majority of the profession thinks that human life is a thing too sacred to be lost, because those who administer a deadly drug underrate its danger, or think that a certain number must die from its use, or that, when the heart suddenly stops, the case is hopeless; and hence are unprepared by prompt and energetic action to save life. A review of these cases, together with a large amount of former experience, can lead to but one conclusion, that Professor Lister's teaching, to "disregard altogether" the pulse, is a fatal error. It appears, from a recent clinical lecture of Mr. Erichsen, that he thinks, when the pulse suddenly fails, the case is all but hopeless; that, in "cardiac syncope," the patient dies. He is right to a certain extent. Death too surely follows, unless means very different from those hitherto used be instantly resorted to. It is probable that Mr. Erichsen had not seen the account of those cases which I have published when he gave his lecture; if he had, he would have known that life has several times been saved under circumstances which he thinks all but hopeless, and by a remedy which he does not even mention by name.

From the reports of all the recent cases, it is evident that a sudden stoppage of the heart's action was followed by death; and that the "usual means" were not sufficient to prevent a fatal occurrence. It may be said that electricity was employed and failed, as well as other means; but the all important question arises, Was that powerful agent used in the manner in which it has been attended with such marked success in similar cases? When suspension of the heart's action is sudden and complete, death can only be prevented by the most rapid and energetic action, and for these two qualities we must look to electricity; no other agent, no other mode of employing any other agent, approaches electricity in these two essential qualities. In addition to its direct effect on the heart, it may be that electricity excites and brings into play the respiratory muscles; this action materially assists that of the heart, and may perhaps enable it to act where in some cases, without this aid, it would be unable to expel its blood.

To give full effect to this potent agent, it is necessary to be prepared for immediate action; the battery should be in the operation-room, ready for use at a moment's notice; and the moment the heart ceases to beat, the battery should be instantly employed, and as instantly the heart begins to beat again. This is the experience derived from six cases at the Bristol Infirmary; and the facts cannot be disputed. No disbelief, no want of confidence in the remedy, no prejudice, nor obstinacy can alter these facts. To attempt to save life, when the pulse is suddenly and entirely gone, by such frivolous proceedings as drawing out the tongue, etc., is only to lose precious time. The tide of life is ebbing too fast to be arrested in its course by such means.

If fatal cases from chloroform continue to occur as lately, some other anæsthetic less dangerous must be sought for. There is abundant evidence to prove that ether is far less hazardous to life than chloroform: the evidence from America is strong in its favour. An American physician, Dr. Jeffries, in a recent visit to England, endeavoured to prove this to the profession in this country, and has given his experience in England in the *Boston Medical and Surgical Journal* for October 1872. From France, Dr. Diday of Lyons, in strong and earnest language, enforces the same opinion. In a pamphlet lately published in Dublin by Dr. Morgan, the facts and opinions collected by him are conclusive as to the dangers of chloroform and the safety of ether; they must remove all doubts from the mind; and, for myself, I feel so convinced as to its superiority, that nothing shall ever again induce me to give chloroform. One death in 23,000 from ether against one in 2,500 from chloroform (if there be anything in statistics) is a startling difference, and may to some extent be accounted for when we know that chloroform depresses the heart's action, while ether stimulates it. This is all important when we are told, on high authority, that "cardiac syncope" is mostly followed by immediate death. Ether produces a deep sleep, chloroform a deeper still; but too often it is the sleep of death.

To those who will still give chloroform, a word of caution as to the preparatory means which should be employed previous to its use may not be entirely useless. All those who have seen semi-solid food gurgling in the pharynx, during the administration of chloroform, must have felt in dread of its passing into the trachea and so causing death; hence, all agree that food should not be taken for some hours previously; but, with such a depressing agent, is it well to encounter vital power depressed by the absence of all nutriment? I have thought not, and for some years have always given about half-a-pint of strong beef-tea and three or four ounces of brandy about two hours before the operation. If given in this way, nutriment and stimulant have passed into the system before the time of operating; little, if any, remains in the stomach to be rejected. In private houses, beef-tea may not be always ready, but eggs and brandy are; these answer the purpose equally well. I have occasionally found that this preparation makes chloroform unnecessary; the patient, when on the table, has left it to me

to give it or not, as I wished; I need not say that, having seen two deaths from its use, and wishing not to see a third, I decided not to give it; the operations were borne without much pain.

In a future paper I may attempt to show that from four to six ounces of brandy, given before an operation, are an efficient anæsthetic. I have taken off the limb of a drunken man, injured beyond all chance of recovery, and he hardly knew what was being done.

THE ADMINISTRATION OF ETHER.

By G. EVERITT NORTON, M.R.C.S., Chloroformist to the Middlesex Hospital.

IN accordance with a wish expressed by the Editor of the *BRITISH MEDICAL JOURNAL*, I have for the last month administered ether in hospital and private practice, in place of chloroform, in all those cases in which it has been possible. I do not, however, quite see my way to administering it in operations when the mouth or nose is involved, as in administering ether it is necessary to keep the mouth-piece closely applied—not so with chloroform. I commenced administering ether according to Dr. Joy Jeffries's plan (a towel in the form of a cone and a sponge); but, before the operations were completed, the theatre became full of ether, and the amount used very large. I now use an inhaler made for me by Hawksley of Blenheim Street, of which the following is a rough diagram and description.

The apparatus consists of an application of one of the principles employed in Dr. Smith's carbonic acid apparatus (*Philosophical Transactions*, 1859-61), by which a current of air is made to travel over the largest amount of surface in the smallest compass. A metal box (A B), measuring 7 × 4 × 3 inches, is divided into six compartments by means

of five metal shelves (the side of the box is represented as removed in the diagram to show this arrangement). Each shelf has a perforation in the middle two inches in diameter; and the shelves at alternate ends of the box are so perforated that each compartment has a free air-communication with the other, and the last one with the outlet-pipe (M). Each shelf and the floor of the box are covered with thick flannel, excepting at the alternate ends of the shelves, where the holes are left uncovered. The box is surmounted by the glass reservoir (H), having a capacity of six ounces, and graduated to drachms, etc., at its side. This reservoir has two stopcocks—one beneath the glass-funnel for receiving the ether, and the other governed by the short lever (T) for admitting ether into the metal box, either in quantity instantly, or slowly and sufficiently for the purpose of the administrator: D is the valve admitting air into the compartments of the metal box; M is the outlet-pipe, communicating by a long elastic tube with the face-piece (K). This latter is after the usual model called "Snow's," and has an expiratory valve at N, and a revolving shutter (L). The latter allows the patient to inhale air without removing the face-piece.

The action of this apparatus is as follows. The two stopcocks of the reservoir (H) are opened, and, say, two ounces of ether are allowed to flow into the box. The fluid, on passing through the top of the box, falls on a round metal plate, an inch and a half in diameter, fixed exactly over the large middle perforations of each shelf. The use of the plate is to at once distribute the ether over a larger surface than could be done were it to fall direct upon the flannel from its pipe. Whilst the top shelf is being saturated, the ether has penetrated the flannel through the middle of the shelf and fallen upon the next shelf, and so on, until in about five seconds the two ounces of ether have been distributed over the six surfaces of flannel contained in the box. Here it will remain without escaping until the inhalation commences. On making an inspiration, the valve (D) falls; air follows along the surface of the shelf as far as the row of perforations, shown at E. Passing through these, it returns beneath the first shelf and down

through the row of perforations at F, into the next shelf, and so on until it escapes at M. The size of the holes at the alternate ends of the shelves is such, that no three of them will admit sufficient air for a single respiration; therefore the air passes through all and over the whole of the superficies charged with ether.

The following are some notes of cases in which ether was administered.

CASE I.—(In this and the four following cases ether was given on a towel.)—A man with a sinus in the region of the hip was brought under the influence of the ether in eight minutes. There was no struggling nor lividity. He was under its influence altogether a quarter of an hour, during which time he took six ounces. He was very sick directly after the operation, and continued so for a short time, but passed a good night and felt quite himself the following morning.

CASE II.—A little girl aged 11, with a sinus over the lower jaw, was brought under the influence of ether in six minutes. There was no struggling nor sickness. She took about three ounces.

CASE III.—A woman aged 30, with cancer of the breast, was brought under the influence of ether in a little over four minutes. There was no struggling. The operation lasted twenty minutes, during which time she took six ounces. She was not sick till the following morning, then twice.

CASE IV.—A woman aged 19, with sinuses around the ankle-joint, was brought under its influence in three minutes. The operation lasted three minutes more, and she took three ounces. There was no struggling nor sickness.

CASE V.—A man aged 40 was brought into the theatre for extirpation of the eyeball. He struggled a good deal, but was brought under the influence of ether in four minutes. The operation lasted four minutes more, during which time he took five ounces. He was very sick.

CASE VI.—(In this and the following cases the inhaler above described was used.)—A child, with abscess of the thigh and supposed necrosis, required three minutes to be brought under the influence of ether, and was kept under for eight minutes longer. She took three ounces; but the mouth-piece was too large for the face, so that a good deal of ether was wasted. She had no sickness.

CASE VII.—A man was operated on for necrosis of the tibia. He had been a soldier, and drank rather freely. He was brought under the influence of ether in five minutes, after a good deal of struggling. He was kept in a state of anæsthesia for six minutes, and took during that time about three ounces. His pulse, during the administration, went up to 140, and once he became rather livid. He had no sickness.

CASE VIII was one of recurrent cancer in the breast and axilla of a medical man. He had been operated upon twice before, each time having had chloroform, which nearly proved fatal the last time. He went off very quietly, without any struggling, and was under the influence of ether in four minutes. The operation lasted thirty-five minutes, during which time he took three and a half ounces. He was slightly sick on the return of consciousness.

CASE IX.—A man with necrosis of the elbow-joint was brought under the influence of ether in four minutes. The operation lasted twenty minutes, during which time he took about three ounces. The pulse, before inhalation, was 96; during it, 114; after it, 104. There was no lividity nor rigidity; but he was sick before he recovered consciousness.

CASE X.—A man with necrosed bone in the stump of the thigh was brought under the influence of ether in four minutes. Before he was quite unconscious there was great rigidity, and twice he became very livid. The operation lasted eighteen minutes, and he took about three ounces. He was very sick. His pulse before, during, and after the operation was 142. He was a very nervous subject.

CASE XI.—A lady on whom iridectomy was performed for glaucoma was brought under the influence of the ether in three minutes. There was neither rigidity, lividity, nor sickness. She took about an ounce for double iridectomy.

CASE XII was one of a man with a large tumour in the axilla. His pulse before operation was 96. He was brought under the influence of ether in five minutes. The operation lasted thirty minutes, the ether being kept up nearly all the time. Towards the end of the operation his pulse became very weak—almost imperceptible—but he soon rallied after an enema of brandy. He had no sickness.

The sickness after ether occurs just about as often as after chloroform, and it is more violent while it lasts, but it does not continue nearly so long. In some cases with ether there is a marked increase in the flow of saliva, but not in all. Cases IX and X had had chloroform in previous operations, and both preferred it to ether. They said that chloroform was less suffocating, and more pleasant to breathe. The pupil under ether is generally dilated. Having given chloroform

for more than two years without a fatal case, I think it rather too soon to give an opinion of the superiority of ether.

In Case I, ether was administered a second time by means of the inhaler, with greater comfort than by the towel. The patient was sick immediately afterwards, but this did not continue.

DEATH FROM CHLOROFORM.

By CHRISTOPHER S. JEAFFRESON, Esq.,

Surgeon to the Newcastle Eye Infirmary; to the Children's Hospital; and Assistant-Surgeon to the General Infirmary.

I HAVE read with great interest the highly practical and interesting remarks of Dr. Jones upon the administration of chloroform; and although I fully concur with him that the dangerous symptoms produced by anæsthetics, especially chloroform, may come on suddenly or gradually, I cannot admit that therefore the deaths from these agents should be classified as avoidable and unavoidable. I say this, because I firmly believe that, in many of the cases where the most sudden and death-like symptoms are instantaneously developed, actual death is avoidable, and may still be averted, provided no time is lost in (at that time) the useless pantomimics of dashing water upon the face, applying ammonia to the nostrils, and various other efforts which are usually resorted to. In these cases, the tongue having been drawn forward, immediate recourse should be had to artificial respiration, and, in spite of all appearances of death, this should be continued for at least three quarters of an hour.

During a large hospital practice, I have administered and assisted in the administration of chloroform several thousands of times; and happy am I to say that I have never witnessed a death, although on two occasions, if I had listened to the advice of bystanders, I fear I should have done so. In each of these cases, the heart's action failed suddenly, and respiration became imperceptible. The bystanders supposed the patient dead, as did I also myself; nevertheless, in one case, after thirty minutes, in the second case, after twenty minutes, of artificial respiration persistently and energetically carried on, symptoms of animation returned, and the patients perfectly recovered. I think many cases are lost in the two or three minutes' delay which generally elapses between the appearance of the dangerous symptoms and the adoption of artificial respiration, a complete stasis occurring in the pulmonary circulation, which cannot afterwards be overcome; and I would direct the attention of the profession to this point.

ETHER AS AN ANÆSTHETIC.

By HENRY GREENWAY, Esq., Plymouth.

A FEW years since, owing to the numerous accidents in the administration of chloroform, a compound of ether, chloroform, and rectified spirit, was brought before the notice of the profession (by whom I now forget) as a safe and reliable anæsthetic. Although apparently safe, its action, when I employed it, was slow, and at times imperfect. It shortly afterwards occurred to me that the ether would be of greater value if administered separately for producing the first stage of anæsthesia, the anæsthesia being then completed with chloroform. In the few cases where I adopted this plan, and then only because I thought, from the aspect of the patient, the administration of chloroform simply would prove unsafe, the results were satisfactory. By following this precaution in every case requiring an anæsthetic, and by interposing with ether (as practised by Dr. Jones of St. George's Hospital) whenever chloroform is seriously affecting the respiration or pulse, I believe we may still regard the agent, so long relied on by Sir James Simpson, as a "good servant", and one possessing advantages over ether simply. That chloroform, even thus employed, or any other anæsthetic, may never or very seldom prove a "bad master", it must be properly administered, and we must be able to say, with some degree of certainty, what cases are unsuitable for its administration. To this end I think the attention of investigators should be chiefly directed.

ACUTE INVERSION OF THE UTERUS.

By THOMAS JOYCE, M.D., Rolvenden.

M. B., aged 27, a slim, delicate looking woman, was in labour with her third child. In each previous labour flooding to a dangerous extent had occurred. The present labour progressed naturally but slowly, and a dose of ergot was given. After the birth, I requested the nurse in attendance to tie the cord and remove the child whilst I devoted my