged employment, it is altogether undesirable. The accidents of its physical condition, its ponderous vapor, its insufficient volatility for the system readily to disembarrass itself of it, are so many reasons for its non-employment in anything like large doses.

CHLORAL.

Professor ORÉ, of Bordeaux, has introduced the intravenous injection of chloral as a means of producing general anæsthesia, and it has found some warm defenders in Belgium and Germany.

The formula which Oré recommends is the following:

40. R.	Hydrate of chloral,	10 grammes.
	Distilled water,	30 grammes.

The apparatus required consists of a glass syringe, graduated down to centigrammes, and containing half the quantity above stated; and a very fine "three-quarter" gold trocar and canula. A band is placed round the arm, above the point selected for operation, and when the vein has become sufficiently prominent, it is pierced through the skin. The operator knows he is in the vein by withdrawing the trocar, when blood flows through the canula. The band is then removed, and the syringe is applied to the canula; but before doing this the blood should be seen escaping from it by a jet. The operation is to be conducted slowly. At first only 50 centigrammes are to be injected. If the patient bears this, we may go on to one gramme, and so on, pausing at each division to watch for symptoms. When the subject begins to complain of an inclination to sleep, we are to go slowly, as anæsthesia is not far off. The canula is withdrawn when insensibility is complete. Eight or ten grammes are usually necessary for an adult, but six or seven grammes are capable of producing the effects required. The duration of the operation ought not to exceed ten minutes. The injection should have the surrounding temperature. It is an indispensable precaution, however, to have an electrical apparatus at hand, in order to rouse the patient from his insensibility by passing a current along the course of the pneumogastric, should that be deemed necessary.

The advocates of this method claim for it the following advantages: 1. Absence of any preliminary stage of excitement. 2. Absence of nausea and vomiting. 3. Accurate graduation of the dose administered. 4. Absolute character of the anæsthesia and muscular relaxation produced. 5. Prolonged blunting of the patient's sensibility, which protects him from the influence of shock.

Among the *hypothetical* disadvantages of the system may be enumerated risk of thrombosis and embolism, difficulty of producing insensibility, danger of prolonged stupor, inflammation of the wounded

vein. The *observed* disadvantages are transient dyspnoea, occasional irregularity of the heart's action, presence of a small quantity of blood and albumen in the first urine passed after the injection, and risk of fatal syncope.

According to M. BOUCHUT, children can be placed in a condition of absolute anæsthesia by means of chloral given by the mouth in doses of gr. xl-lx, without gastric disturbance. In this condition minor operations can be performed, and the child will awake in three or four hours, with no knowledge of the pain.

CHLOROFORM.

This is the most potent of all anæsthetics, and its use is still advocated by many eminent surgeons. Only the alleged dangers attending it prevent its exclusive employment. Many of these arise from its ignorant or heedless administration. The following rules should be observed:

Preliminaries.—Unless very feeble, the patient should fast for three hours before the inhalation. Twenty minutes before the inhalation a dose of brandy should be given in water—teaspoonful to a child, one or two teaspoonfuls to an adult. The patient should, whenever convenient, be wholly undressed, and, invariably, everything tight about the chest or neck should be removed. If possible, let the patient be in the recumbent position, and on his back. Let the chest and neck be well exposed. Whatever form of apparatus be used, (a piece of lint, a handkerchief or an inhaler,) there is little or no risk with the first inhalations, and the patient may be instructed to draw full breaths. So soon as any effort is manifest, more caution must be observed. The respiratory movements should be carefully watched, and also the color of the cheeks, lips and eyes. When convenient, the finger may be kept on the wrist-pulse; but this is not essential. If the patient struggle much, proceed with increased caution. (WARNING.) The chloroform should not be allowed to touch the lips, or it may blister them. By not chloroforming a patient within two hours of a full meal, the annoyance of vomiting may be prevented. He should be narcotized before removal to the operating table or the sight of any preparations. He should be taken to bed again in a state of unconsciousness. *There should be no hurry*, because complete insensibility to pain and absence of involuntary movement are more safely obtained after the vapor has had time to benumb all the peripheral

nerves. Dr. SNOW states that insensibility to pain cannot be obtained in a very rapid manner without a dangerous degree of narcotism of the nervous centres. The inhalation should occupy eight minutes altogether. The loud talking or violence of the intoxication stage is no cause of alarm; it shows that the vapor has not produced a dangerous effect, and that a slight increase is necessary. At every operation, the management of the chloroform should be committed to one competent person, whose duty it should be to attend to it, and to nothing else. The chloroform should be pure—that is, free from oily matter, muriatic acid and uncombined chlorine.

It may be administered in vapor, either by means of a folded handkerchief applied over the face and nose, or by means of inhalers, which are sold for this purpose; and care should be taken that the patient breathes pure atmospheric air at the same time with the chloroform vapor. There is reason to believe that cardiac syncope of a fatal character has been produced by inhaling air very strongly charged with chloroform. It is, therefore, important to administer it gradually, and if a handkerchief is used, to hold it at least an inch from the mouth, and not to put more than fifteen or twenty minims upon it at one time.

It has also been stated, on excellent authority, that air heavily charged with carbolic acid, as is so often the case in operations performed under the carbolic spray, decidedly increases the dangers of chloroform.

The tendency to *emesis*, which is a fertile source of danger to the patient, and an annoyance to the surgeon, can almost certainly be prevented by forbidding any food for four hours before the inhalation, and by administering a few minutes before it a few teaspoonfuls of brandy.

The following special conditions should be considered:

Age.—Children and aged persons bear chloroform well. Mr. JONATHAN HUTCHINSON teaches that the anæsthesia of chloroform is safer than that of ether in advanced life, as it is attended with less cerebral excitement. In giving it to infants, but a few drops should be administered at a time.

Sex.—Hysterical females are peculiarly susceptible to the action of chloroform.

Heart Disease.—Most surgeons believe that fatty degeneration, marked cardiac debility, and the presence of large aneurisms, contra-

indicate the use of chloroform. This is denied by Prof. GROSS, who has never witnessed evil effects from these causes. Prof. OCCHINI, of Italy, recommends that such patients should inhale *ammonia* for five or ten minutes before commencing the chloroform. But a recent and able authority, Prof. GEORGE H. B. MACLEOD, F. R. S. E., of the University of Glasgow, maintains that any such precaution is wholly needless. His words are:

"We recognize almost no disease as rendering a patient an unfit subject for chloroform; and to examine him beforehand would only augment his anxiety, and possibly discover conditions which the administrator would better be in ignorance of, as it might render him less decided in his actions, and so the patient might not be as completely under the influence of the anæsthetic as was requisite for his safety. No examination should be capable of augmenting the care and caution always to be employed. Heart-disease, instead of being a counter-indication to the use of chloroform, is often greatly alleviated by its employment; and that fatty change of the organ which is supposed to render it peculiarly liable to 'paralysis,' is the very form of disease in which chloroform, if properly administered, interposes the most effectual barrier between it and the fatal shock which an operation is apt to occasion. To obtain this good, however, the patient must be completely anæsthetized. If the action be incomplete, the danger is, if anything, augmented. I have frequently had to perform operations of severity when undoubted heart-disease was present, and no cases seemed to me to do better with it. A good many of the deaths under chloroform have apparently been due to patients suffering from heart-disease not being completely insensible when the operation was performed, and the shock killing them. The chloroform is blamed; whereas, what was really wrong was that it was not sufficiently pushed. There are positively no cases which can be submitted to operation in which chloroform is inadmissible." (*British Medical Journal*, Jan., 1876.) Dr. VERGELY, of Bordeaux, (*La France Médicale*, 1879,) has given recent testimony to the same effect.

Habitual Drinkers.—A number of deaths have occurred among habitual drunkards under chloroform. Dr. UTERHART, of Berlin, recommends that in such cases half a grain of morphia be injected subcutaneously, ten or twenty minutes before the chloroform is administered. This materially shortens the period of delirium.

Nervous Shock is said by Prof. GOSSELIN to be a contra-indication.

Of sixteen deaths from chloroform, he found twelve of them occurred in persons who had just received severe injuries, and had not yet completely recovered from the shock.

On account of its tendency to produce *emesis*, chloroform is contra-indicated in *ovariotomy* (PEASLEE) and similar operations on the abdomen.

Danger from Chloroform.—It has been shown by Prof. SCHIFF, of Geneva, that both ether and chloroform may be followed by paralysis of the vascular and respiratory systems; but whereas, in the employment of ether, the paralysis of the respiratory acts always comes first, and hence presents, in the cessation of breathing, a timely warning, in chloroform, on the other hand, the far more dangerous paralysis of the vascular system (*i. e.*, of the heart,) may be the first to appear, and thus present no warning and leave no time for precautionary measures.

In administering this anæsthetic, especial attention should be given to the *pulse*, the *respiration*, and the *eye* (conjunctiva and pupil.)

The *pulse*, at first quick, and it may be weak, should, as soon as unconsciousness sets in, fall somewhat in frequency and gain in force. It should continue regular and strong throughout. Should it become quick and weak, or irregular, then the inhalation must be withheld, unless the irregularity is obviously due to the patient's struggles.

The *breathing* often affords an earlier sign of danger than the pulse. If the respiration becomes shallow, and gradually less frequent, the chloroform should be suspended for a time; should it cease, active measures must be resorted to, as will be described hereafter. What is called "stertorous" breathing, a noisy, catchy respiration, is nearly always a sign of deficient innervation of the respiratory apparatus, and hence the danger. A very similar kind of breathing, however, takes place in operations on the rectum and vagina, which is without danger. The true character of this form may generally be discriminated by noting that it does not occur until the rectum or vagina is manipulated, and is especially loud and noisy when the finger or an instrument is passed into either orifice with any force.

The surest signs of safety and the earliest of danger are afforded by the *eye* of the patient, as exhibited in the condition of the pupil and the conjunctiva. So long as irritation of the conjunctiva causes reflex action, and is followed by winking, there is usually no danger. (RINGER.) The pupil is much contracted in the stage of insensibility,

when no danger is to be apprehended; but on the approach of peril from dangerous narcosis, the pupil dilates. When on touching the conjunctiva reflex action is annulled, and the limbs when raised fall heavily, consciousness of pain is entirely absent.

Death from chloroform occurs usually by asphyxia, owing to closure of the glottis by the tongue falling back, or due to paralysis of the laryngeal muscles; or else by vomited matters passing into the larynx. In all cases the treatment must be prompt:

1. Stop the administration of the anæsthetic.
2. Lower the head below the level of the body.
3. Seize the tongue with the catch-forceps, and pull it forward so that its tip appears well between the teeth.
4. Admit fresh air freely to the patient by open windows, fanning, &c.
5. Commence at once artificial respiration.
6. Apply electricity freely to the heart and through the diaphragm.
7. Let an assistant rub each extremity briskly with a hot towel; dash cold water in the face; insert a lump of ice in the rectum.
8. As soon as the patient can swallow, stimulate with ammonia and brandy.

An expedient suggested by Dr. HEIBERG, of Norway, in chloroform narcosis, is to bring forward the under jaw *in toto*. When the rattling, incomplete respiration begins—that is to say, in all those cases in which the teeth are otherwise forced apart, and the tongue drawn out—he draws the under jaw forward by the following means: Standing preferably behind the reclining patient, the operator places both thumbs on the symphysis of the lower jaw, presses the second joint of the bent forefingers behind the posterior margin of the rami ascendentes of the under jaw, and thus holding the whole bone fast between the two hands, draws it forcibly forward (anatomically speaking.) The most successful impulse is that which would be given if the intention were to lift the whole head and body by this grasp. By this proceeding, and as long as it is continued, the jaw is kept luxated forward. The obstacle to the respiration is removed, and in short, exactly the same result is obtained as if the tongue had been drawn forward and the mouth kept open by a gag.

As an antidote, *nitrite of amyl* has received considerable attention. The amyl should always be in the armamentarium of the medical man. It can be administered from a bottle, or five or six drops may

be placed on a handkerchief, and held to the nose and mouth of the patient. An exceedingly convenient method of carrying the drug is by means of the nitrite of amyl-bulbs made of glass. When required, one of the bulbs can be broken in a handkerchief or towel, and its contents immediately inhaled.

Prompted by this antagonism of the two agents, Dr. W. N. SMART, of Michigan, combined chloroform with nitrite of amyl, using two per cent. of the latter to ninety-eight per cent. of the former. Under the name "chloramyl," a somewhat similar mixture is recommended by Dr. GEORGE E. SANFORD. (*Medical Record*, October 5th, 1878.)

Atropin, as a paralytant of the cardiac inhibitory apparatus, is indicated where there is liability to death from arrest of the heart's action. But, as pointed out by Prof. E. A. SCHÄFER, (*British Medical Journal*, Oct., 1880,) it is necessary to give it immediately before the administration of the chloroform, *as a preventive*. The hypodermic injection of atropin *afterwards* is of little value.

What is called *Nelaton's* method of restoration has frequently proved all-sufficient in desperate cases. The patient is seized by the feet and suspended, head downwards: or the body is brought to the side of the table, and the trunk and head allowed to hang down. Artificial respiration is made by pressing alternately the sides and front of the chest, and by bringing the elbows to the sides, and from there below the head. Several minutes may elapse before the respiration is restored, and it is well to hold the patient in this position from five to ten minutes, until all danger has passed.

Galvanization is also an efficient restorative. The current should be passed along the pneumogastric nerve or through the diaphragm.

ETHER.

This anæsthetic is usually preferred on account of its safety. The rules for administering it, and for treating its poisonous effects, are the same as those given under chloroform. As, when mixed with air, its vapor is inflammable, care should be exercised in using it at night, or when employing the actual canterly.

In giving ether, a newspaper cone, lined with a towel, is a convenient apparatus. The cone should be short, so as not to be in the way, and thick, so as not easily to be saturated with the fluid, and thus lose its shape. The cone should be held a little distant from the patient's nostrils when he takes the first two or three inspirations, so that the

ether may be freely diluted with air. As soon as he commences to struggle, the cone should be closely applied. His countenance should be watched and his breathing attended to. The moment his face becomes injected or dusky, the ether should be removed, and the tongue drawn well forward. If the symptoms do not readily disappear, the measures recommended under asphyxia from chloroform must be resorted to (page 48.)

Dr. O. H. ALLIS, of Philadelphia, maintains that the most striking defects of ether, to wit, (a) its proneness to irritate the air-passages, (b) its comparative feebleness as an anæsthetic agent, (c) its long and vexatious stage of excitement, are owing entirely to a defective method of administering it. What ether requires is an opportunity to evaporate, and, under favorable circumstances, when there is a thin stratum of it, its disappearance is almost instantaneous. Any apparatus or vehicle for the administration of ether, that holds it in any quantity and retains it in the fluid state, is not well adapted for its use; while any contrivance that will favor the rapid deliverance of the vapor of ether must, *ceteris paribus*, be more effective.

To reach this point, he has contrived a wire frame-work for keeping many folds of a bandage at a slight distance from each other, and yet having the whole in a compact form that will readily adjust itself to the face. The sides are inclosed, but the ends are left open—the one for the patient's face, the other for the entrance of air and the ready supply of ether.

He has found it very effective. He usually produces complete anæsthesia in females in seven minutes, and with about two ounces of ether. Persons seldom object to taking it, and the stage of excitement is no more *excessive, prolonged or frequent* than with chloroform.

He adheres strictly to the following plan: The patient being freed from all restraint as to clothing, he places the apparatus over the face and adds *a few drops of ether*—hardly enough to give a strong odor of ether. In a few seconds he adds a few more drops, taking care not to give it in too concentrated a form at first. In a few minutes the patient takes deep respirations, and then he adds it more constantly, *not too much to be offensive or objectionable to the patient, and not too little to be efficacious.*

The sick stomach and headache which often follow the use of ether may generally be prevented by administering, shortly before the inhalation, a few drachms of brandy; or, what is said to be equally, if

not more efficacious, a spoonful or two of *bromide of potassium*, half an hour before, as recommended by Dr. A. J. STONE, of Boston.

On the *relative value* of chloroform and ether much difference of opinion prevails. Prof. SCHIFF, of Geneva, has expressed himself to the effect that chloroform should be banished from practice as an anæsthetic agent, except in cases in which extraordinary resistance to the effect of ether shows itself, in which instances it might be allowable to mix a little chloroform with it, in order to produce the commencement of anæsthesia, which should afterwards be continued with pure ether.

An excellent authority, Professor FRANK H. HAMILTON, of New York, says: "In nearly all my surgical operations I prefer ether to chloroform, as being equally efficient and more safe; but in the reduction of dislocations we need complete muscular paralysis, and this is much more quickly and certainly attained by chloroform than by ether, and I am, therefore, in the habit of using chloroform in the reduction of dislocations."

In cases where an immediate effect is required, as in puerperal eclampsia, chloroform is to be preferred. It is generally believed that if chloroform is sufficiently diluted with air, as can be done by letting it fall drop by drop on a handkerchief spread over the mouth, as recommended by Sir JAMES Y. SIMPSON, it is quite as safe as ether.

Dr. TRIPIER insists (*Revue Scientifique*, Nov. 9th, 1876,) that chloroform is, for children, a much safer anæsthetic than ether. Children, he says, under ether seem to "forget to breathe," and die in a manner not explained by asphyxia or cardiac paralysis; these symptoms he has never seen when chloroform is used in them.

ETHIDENE DICHLORIDE.

Some favorable reports on this anæsthetic have appeared. It has greater solubility and volatility than chloroform, acts more rapidly, and the recovery from it is also more rapid. As it has also a more stimulant action on the heart and is rapidly eliminated from the system, it would appear to be a safer agent. The after-effects are usually not unpleasant, vomiting and headache being exceptional. About half an ounce is required to produce anæsthesia in the adult. Some cases of its use are given by J. R. MACPHERSON. (*Half-Yearly Compendium of Medical Science*, Jan., 1880.)

ETHYLIC BROMIDE, OR HYDROBROMIC ETHER.

The ethylic bromide has been tried by M. RABUTEAU on the lower animals, and by Dr. LAURENCE TURNBULL, of Philadelphia, as a local and general anæsthetic. (*Artificial Anæsthesia*, 1879.) The latter holds that it occupies an intermediate position between chloroform and ether, and that it is free from irritating effects upon the lungs and heart. It is a colorless liquid of an agreeable odor and flavor, not caustic, and may be taken internally in doses of half a drachm, soothing pain and not disturbing the appetite. It is sparingly soluble in water, but completely so in alcohol and ether.

In 1879-80 it was extensively employed in Philadelphia by Drs. R. J. LEVIS, H. A. WILSON and others. (See article by the last named in the *Med. and Surg. Reporter*, Aug. 7th, 1880.) The result of these experiments, while developing some special advantages in the rapidity of anæsthesia, proved that the drug is much more dangerous than ether, and probably on the whole can never take the place of it or chloroform. Several sudden deaths occurred under its influence.

METHYLENE BICHLORIDE.

Mr. PHILIP MIALL, surgeon to the Bradford Infirmary, England, who has employed this anæsthetic in a large number of cases, states that insensibility in adults is usually produced in about two minutes. One dose of a drachm is usually sufficient to produce anæsthesia. Vomiting occurs in but a small number of cases. The respiration is usually quickened, the pulse lessened in frequency. In its administration, it is important to exclude rather than to admit air, and for this purpose a close-fitting inhaler should be chosen. The apparatus should be well applied to the face. (*Half-Yearly Compendium of Medical Science*, July, 1870.)

On account of the immunity from sickness of the stomach it gives, this anæsthetic is much used in ovariectomy; and on account of the rapidity with which persons can be brought under its influence, it is preferred in some English ophthalmic institutions where many operations are performed.

Mr. J. T. CLEVER, of England, states that he has not found its effects so uniform as chloroform, and attributes this to the compound nature of the body, as indicated by its variable boiling point.

The bichloride has been used both alone and in combination quite

extensively by Dr. C. BELL TAYLOR, of London, who gives a generally favorable report upon it. (*Medical Press and Circular*, Jan., 1874.) His opinion is that it is not quite so convenient as chloroform on account of the inhaler employed, but it is far more rapid in its effect; and when there are a great number of patients to be operated upon, and time is of importance, this is the anæsthetic which will always be preferred. The bichloride, he states, is best administered with an inhaler that almost excludes the air, though a little may be admitted at the commencement; two or three drachms should be poured on, and the agent be pushed when the patient shows signs of going off; when fully off, remove the inhaler, and do not give another inspiration unless the patient shows signs of returning sensibility. Patients succumb very quickly to the bichloride, and recover as quickly; hence, it is a most convenient anæsthetic, and, perhaps, safer than chloroform; it is, however, like chloroform, a lethal agent, and requires careful watching. Attempts have been made to combine it with ether, and the result has been the discovery of a definite compound called *ether methylene*, which is a very convenient and very safe anæsthetic administered in the same way as the bichloride.

The strongest advocate of this anæsthetic has been Mr. T. SPENCER WELLS, F. R. C. S., whose opinion, as expressed before a late (1877) meeting of the British Medical Association, is so decided that it merits quotation in his own words:

"In 1872, I made known my opinion that all the advantages of complete anæsthesia, with fewer drawbacks, could be obtained by the use of bichloride of methylene or chloromethyl, than by any other known anæsthetic. That was the result of an experience of five years, and of three hundred and fifty serious operations. The experience of the five succeeding years up to the present time, with more than six hundred additional cases of ovariectomy, and many other cases of surgical operations, has fully confirmed me in this belief. Given properly diluted with air, the vapor of chloromethyl has, in my experience of ten years, with more than one thousand operations of a nature unusually severe as tests of an anæsthetic, proved to be, without a single exception, applicable to every patient, perfectly certain to produce complete anæsthesia, relieving the surgeon from all alarm or even anxiety; and its use has never been followed by any dangerous symptom which could be fairly attributed to it. I wish I could speak as confidently of the chemical composition of the fluid sold as bichloride

of methylene as I can of its anæsthetic properties. But whatever may be its chemical composition, whether it is or is not chloroform mixed with some spirit or ether, or whether it is really bichloride of methylene, I am still content with the effects of the liquid sold under that name, when properly administered. The only deaths ever attributed to it were, I believe, rather due to asphyxia. No air was given with the methylene. By Junker's apparatus, air charged with methylene vapor is given, not the vapor itself; and, so employed, it has always been in my experience both efficient and safe."

NITROUS OXIDE.

This is a safe and valuable anæsthetic in many cases. When successfully given, the patient appears to fall asleep without any delirium or excitement; but if the operation be one leaving much pain behind it, the patient sometimes will have a dream more or less connected with it, and then wake up rapidly and completely. It is by far the best anæsthetic for many short operations, such as the extraction of teeth, opening abscesses or boils. It answers very well in operating for strabismus. Removal of the eyeball has been performed for a lady, who said she had no consciousness of the operation. It is well suited for examining hysterical cases, wrenching stiff joints, and reducing luxations of recent date. It is not suitable for cases where it is necessary to keep the patient quiet more than three or four minutes; but if the patient be allowed to recover consciousness after one inhalation before another is commenced, the anæsthesia may be kept up tolerably well for half an hour.

In administering nitrous oxide, a plentiful supply of gas is essential to success. There is no fear of patients inhaling too much at first. They should be told to breathe deeply and slowly. The administrator should always use a double-valve inhaler, attached by a hose of large calibre directly to the reservoir of gas, so that a quite large column may pass directly to the patient. In this way the respiration is free, whereas if the column of gas is small, the respiration is more or less labored. An inhaler with a mouth-piece in the centre to pass between the teeth, leaves the mouth open for the operation when anæsthesia is complete.

Anæsthesia is supposed to be produced with it by supplying the system with carbon more readily than it can be eliminated. The patient passes quickly into a perfect state of anæsthesia, which is

always plainly indicated. The condition is of shorter duration than that produced by chloroform or ether. The functions of the body are slightly exalted, and respiration fully supported. After the lapse of from two to five minutes, the patient is in as perfectly a normal condition as before inhaling it.

Of the *risks of its administration*, it is evident, from the many thousands of cases in which the gas has been given, and the extreme rarity of a fatal accident from its use, that, in the hands of a skilled and careful operator, no great risk attends the employment of this anæsthetic; but it is also obvious that, to a patient with a feeble, fat heart, the distension of the right cavities which accompanies the disappearance of the radial pulse, and the general lividity of the features, must be attended with some degree of risk, and the danger must be increased when, the muscles of the trunk and limbs being convulsed, the pressure of the contracting muscles upon the veins drives the blood forcibly towards the right cavities of the heart, and so adds to their distension.

Prof. PAUL BERT, of Paris, discovered, in 1879, the use of mixed nitrous oxide and oxygen, *under tension* or compression, so that the patient respire, with the gas, his ordinary supply of oxygen. A special chamber is required, and a pressure of two atmospheres is used. The value of this anæsthetic mixture of about eighty-five parts of nitrous oxide and fifteen of oxygen, promises to be very useful and practical. With this mixture, employed in compressed air, the patient does not get blue in the face, and the natural complexion, pulse and breathing seem to be preserved. Moreover, it is not preceded by the period of agitation which often proves so tedious and troublesome, and is not followed by the stage of reaction which often upsets a patient for several consecutive hours.

ANÆSTHETIC COMBINATIONS.

M. SAUER, OF BERIN.

This surgeon dentist recommends the following compound as free from the dangers attendant on the use of either chloroform or ether alone:

41. R.	Chloroform (liquid),	6 grammes.
	Atmospheric air,	$\frac{2}{3}$ kilogramme.
	Protoxide of nitrogen,	16 kilogrammes.