formed. After securing and cleansing the separated cuticle in physiologic saline solution, it was replaced upon the sterilized wound where it adhered well. That since that time he had obtained blister grafts with cantharides and had successfully applied them to small wounds.

Just when the idea first occurred to the author or how long he has been doing skin-grafting by this method, is not stated. In his preface he mentions a list of periodicals in which he says, that the substance of many of the notes have appeared. Among the number mentioned I can find no reference to skin-grafting with blisters, hence I conclude that the first publication of his experience is that which appears in his book just published, 1896. It will be observed that in all cases reported, grafts of large size were used. In that of Dr. Freeman, cantharides was applied of appropriate size and allowed to remain until the following morning, when it was transferred directly to a septic surface and under these conditions "took nicely."

In Dr. Overton's case grafts no less than one-half, probably three-fourths inch square, were applied. Six days later one was removed with dressings when another of same size was applied, and finally developed into a healthy covering, by February first, twenty-one days after first graft was applied and fifteen days after second.

My experience with large grafts was invariably attended with negative results. With careful attention to asepsis, little septic blebs would lift the grafts in places, so that in changing dressings, if not removed, little evidence of life could be seen. Very often they will become disintegrated and disappear in the secretions. If on the eighth or tenth day pus is not materially lessened in quantity, you may be pretty sure that your grafts are a failure. On the contrary, if the secretions are materially augmented, you may be satisfied that grafts have taken and are doing well. Grafts not larger than one-twelfth inch square when properly applied nearly always take nicely. On the tenth or twelfth day the grafted surface will be studded with numerous depressions surrounded with atrophied granulations and from this time their growth is surprisingly rapid. The epidermis raised with cantharides is less porous than that separated by the knife according to the Thiersch method. I am convinced that the method of applying dressings, permitting frequent examinations without disturbing proximal covering and the application of the aseptic mixture is followed with better results on granulating surfaces than the so-called dry dressings.

Various experiments have been made to ascertain the limit of vitality of grafts separated from the body. The longest period of which I can find any record is ninety-six hours.¹ In my first case, I successfully healed a granulating surface three and one-half inches in diameter with grafts which had been separated from the body forty-eight days. In the case reported by Dr. Freeman, the cantharides plaster was attached to the cuticle from twelve to fourteen hours, which demonstrates one important fact in connection with the cuticular epithelium and that is, that it will undergo any treatment short of total annihilation and yet, when returned to its natural environment, it will become revitalized and awakened into new life and activity.

¹ Georges Martin, *Encyclopedia of Surgery*, Vol. I, p. 543.

What are the advantages of this method as compared with those generally employed? 1. By the Thiersch method the operation by which material is obtained is exceedingly painful, so much so that in cases weakened by their injuries and especially in children, the surgeon has to seek kind and obliging friends of his patients in order to obtain the necessary grafts. Such friends, as a rule, are very scarce under these circumstances. 2. The technique requires the skilled operator to properly cut or shave off the grafts. There is also the danger of transmitting syphilis or other infectious diseases. The same objection would apply to the Reverdin method, though to a less degree, being less painful.

By the method which I have described, the advantages are: 1. The material for grafting can be obtained from the patient *per se*, without causing pain or discomfort, with the danger of transmitting syphilis or other diseases eliminated. 2. The technique is simple. A surgeon or general practitioner with a knowledge of antiseptics and ordinary surgical skill can successfully operate. 3. It is quite as potent in healing wounds of large size more rapidly and with results as perfect as by any method known, the skin produced being soft and pliable with no keloidal cords and in many places so natural that it can scarcely be distinguished from normal skin.

A SAFE METHOD BY WHICH ANESTHETICS MAY BE ADMINISTERED WITH OXYGEN.

Read in the Section on Surgery and Anatomy, at the Forty-seventh Annual Meeting of the American Medical Association at Atlanta, Georgia, May 5-8, 1896.

BY J. N. DEHART, M.D.

BROOKLYN, N. Y.

Since the discovery of the application of ether by Dr. Morton, of Boston, and its first use in the Massachusetts General Hospital by the late Dr. J. C. Warren as an anesthetic in 1846, there has been a great desire that some means should be devised by which all danger might be allayed, so that the patient could not be rendered cyanotic, especially when there was disease of the heart or kidneys that complicated the patient's condition. While ether has had the preference to chloroform in our country, yet in Europe the latter has been more universally used, and at the present day is also being adopted for anesthetic purposes in many private sanitariums, either alone or in the A. C. E. mixture.

Among the advantages derived from the use of chloroform are that it requires a much smaller amount to produce anesthesia, the patient becomes unconscious more rapidly and there is less bronchial irritation and excitability, there is a more prompt return to consciousness and hence less unpleasant effects afterward; all of which are worthy of consideration, and with care on the part of the person administering the anesthetic would tend to lessen the mortality in such cases where chloroform was used.

Since the early part of last year many surgeons in various cities of the United States have been devising means by which anesthetics could be given with oxygen gas during surgical operations. The most important factor in this mode of giving them was a properly constructed inhaler, by which the patient could breathe the anesthetic with oxygen gas and at the same time expire the carbonic acid gas; the latter would often cause cyanosis and also nausea when given in the usual way with a cone.

Having observed the giving of anesthetics with oxygen in a few cases during an extensive tour of the Northwest and South last spring and summer, and my attention having been called to the need of a properly constructed inhaler for this purpose, in December last at the request of several surgeons to whom I had related what I had already observed, and they having expressed a desire to give oxygen gas a fair trial with anesthetics, I visited several surgical instrument establishments and after carefully examining the various inhalers in them, I saw what seemed to me would make a practical one, and began devising designs for this purpose. I think that I have had constructed such an inhaler, which has been used in over one hundred cases in the various hospitals of Brooklyn, New York city, Boston and vicinity by myself, and I can safely say that it has been used since Jan. 1, 1896, over five hundred times by the surgeons of these hospitals, and also in the private hospitals and practice of many others.

The illustration which accompanies this paper shows the inhaler adjusted for immediate use. It consists of a nickel-plated mask with a rubber face guard and valve for expired air. This valve is made of two metal discs, between which is placed a rubber disc. These are enclosed in a nickel-plated box with

a movable cover and slot for expired air. This mask is connected with a graduated bottle with metal cap and two nickel-plated tubes. The long one contains two small brass nebulizing tubes, so that the anesthetic is carried over to the patient as a fine vapor. This bottle is connected with the cylinder containing the oxygen, which supplies the pressure and should be allowed to flow slowly into the bottle. Another mask made of vulcanized rubber with nickel-plated frame and nickel-plated box, containing a metal disc, secured by a movable pin, and underneath it having a rubber disc for expired air, is also made. This mask is connected with a larger graduated bottle and two hard-rubber tubes, the long one having two platinum points for nebulizing the anesthetics. This bottle is also connected with the cylinder containing the oxygen gas. A double air bulb can be used with either of the masks and bottles, when the oxygen gas gives out during a surgical operation, or if it can not be obtained in cases of emergency.

At the suggestion of a prominent surgeon I made a small box and attached it to the rubber mask and placed a sponge in it on which ether, chloroform or A. C. E. mixture can be dropped and rapid etherization produced in minor surgical operations and obstetric cases.

The advantages derived from using anesthetics with oxygen gas are:

1. That there is seldom or never any period of excitement during the early administration of the anesthetic.

2. There is no nausea nor vomiting nor cyanosis at any time while giving the anesthetic, either in the early stage or during the operation, except in cases where brandy may have been given for a stimulant either before or during the operation.

3. The patients are more readily restored to consciousness than when anesthetics are given alone and make a more rapid recovery.

4. A much smaller amount of the anesthetic is used, usually about one-third the quantity, and seldom more than three or three and one-half ounces of ether per hour and the same proportion of chloroform or A. C. E. mixture.

Through the courtesy of several surgeons in Boston, New York, Brooklyn, Albany and other suburban cities I am enabled to report a few of the more interesting cases where my inhaler was used with anesthetics combined with oxygen gas.

Case 1.—F., aged 40, Dr. Charles McBurney, Roosevelt Hospital; carcinoma of left breast. Ether with oxygen gas (dilute). Patient came under the anesthetic very slowly and was removed to the operating room in a few minutes after etherization was commenced. A small nodule about the size of a walnut was found just below the nipple in left breast, which had been developing for some months past, and recently had become quite painful on pressure and at times sharp pains radiated from it in different directions. Have no knowledge of any hereditary taint in any members of her family, either on father's or mother's side. This was dissected out and wound dressed antiseptically in thirty-five minutes. Two and a half ounces of ether was used and about ten gallons of oxygen (dilute). There was no nausea nor cyanosis during the entire operation, and patient recovered consciousness soon after leaving the operating room.

Case 2.—F., aged 35; Dr. G. R. Fowler, Brooklyn Hospital; carcinoma of right breast. No family history was obtained at the time of the operation nor afterward. Ether with oxygen (dilute) was given to the patient and she came under its influence in seven minutes without any nausea or cyanosis or excitement, passing from first to second stage and then to complete anesthesia. The entire breast was removed, as the carcinoma involved almost the whole glandular structure and would soon have broken down. There was very slight hemorrhage and but few vessels were ligated. Afterward the pectoral major muscle was also dissected off, as it was thought best to do so, lest the carcinoma had also affected a portion of it. The axillary glands were also removed. The wounds were then dressed antiseptically and catgut sutures were used to approximate the edges of the wound, and iodoform gauze and bandages were applied to the chest.

No nausea, no vomiting nor cyanosis during entire operation, which lasted one hour. Four ounces of ether and twenty gallons of oxygen (dilute) were used. Patient became conscious before leaving operating room.

Case 3.—F., aged 32; Dr. Picher-Seneg, Memorial Hospital, Brooklyn, N. Y., section of trifacial nerve. This patient has had a persistent neuralgia for a long time past and been under the care of several surgeons, who could not afford much relief by any medical treatment short of a surgical operation, which she finally consented to have performed. Had an exploratory operation a few days since, in which an incision was made through the integument covering cheek and eyelids, about two and one-half inches in length, and closed with adhesive straps until to-day, when it was opened and continued underneath the superior maxillary bone. Chloroform with oxygen (dilute) was given and patient yielded to its anesthetic effect in three and one-half minutes. No excitability, nausea nor vomiting or cyanosis during the entire operation, which lasted one hour and fifteen minutes and consumed one ounce chloroform and fifteen gallons oxygen.

Case 4.—M., aged 68, Hebrew; Dr. G. R. Fowler, Brooklyn Hospital; supra-pubic cystotomy. Chloroform with atmospheric air was given by means of a double air bulb, the supply of oxygen (dilute) which the hospital always keeps on hand, having been exhausted by two cases of asphyxia from illuminating gas which came in during the previous night. Patient came under the anesthetic effect of the chloroform very readily

in four minutes without any excitement, nausea or vomiting, and passed rapidly to an unconscious condition. An incision two and one-half inches long was made along the median line and above the pubic region. A careful dissection through the abdominal wall exposed the bladder to view, a sound having been previously introduced into the bladder and held by an assistant, an incision was made through the parietes of the bladder and a careful exploration made of its contents. An encephaloid was found and a mass that would fill a dessert spoon removed with a curette, after introducing it several times. The bladder was then carefully washed out with antiseptics and incised wound closed with sutures. There was very little hemorrhage during the operation. Iodoform gauze and bandages were applied and patient removed from operating table to his room, when consciousness was restored. There was no cyanosis nor vomiting during the operation, which occupied forty-five minutes, and three ounces of chloroform were consumed. The pulse, temperature and respiration were normal during the entire operation, a gum elastic catheter (large size) was passed through an incision made in the perineum and upward into the bladder and secured there for drainage.

Case 5.—M., aged 48; Dr. McDonald, Albany Hospital, N. Y.; ankylosis of left knee-joint with bad union of fracture. Was kicked by a horse some time since and had acute synovitis, followed by this deformity of the limb. A. C. E. mixture was given with oxygen. Patient came under its anesthetic influence in four minutes and passed from first to second stage without any excitement or nausea. Partial resection was made of upper end of tibia. Adhesions were loosened and bone broken over again as near former fracture as possible, so that there was good motion of the joint obtained, which would enable the patient on recovery to walk with only a slight limping gait. The limb was then flexed and dressed with plaster paris bandages and an angular wooden splint secured underneath the knee-joint. Pulse and respiration good through entire operation, which occupied one hour. Esmarch bandage was first applied to aid in controlling any hemorrhage, and it was very slight, during the operation only a few ligatures being required.

Case 6.—F., aged 24; Dr. A. Vandereed, Albany Hospital; necrosis of nearly two-thirds of right femur, with ankylosis and distortion of knee-joint. Ether with oxygen (pure) was given and patient yielded to its influence in five minutes, passing rapidly to an unconscious condition. Esmarch bandage was first applied to control hemorrhage, and amputation of limb was made at upper third of femur by a flap operation. After ligating blood vessels and washing the stump antiseptically it was found necessary to remove another inch of the femur, as it was found to be necrosed farther up than the external appearance of the limb would indicate. Pulse and respiration normal during the entire operation, which lasted fifty minutes. There was no nausea, vomiting nor cyanosis at any time. Glass drainage tube was inserted.

Case 7.—F., aged 40, weight 121 pounds; Dr. Kittredge, of Nashua, N. H., was the family physician. Dr. Irish, of Lowell, performed operation for resection of ribs on right side. Patient had an attack of pleuro-pneumonia, followed by effusion in the chest. The usual remedies had been tried but failed to absorb the fluid. The failing health of the patient, with symptoms of pyemia necessitated resection of ribs on right side in order to get good drainage. A. C. E. mixture with oxygen (dilute) was given and patient yielded rather slowly to its effects. There was no nausea or cyanosis and patient passed to an unconscious state in ten minutes, showing how non-susceptible some are to the anesthetics, no matter which are used. After removing a section of rib and enlarging the opening, there was a very abundant flow of very foul-smelling and flocculent fluid to the amount of twelve or fourteen ounces. A drainage tube was inserted after the cavity had been thoroughly washed with a solution of salt and water, and afterward with a weak solution of peroxid of hydrogen. Patient has improved, for the past week in good health, and there is continued flow of fluid through drainage tube, but does not have such a bad odor as formerly.

Case 8.—F., aged 35, laparotomy; Dr. Wm. M. Conant, Boston, Mass. This patient has had pain in right side and also in lumbar region of same side for some months past. There has been some swelling and tenderness on pressure recently in same locality. Has not made the usual quantity of urine for several weeks past and there has been partial suppression at times, which necessitated catheterization. A careful diagnosis led to the belief that the kidney was involved and also the right ovary. Ether was given alone at first and on my arrival the vomiting was so persistent and the operation had been interrupted so many times that I was requested to

give oxygen, which checked the vomiting in a very few moments. The operation was then resumed and was very soon terminated, without any more vomiting. An incision about three inches long was made through the abdominal wall and over the right ovary and a careful dissection revealed a cystic ovary, which was removed and ligaments secured with catgut sutures. A further exploration was made and the right kidney was found to be encysted throughout and nothing left of it but a mere shell. This was also removed and the arteries, etc., ligated. The hemorrhage was quite free and continued for some time from some small arteries, requiring a further ligation of some that appeared at first would not require it. The abdomen was then washed out antiseptically, and wound closed with catgut sutures. Iodoform gauze, adhesive plaster and bandages were applied and patient was removed to her room. Oxygen was also used to resuscitate this patient after the operation. She made a good recovery and had no vomiting during her convalescence, nor other unfavorable symptoms.

DISCUSSION.

DR. MCHATTON, Macon, Ga.—I think this question of anesthesia is a very important one and there are many different methods of administering them. Anesthesia is always dangerous and I prefer to use either chloroform or ether alone, as when we mix the two, new dangers arise which we can not ascribe to either one. I am rather afraid of the A. C. E. mixture.

DR. HAINES, Cincinnati—I think the point is well taken by the last speaker and I believe it is the general opinion, *i. e.*, that one or the other should be employed by itself. Personally I prefer chloroform. I have seen chloroform administered by midwives, nurses and husbands, and I consider this a practice to be deprecated. When we consider the few deaths as compared with the large number of cases anesthetized daily, I can not but think chloroform is the safest if you can get it pure.

The Secretary, Dr. W. L. ESTES—Anything that will add to the safety and to the relief of the burden on the surgeon should be welcomed by the whole profession. The author desires to change the title of his paper, and as he now calls it a safe method it makes it very suggestive. If it is a safe method, it is a great boon. We have often heard of safe methods; for example, anesthesia by direction and the employment of various inhalers. We have begun to question the value of any one appliance or remedy for the administration of the anesthetics. It seems to me that it is the administrator that is the actual actor in the giving which is the safeguard. I think the manner employed in America generally in the giving of anesthetics is to be deprecated, as in most hospitals it is the custom for the general assistant to give it. We all know that if one act in the operation is of importance and requires skill it is the giving of the anesthetic. In England professionals are employed to do this work and nothing else; even there, almost every week we hear of deaths, and if this is true under such circumstances, there must be something in the agent we use which is dangerous. If the reader has introduced something which is absolutely safe, if it be true that oxygen renders it safe, he has, indeed, conferred a boon. One thing that increases this danger is the inhaler, and the one which admits of the greatest quantity of fresh air, I should think, would be the one to use. If the author can prove his theory, it is something which will redound to his credit and others who have suggested it. If he can give us something practicable which can be carried around to every case, it is, indeed, a step in advance. The idiosyncrasies and diseases of the patient should be considered first, and secondly the skill and experience of the operator.

DR. HALL, Milwaukee—There are indications for the use of chloroform and vice versa that are unmistakable and which manifest themselves throughout the time of the action of the anesthetic. I would suggest that a thorough examination before the anesthetic be given would indicate which anesthetic is best and when, if at all, it is advisable to change it. Ether in this country has a reputation for being a very safe anesthetic, and in other places chloroform is so generally used that in the ordinary shop and drug stores ether can not be obtained. This shows narrow-mindedness on the part of the profession. I would say that ether is far more dangerous than chloroform. In the one instance death occurs immediately, while in the other it may take place long after the patient has apparently recovered. The mixture of the natural atmosphere, of course, is a very prominent factor in the safety of the administration. I would like to raise the point that in giving chloroform it is not well to give too much oxygen. The one who has charge of this anesthetic should bring the

patient well under, until a condition between the second and third stage is reached, and hold him there. In that condition it is far less dangerous and there is much less danger of spasmodic contraction of the muscles.

DR. J. McFADDEN GASTON, Atlanta.—I have had a somewhat peculiar experience in connection with anesthesia. Recently in preparing for laparotomy, I observed in my bag a vial, presumably containing 25 per cent. solution of the A.C.E. mixture, which turned out to be carbolic acid and alcohol. The person giving the anesthetic experienced considerable difficulty until it was found where the mistake was. The hands became swollen and the lips were considerably burned. I expected my patient would suffer some inconvenience as the result of this mistake, but she did not. A preparation that I have employed for fifteen years, and which I have found free from danger, is alcohol one part, chloroform two parts, and ether three parts. My anesthetic in former years was chloroform. In speaking of oxygen, if you observe the blood when under the influence of chloroform, the arterial blood will be found of the color of the venous blood. I only know of one instance in which my mixture was fatal and this was in the case of a child who insisted on its being administered every day for a month when changing a dressing. In undertaking to operate in a case of ulceration of the bowel, in which there was marked contraction of the sphincter, I desired to dilate. How far the condition may have been aggravated I do not know, but in the midst of the dilation, there was very difficult breathing and suddenly the patient succumbed. This is the first case of fatal result that I have ever witnessed and I consider it a very serious experience. Some of you may have noticed, the other day, that one of our leading surgeons in Tennessee was arraigned before the court for malpractice for the death of a patient during the administration of an anesthetic, but the court said there was no ground for action. I am not quite sure where we should stand in giving out death certificates in these cases and I should be much puzzled.

DR. J. N. DEHART (closing the discussion).—Many cases of the use of my method have been reported and it is now being employed in over fifty hospitals. It was recently used in a case reported in New York, in which the patient recovered one hour sooner than usual. I have employed chloroform in cases of heart trouble and the patient has been under the influence two and a half hours. The pulse was 114 to 120 for six weeks and at the end of the first hour the pulse had risen to 160. I used oxygen for five minutes and the pulse came down to 145. I gave one-sixtieth of a grain of strychnia and resumed the anesthetic. At the end of one and a half hours the pulse was again 160. I gave oxygen again for ten minutes and it came down to 145. It subsequently rose again to 168. The woman lived for six days and subsequently died of peritonitis, although it was declared at the time of the operation that she could not live through it.

SOME GENERAL CONSIDERATIONS IN RELATION TO THE NATURE AND TREATMENT OF DISEASE.

Read in the Section on Practice of Medicine, at the Forty-seventh Annual Meeting of the American Medical Association, at Atlanta, Ga., May 5-8, 1896.

BY LOUIS BALMAT BAKER, M.D.

ERIE, PA.

"Flower in the crannied wall,
I pluck you out of the crannies;
Hold you here, root and all, in my hand,
Little flower—but if I could understand
What you are, root and all, and all in all,
I should know what God and man is."

How profoundly true this is! Given one fact and you have the key to the universe, a formula that can solve all problems, a talisman that will open all the arcana of nature. Be faithful to your one fact and it becomes an unailing test for truth, for nothing that contradicts it, can be true. An isolated fact is an impossibility. Conditions that are unvarying and know no shadow of turning, relate your one fact to all the other facts in nature. And these laws and relations are constant; the same yesterday, to-day and forever. To believe that nature is fickle and capricious, doing a certain thing under definite conditions, one way to-day and another way to-morrow, is to be

left utterly without a guide. There remains nothing on which to depend. It is to be given over to "permanent intellectual confusion." Much of the false reasoning in philosophy and theology, as well as in science, has arisen from infidelity to this great principle, this sure and firm foundation of all correct deduction. The law of gravitation is no more sure and constant, than the laws that rule in the mineral and organic worlds. The crystal forms along definite lines of cleavage, always in the same way under the same conditions; the seed germinates and bursts into bloom and beauty; the bird soars and sings:—all in strict accord with the laws that rule their life and growth. That the gem sparkles, the flower blooms and the bird sings, means simply that they have obeyed the laws of their being.

Let us take the flower, "root and all, and all in all," and see if it will tell its secret. What are the conditions, in obedience to which it has reached its full perfection? First the seed, with its marvelous potentialities, is placed in the soil. It absorbs moisture, swells, bursts its tiny envelope, sends forth its delicate roots in search of food, and presently shoots the green stem above the surface; it unfolds its leaves to the sun, bathes in its warmth, drinks of the rain and the dew, fashions the tender bud and finally shows its full perfection in the beautiful flower.

The conditions that have to do with the proper development of the plant, are mainly six: Light, air, moisture, warmth, suitable soil and protection from parasites.

Light.—Witness the pale and sickly sprout in the dark cellar; the marvelous chemistry of the sunbeam is essential to life.

Air.—Place a plant under a glass receiver, exhaust the air, and it speedily dies. A vacuum would be no less fatal to animal life.

Moisture.—Instance, the Sahara.

Warmth.—The Arctics are as bare of vegetation as the desert.

Suitable Soil.—The food supply; this is of vital importance.

Protection from Parasites.—If a blight attacks the crops or work havoc among the fruit trees, the intelligent farmer no longer attributes it to a mysterious dispensation of Providence. He attacks the invading army of parasites with fire and poison and drives it from the field. Patient investigation, chemic analysis of the plant and of the soil, repeated and faithful observations and experiments, have made agriculture something of a science.

Given a sickly, stunted, imperfect plant, and we know at once that some of the conditions vital to its growth have been violated. The wise gardener seeks to know what condition has been violated; his treatment consists in the correction of the violated condition, and it is simple and rational, the logical sequence of cause and effect. In a word, the scientific method is applied to the study of the nature, structure and conditions of growth of the normal and healthy plant and the treatment of the abnormal bears a strict and definite relation to what has been learned of the normal.

A plea is made for the application of the same method in the domain of medicine. The subject is vastly more complex and difficult, but the principle is the same.

Given a weak, diseased and imperfect man. How is it with us? What is our thought of his condition,