

inated, the heart is left unsustained, when great weakness may set in; whereas the frequent administration of smaller quantities keeps the heart more uniformly supported.

Some easily digested food in small quantities should be given with the stimulant, which, by promoting digestion, supports the patient's strength in the most natural and most effectual way. As a rule, where food is freely taken and digested, stimulants are little needed.

Weakly children derive more benefit by taking stimulants about an hour before rather than with food. This plan enables them to take more food, and to digest it better, than the more common one of giving the stimulant with food.

In common with ether and chloroform, alcohol is an anti-spasmodic, but in this respect ether and chloroform are more effective.

It does sometimes happen that one alcoholic stimulant is harmful, while another is found useful; a fact especially noticeable in coughs, which are aggravated by porter or beer, but are unaffected or even relieved by brandy or wine. Beer or stout sometimes produces sleepiness, heaviness, even headache, and flushing of the face, while the same person can take wine or brandy without inconvenience. Individual peculiarities abound in respect of wines; for example, one person cannot take sherry without suffering from acidity, while another is speedily seized with gouty pains on taking port.

The wish of the patient for any particular form of stimulant is often a correct indication of its desirability. A free draught of the weaker beers will often gratefully slake the urgent thirst of fever.

Stout is very supporting and nourishing to persons brought low by exhausting discharges, and to women weakened by suckling. In many cases unfortunately it disagrees, producing headache and sleepiness. The good old-fashioned remedy, rum or brandy and milk taken before breakfast, is useful in phthisis and in exhausting diseases. A little rum and milk an hour before rising is a good prop to town-

living women, to whom dressing is a great fatigue, who, without appetite for breakfast, suffer from morning languor and exhaustion, often lasting till mid-day, and to convalescents from acute diseases.

The ill effects of alcohol in gonorrhœa are well known. A cure is much more readily effected if the patient will abstain altogether from alcoholic beverages. Even when the cure seems near completion, a single indulgence in spirits, wine, or beer will bring back the scalding and discharge. Exercise too should be interdicted.

CHLOROFORM.

CHLOROFORM, when applied to the surface of the body, speedily volatilizes and cools the skin; but it is seldom used as a refrigerator, being in this respect inferior to other agents.

Owing to its high diffusion-power, chloroform readily penetrates the animal textures. If evaporation is prevented it penetrates the cuticle and excites inflammation, and, thus applied, chloroform is rubefacient.

In quantity insufficient to excite inflammation, chloroform deadens sensation, and acts as a local anæsthetic. It is sometimes applied to relieve pain, and occasionally with good effect, although it often fails, and is inferior for this purpose to many other external applications. It has been used in neuralgias, sometimes with success, but it generally fails, and even when successful, the relief is ordinarily very temporary, the pain soon returning.

In faceache or toothache, two or three drops on a small piece of cotton-wool, introduced into the ear, gives occasionally complete and permanent relief; but if too large a quantity is used, it will excite inflammation, even vesication, and give much annoyance. The pain of cancer, when the skin is broken, leaving a painful, irritable sore, is relieved by play-

ing vapour of chloroform on the raw surface, and often the immunity from pain lasts several hours. The pain of cancer of the uterus, of ulceration of os uteri, of neuralgia of the uterus, and, in a less degree, the annoyance of pruritus pudendi, are relieved by a similar proceeding. The vapour must be made to play on the os uteri for some minutes. The author thinks that chloroform vapour may be tried in cancer of the rectum, spasms of the intestines, etc.; recollecting, however, that chloroform is easily absorbed by the large intestine.

According to Sir J. Simpson, a few drops of chloroform whilst evaporating from the palm of the hand held close to a photophobic eye, will enable it to bear the light without pain.

Dr. Churchill lessens the violence of the paroxysms of whooping-cough by the simple plan of directing the nurse to pour about half a drachm of ether of chloroform over her hand, and to hold it before the child's mouth. The child at first dislikes this treatment, but soon appreciating its benefit, will run to the nurse on the first warning of an attack.

The itching of urticaria, lichen and true prurigo may often be allayed by an ointment composed of half a drachm of chloroform to an ounce of lard; but, like most other ointments, it often loses its effects in a short time, hence anti-itching applications require to be changed from time to time.

Dr. Augustus Waller has shown that chloroform promotes to a considerable extent the cutaneous absorption of many substances. Thus chloroformic solutions of aconite, atropia, strychnia, or opium, applied to the skin, speedily destroy an animal with the characteristic toxic symptoms of the alkaloid employed. The absorption of watery or alcoholic solutions is far less rapid. He ascribes this property of chloroform to its power of rapidly passing through animal textures, carrying with it, in its passage, the dissolved alkaloid. The addition of a certain amount of alcohol to the chloroformic solution does not hinder the absorption of the alkaloid—indeed, it appears to hasten it; for when an equal quantity of alcohol is added to the chloroformic solution, the

absorption is more rapid than when chloroform only is used. This effect of chloroform should be borne in mind when we employ alkaloids as external applications.

It produces in the mouth a sensation of warmth, and, if undiluted, excites inflammation. Being a stimulant to the mucous membrane, it excites a flow of saliva. A few drops on cotton-wool inserted into the hollow of a decayed aching tooth often gives permanent relief. After the anæsthetic effect has ceased, the pain is sometimes aggravated, the chloroform having irritated the inflamed pulp. It is a good plan to fold over the hollow tooth a piece of linen moistened with chloroform, so that the vapour may remove the pain. Equal parts of chloroform and opium, or of chloroform and creasote, constitute a useful application in toothache.

Chloroform excites a sensation of warmth in the stomach, but in large doses it induces nausea and vomiting. Drop doses of pure chloroform are beneficial in flatulent distensions of the stomach, sea-sickness, and other vomitings.

Its high diffusion-power enables it to pass rapidly into the blood, little, if any, finding its way into the intestines. The physical and chemical changes produced in the blood by its admixture with chloroform are at present unknown.

When given in medicinal doses, to a healthy person, it produces very little change either in the frequency or strength of the heart's contractions, though it is said, when inhaled, judging by the hæmadynamometer, at the very first, slightly to increase their force. In disease, on the other hand, when the heart beats feebly, especially if due to some sudden and transient cause, chloroform certainly strengthens the heart's contractions, so relieving such symptoms as syncope, etc.; but it is in no way preferable to a glass of brandy and water or wine. It no doubt acts more quickly and evanescently than alcohol, and its effect on the heart certainly declines more speedily than is the case with alcohol. It is frequently administered to hysterical patients and others suffering from weakness, depression of spirits, nervousness, etc. By habitual ingestion it soon loses its effect, as indeed is the case with

all stimulants, especially with chloroform and ether, so that from time to time the dose requires to be increased, and even then it soon loses its efficacy.

In diarrhœa, after the removal of the irritant which caused it, spirit of chloroform, combined with astringents and opium, may be given with much benefit. It is useful in intestinal or stomach colic from whatever cause arising, and in renal and biliary colic, in hiccup, hysteria, and asthma, both primary and secondary; and from the relief it gives in these affections, it is ranked among antispasmodics. Its mode of action is at present unknown. Possibly by restoring the weakened muscular or nervous system to its natural physical condition it controls inordinate muscular action, and removes pain, thus becoming a true stimulant. In the treatment of any of the foregoing diseases it is usually combined with opium, and this combination succeeds admirably. No doubt much of the effect is due to the opium, its action it appears, however, being increased and sustained by the chloroform.

Chloroform, combined with small doses of morphia or opium, given with a drachm of glycerine, honey, sugar and water, or treacle and water, is often conspicuously beneficial in certain coughs. It is useful when the cough is paroxysmal and violent—violent out of proportion to the amount of expectoration; when, indeed, there appears to be much excitability or irritability in the respiratory organs, and when a slight irritation is followed by a distressing fit of coughing. In such circumstances the chloroform is of more service than the opium, and should be given in a full, while the opium should be given in a very small dose. This combination allays the cough in the fibroid form of phthisis, so frequently paroxysmal, wearing and exhausting to the patient.* Cough

* In fibroid phthisis, the long-continued teasing cough arises from a different cause and requires a different treatment. In this form of lung disease there is often such extensive induration, with thickening of the pleura, as to prevent any expansion of the lung, and consequently of the chest walls, so that little or no air enters the consolidated part of the lung, and no expulsive force can be brought to bear on the mucus. Here our attention should be given to check the abundant secretion, to lessen its tenacity, and so facilitate its expulsion.

often arises from a morbid condition of throat; and even when due solely to disease of the lungs, the application of this mixture to the throat and parts about the glottis is often beneficial, in accordance with a general rule that organs can be influenced through the nerves by remedies applied to the orifices communicating with certain organs, as the nipple, rectum and throat. For example, many coughs are allayed much more efficiently if the opium and chloroform mixture is swallowed slowly, and so kept in contact with the fauces as long as possible.

Being highly volatile, much chloroform passes off by the lungs, and its odour can be detected in the breath; some, probably for the same reason, escapes by the skin, and some probably by the urine. In its passage from the lungs it is unlikely in any way to influence the mucous membrane of the bronchial tubes, the quantity separated being very small; and even during and after the inhalation of chloroform we do not observe that it modifies in any way the secretion of this mucous membrane. Its influence, if any, on the kidneys and the urine, is at present unknown.

Harley's observations on the action of chloroform on the respiratory function of the blood tend to show that it lessens the oxidation of the blood, and diminishes the evolution of carbonic acid; but to establish this point we think that further experiments are needed.

Chloroform is of the most signal service as an anæsthetic, and we will now give a succinct and practical account of its administration.

Chloroform at first very often causes a sensation of tingling and heat in the lips and nose, and these parts, if accidentally moistened with it, may become inflamed even to blistering; an accident which can always be prevented with care, particularly if the nose and lips are first smeared with glycerine or cold cream, or some protecting substance.

The early sensations experienced vary much in different persons, being sometimes so agreeable as to tempt to the inhalation of this substance merely for the sake of inducing

them; but in the majority the sensations are more or less disagreeable, often intensely so.

At first there is a sensation of warmth at the pit of the stomach, spreading to the extremities, and accompanied by some excitement; then some or all of the following symptoms soon set in. Noises in the ears, lights before the eyes, great weight and oppression of the chest, great beating of the heart, throbbing in the large vessels, and a choking sensation. These symptoms betoken no danger, and need excite no apprehension. At the very commencement of the administration some cough is not unfrequently excited, or even a passing spasm of the glottis, sure signs that the vapour is administered in too concentrated a form, and that more air must be mixed with it, by opening the valve in Clover's apparatus, or by removing the lint farther from the nose and mouth.

At this early stage of the proceedings, women, by becoming hysterical, may give some trouble and alarm. They laugh, sob, or cry; their breathing is often extremely irregular and hurried—a condition which frightens the friends, and inexperienced chloroformizers; but this state is to be accepted as an indication to continue the administration, not to withhold it; for as the patient passes more deeply under the power of the anæsthetic, this condition soon subsides.

The pulse, at first quick, and it may be weak, if not due to the patient's illness, is the effect of nervousness and anxiety; and as soon, therefore, as unconsciousness sets in, the pulse falls in frequency, and gains in force.

A few seconds from the commencement of the administration all discomfort ceases, the patient becomes quiet, and breathes calmly. The consciousness is now more or less affected; questions are still heard, but are slowly answered, and not to the purpose. The induction of this medium stage is adequate for confinement, and for the treatment of renal colic.

All knowledge of the external world soon becomes lost, and is followed by a period of excitement. Various inco-

herent ideas occupy the mind. Some struggle, attempt to get up, and are often much irritated when they are restrained. The stage of complete unconsciousness required for capital operations is now fast approaching. Violent tonic contraction of the muscles of the body often occur before complete unconsciousness and perfect muscular relaxation set in. The extremities become rigid; the muscles of the chest are firmly fixed, and the respiration thus becoming impeded, causes, in combination with the general violent muscular contraction, duskiness or lividity of the face. The eyes are injected or prominent, the lips blue, the jugulars stand out like large black cords, the mouth is clenched, and a profuse perspiration breaks out on the body, especially about the face. In a few seconds all these symptoms pass away. They may be accepted as a sure indication of the immediate approach of utter insensibility and complete flaccidity of the muscles, and as a warning that the administration must be conducted with increased caution, or the patient will suddenly pass into a stage of danger, with noisy, stertorous, quick, shallow breathing, and quick, weak pulse. These violent muscular contractions, which greatly distort the face, and frighten the patient's friends, rarely occur in women or children, or in men weakened by exhausting illness; and it is a condition more frequently seen when the chloroform is administered too abundantly, and the patient brought too quickly under its influence.

As these movements cease, the muscles become flaccid, and the stage of perfect insensibility is reached. Reflex action is lost; the conjunctiva can be touched without producing winking. The limbs, when raised and let go, fall heavily. The breathing is calm, but a little superficial; the pulse is not much altered, but it may be a little more compressible. The face is moist with perspiration. The pupil is much contracted. This condition may be maintained with due precaution for a considerable time; but if now the chloroform is continued in undiminished quantity, the breathing becomes noisy and stertorous; the pupil greatly dilates;

the pulse loses its strength; the breathing becomes gradually more and more shallow, and less and less frequent, till both pulse and respiration stop. Even now, if artificial respiration is performed, the breathing often recommences, the pulse again beats at the wrist, and life is saved. On several occasions the author, while administering chloroform, has witnessed recovery from this critical condition.

On the other hand, it appears that sometimes, without warning, while the pulse is beating well and the breathing is deep and quiet, the heart suddenly stops, and respiration immediately ceases. This form of death arises probably from cardiac syncope, while the other form of death is probably due to gradual paralysis of the respiratory muscles.

With care, chloroform insensibility may be maintained for hours and even days.

In administering chloroform, the attention should be directed to the state of the pulse, the breathing, the conjunctiva and the pupil. The pulse usually retains throughout its frequency and force. Should it become quick and weak, or irregular, then the inhalation must be withheld, unless the frequency of the beats can be accounted for by the patient's struggles. The breathing often affords an earlier sign of danger than the state of the pulse. If the respiration become very shallow, and gradually less frequent, the chloroform administration should be suspended for a time.

The surest signs of safety, and the earliest of danger, are afforded by the state of the conjunctiva and pupil. While irritation of the conjunctiva causes reflex action, and is followed by blinking, there is usually no danger. The pupil is much contracted in the stages of insensibility when no danger is to be apprehended; but on the approach of peril from over-dose of the anæsthetic, the pupil dilates. When, on touching the conjunctiva, reflex action is annulled, and the limbs when raised, fall heavily, the patient is fit to undergo any operation.

One or two circumstances require a passing notice. Vomiting is liable to happen if food has been taken a short time

before the administration of chloroform, and occurs either as the patient is passing under its influence or more commonly on recovery from it. Vomiting ceases always when the full effect of chloroform takes place. Vomiting, happening after the full effects of chloroform, may be taken as a sign of returning consciousness; and if the operation is non-completed, the administration should at once be continued, when the vomiting will speedily cease. But to avoid vomiting, it is advisable that no food should be taken for three or four hours before chloroformization. At the same time, too long a fast should be avoided, or its very purpose may be defeated by inducing the tendency to vomit; and fainting and much exhaustion may occur from a small loss of blood during the operation. In case of vomiting, the head should be turned aside to assist the escape of the rejected food, and to prevent choking.

It should be borne in mind that operations on the rectum and vagina, even when the patient is quite insensible, often, nay generally, cause noisy catchy breathing, very much resembling stertorous breathing, often mistaken for it, and sometimes thought to indicate that too much chloroform has been administered; but this is not the case. The true state of things can generally be discriminated by a little attention to the circumstances. Thus, the noisy breathing does not occur until the rectum and vagina are manipulated, and is especially loud and noisy when the finger or an instrument is passed into either orifice with any force.

On discontinuing the administration, consciousness usually returns in a few minutes, but is sometimes delayed for a longer period. If perfect quiet is observed, its effects are often followed by sleep, which refreshes the patient, gives time for many of the disagreeable consequences of the inhalation to pass off, and allows the pain of the operation to subside.

Experiment, practice, and common sense all show that the danger of chloroform is in proportion to the percentage of vapour inhaled in the air. The importance of ascertaining