

The physiological method of inducing respiration in cases of drowning, stillbirth, suffocation from chloroform, etc. etc / by Henry R. Silvester.

Contributors

Silvester, Henry R. 1828-1908.

Publication/Creation

London : J. Churchill, 1862.

Persistent URL

<https://wellcomecollection.org/works/ysaysyzv>

License and attribution

This work has been identified as being free of known restrictions under copyright law, including all related and neighbouring rights and is being made available under the Creative Commons, Public Domain Mark.

You can copy, modify, distribute and perform the work, even for commercial purposes, without asking permission.

**wellcome
collection**

Wellcome Collection
183 Euston Road
London NW1 2BE UK
T +44 (0)20 7611 8722
E library@wellcomecollection.org
<https://wellcomecollection.org>

THE
PHYSIOLOGICAL METHOD
OF
INDUCING RESPIRATION
IN CASES OF
DROWNING, STILL-BIRTH,
SUFFOCATION FROM CHLOROFORM,
ETC., ETC.

BY
HENRY R. SILVESTER, B.A., M.D., LOND.,
CLAPHAM COMMON, S.;

ASSOCIATE OF KING'S COLLEGE, LONDON; AND FORMERLY SCHOLAR IN
HUMAN AND COMPARATIVE ANATOMY IN THE ROYAL COLLEGE
OF SURGEONS OF ENGLAND.

Second Edition.

LONDON:
JOHN CHURCHILL, NEW BURLINGTON STREET.

M.DCCC.LXII.

“Death may usurp on Nature many hours,
And yet the fire of life kindle again
The overpressed spirits. I have heard
Of an Egyptian had nine hours lien dead,
By good appliance was recovered.”

SHAKESPEARE, *Pericles*, act iii.

“Lateat scintillula forsan.”

A NEW METHOD OF RESTORING RESPIRATION TO PERSONS APPARENTLY DEAD FROM SUSPENDED BREATHING.

IN the following paper, I purpose to describe a new method of treating apnœa, or suspended respiration, by inducing such movements of the thoracic parietes through the muscles of respiration, as shall cause the atmospheric air we breathe to be drawn into and again expelled from the lungs of the asphyxiated person—and without having recourse to the employment of any mechanical apparatus. The process is of universal application; it is easy of performance, entirely in harmony with that of Nature, and does not prevent or interfere with the use of those means in which much confidence has hitherto been placed; such, for instance, as the use of the warm bath and other plans of restoring warmth and circulation.

The subject is one of deep practical and physiological importance, and is of direct personal interest to every individual, since no one can claim for himself or his family security from the dangers against which this method proposes a remedy.

Apnœa, or suspended respiration, may be the result of drowning, of still birth, of epilepsy, of apoplexy, of the undue or excessive employment of opium, of chloroform, of certain gases, etc.

The methods usually resorted to for restoring patients affected by suspended respiration may be grouped under three divisions. The first division includes various plans for exciting the reflex function of the nervous system. The second provides for the maintenance of warmth and circulation. The third proposes means for supplying air to the lungs, either by mechanically forcing air into the

chest, or by inducing such movements in the thoracic parietes, as shall induce fresh air to enter into the pectoral cavity alternately with the expulsion of the products of respiration.

It is with the third division that we are especially concerned.

With regard, however, to the second division—the treatment by *warmth and friction* only—I may be allowed to make a few passing observations. There is much difference of opinion, but it must be said that experience is greatly in its favour; greater numbers having been restored by it than by any other means. It is to be kept in mind that persons are usually submerged in cold water, and the chief point aimed at is the maintenance of the natural temperature of the body, so that pulsation may be increased, and thus respiration encouraged with more hope of success. Hence the Royal Humane Society, in its printed rules, particularly recommended it as a restorative in cases of the apparently drowned, and of the apparently dead, from intense cold, or from hanging. “In one of the most remarkable cases of resuscitation on record, the individual had been fourteen minutes under water, and no signs of returning animation were evinced until the treatment, which consisted simply in the application of warmth and constant friction, had been persisted in for eight hours and a half from the time of the accident.” (Taylor, *Med. Jurisp.*)

Edwards, Brown-Séguard, Dr. Marshall Hall, and others have experimented on animals. But the results of experiments on animals are unsatisfactory, and would not, probably, be applicable to man. “The practical conclusion at which Dr. Hall arrived was, that, in the treatment of apnœa, the continuous warm bath must be excluded. This inference is, we think, scarcely warranted by the facts. In the experiments he made, animals were completely submerged, so that there was no escape for the products of respiration; whereas, in the use of the warm bath, there would not be this obstacle.” (*British and Foreign Med.-Chir. Review*, 1858.) “The duration of life in asphyxia seems to be proportionate, not to the warmth, but to the maintenance of a medium temperature of the patient or of the animal made the subject of experiment. The restoration of warmth can

only be safely effected when the respiratory movements are maintained, and the circulation is promoted. The warm bath, used *alone*, appears to have been often fatal." (*Lancet*, December 1856.)

Dr. Edward Smith states that the hot water bath might act injuriously by the increased pressure on the chest, and also by the position not being a favourable one for respiration. Dr. Markham has suggested that possibly the warm water bath might do harm by preventing the access of air to the skin, and thus assist the state of asphyxia.

I think we may, notwithstanding, conclude that the warm bath may be considered as an *auxiliary* means, and that much dependence is to be placed on both friction and warmth, and that nothing should be allowed to interfere with the application of those means by which warmth is restored to the skin. "It ought certainly to be borne in mind, that the practice of the Royal Humane Society, whose rules, Dr. M. Hall states, 'may be summed up in one word—warmth!' has been eminently successful." (Vide *British and Foreign Medical-Chirurgical Review*, April 1858.) The impossibility of using the warm water bath during the adoption of the postural method of Dr. Marshall Hall is universally admitted.

In the apnœa of still born infants, momentary immersion in baths of from 50° to 60°, and 98° to 100°, alternately and quickly, might be tried, as recommended by Dr. Hall.

Hot air increases respiration, a person respire more frequently in hot air than in cold. It also increases pulsation.

Cold also increases respiration, but acting only as shock it does not increase pulsation.

Accordingly I would suggest the employment of a *hot air bath* where practicable in cases of suspended animation as a general stimulant to both the respiration and circulation, with the occasional application of cold to act on the principle of shock, and so accelerate any respiratory efforts.

The air would have free access to the skin, and the position of the body might be such as was thought desirable.

We now come to the third division of our subject. The introduction of air into the chest.

1. By the use of instruments.

2. By taking advantage of certain movements of the walls of the chest.

1st. *The mechanical introduction of air* into the chest by means of the bellows, by Dr. Sibson's or some other apparatus, appears, theoretically speaking, to be strongly indicated; but the obvious objection is, that the instruments are not commonly at hand, and whatever is done on these occasions must be done quickly. A similar remark may be applied to the employment of electricity and electro-magnetism, and the introduction of certain gases, oxygen, ammonia, etc. Mr. Mare states, that "more good is done by drawing air out of the lungs than by artificially inflating these organs."

2nd. Under this division we come to the examination of some of the various ways of introducing air by imitating inspiration and expiration, employing with that view certain *movements of the thoracic parietes*. We will group them under three heads:—

I. Alternate compression and relaxation of the walls of the chest.

II. The postural method of Dr. Marshall Hall.

III. The method which I beg to introduce to your notice.

I.

Alternate compression and relaxation of the chest.

This is the essential part of the various plans formerly employed. On compression, the walls of the chest descend below their accustomed level, the capacity of the lungs is diminished, and air is expelled. Upon the removal of the pressure or relaxation of the chest, the ribs rise again to their usual and ordinary height, and air is again introduced. There is no elevation of the ribs, such as takes place in natural deep inspiration, in which they are made to rise above their ordinary or quiescent level, and the cavity of the chest greatly increased in size.

These methods have been made the subject of experiment. The apparatus employed was very simple, and consisted of three tubes, one of glass, to be passed into the trachea; another, a bent barometer tube, graduated; and these two connected by a piece of India rubber tubing. The glass tube was passed through an aperture made in the trachea, and firmly secured in its

place by a ligature. A small quantity of coloured spirit was poured into the barometer-tube, which was in the form of an inverted syphon, and was retained in an upright position, on a level surface, by an assistant who

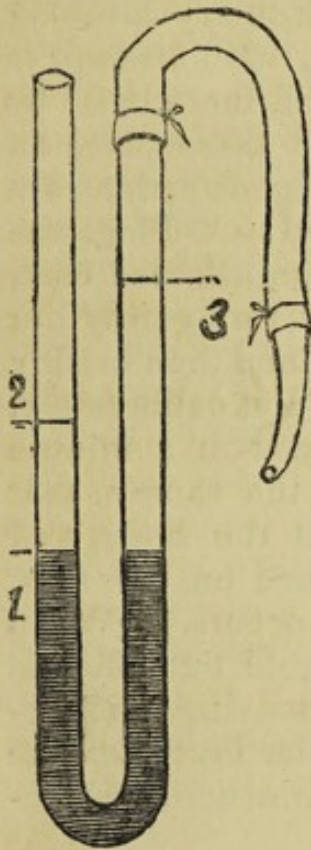


Fig. 1.—1. Natural level of fluid. 2. Height to which fluid rose by pressure on the chest. 3. Point to which the fluid receded in the first leg of the instrument by the drawing of air into the lungs when the chest was expanded by my method.

carefully noted the height of the column of fluid. Trials were made on persons of both sexes and of different ages, and at a length of time after death which varied from one hour and a half to two days, in those with lungs sound or otherwise. *But practical deductions have been drawn from those cases only in which the results were obtained when the body was warm, and when two hours had not elapsed after death.* This is very important, *rigor mortis* preventing trustworthy conclusions. *The chest also should be free from disease.* The subject of experiment was placed in various positions; and, compression of the chest being made, the fluid contained in the inverted syphon, connected with the lungs by the flexible tube, immediately rose; and, when the compression ceased, the fluid fell slowly to its previous level, demonstrating—

1st. That air had been expelled from the lungs in consequence of the pressure exerted on the parietes of the thorax.

2ndly. That the air returned into the chest, though slowly, upon relaxation

of the pressure, in consequence of the feeble elasticity of the chest.

3rdly. That the actual capacity of the chest was not increased by this mode of practice.

II.

Postural Method of Dr. Marshall Hall.

The principle involved in this method of treatment is precisely the same as in the foregoing plan, in which simple compression and relaxation of the chest are employed to induce expiration and inspiration; the difference

being that, in the postural method, the compression of the thorax is occasioned by the weight of the body of the patient resting on the chest during the prone position, followed by the removal of the pressure, and consequent return of the thoracic parietes to their ordinary level on the patient's assuming the supine posture. No attempt is made to enlarge the actual capacity of the chest by inducing an elevation of the ribs, such as takes place on making a deep inspiration. The following directions are given for performing the postural method:—"Place the patient on his face, supporting the chest on a folded coat, or other article of dress. Turn the body very gently but completely on the side, and a little beyond, and then briskly on the face, alternately repeating these measures deliberately, efficiently, and perseveringly, fifteen times in a minute only. (When the patient reposes on the thorax, that cavity is compressed by the weight of the body, and expiration takes place; when he is turned on the side, this pressure is removed, and inspiration occurs.) When the prone position is resumed, make equable but efficient pressure with friction along the back, removing it immediately before rotation on the side. (The first measure augments the expiration; the second commences inspiration.)

Numerous experiments have been made on the dead body in order to test the influence the postural method has upon respiration. The following results were obtained by the aid of the apparatus mentioned above, namely, a glass barometer tube bent in the form of an inverted syphon graduated, and containing a little coloured spirit, made to communicate with the trachea by means of a long flexible tube, the joints well secured by ligature.

First: The subject of experiment being placed in the prone position, equable but efficient pressure with friction was made along the back, as recommended by Dr. Marshall Hall, in his rules for restoring persons apparently dead from apnœa. The fluid rose in the bent tube, proving that the compression exercised on the thorax by the weight of the body, etc., did displace some air from the lungs.

Secondly: On turning the body on the side and a little beyond, the column of fluid fell slowly to its former level, proving that the air returned into the chest, though slowly,

upon the removal of the pressure, in consequence of the return of the parietes of the chest, by their feeble elastic force, to their natural level.

Thirdly: It was proved, by the fluid in the bent tube not descending below its level, that the actual capacity of the chest is not enlarged. It must be remembered that it is only the "residual air," or that which remains in the chest after an expiration, which is operated upon in the postural method.

Fourthly: From the results of the experiments on simple compression exactly corresponding with the results of the experiments on the postural method, we may infer that these two methods of treatment are identical in principle.

The Postural or Ready method of Dr. Marshall Hall has been found open to some objections; for instance:—

1. Expiration is made to precede inspiration, whereas originally expiration is second in order, and not the primary act. In still-born infants, whose lungs have never been inflated, forced expiration, at first, is of course impossible.

2. The expansion of the thorax, or inspiration, being dependent on little more than the elasticity of the tissues, takes place feebly, inefficiently, and slowly, and therefore calls for more active mechanical aid.

3. It is scarcely possible to use the warm bath during the adoption of the postural method.

4. The patient is liable to have the mouth and nose compressed, the face bruised, or the neck twisted by the almost lifeless body being turned alternately on the chest and back fifteen times a minute for some hours. Moreover, to the operator this process is very arduous.

5. When the patient is turned on the face and pressure made on the back (pronated) the contents of the stomach are liable to pass into the œsophagus and windpipe.

6. When the patient is turned "completely on the side and a little beyond" (supinated), the tongue is apt to obstruct inspiration by falling back into the throat, with the epiglottis resting against the back of the pharynx.

7. Both sides of the chest are not equally inflated, one side only being called into action at the same time to any important extent.

8. This process is not entirely in harmony with that of nature. It is not the way in which we generally breathe.

9. The amount of air respired is exceedingly small; this is, doubtless, in consequence of the actual capacity of the chest not being increased.

As to the state of the tongue, I observe that, in cases of asphyxia the tongue is usually swollen, and falls back into the throat, the epiglottis resting against the back of the pharynx, so as to act as a plug to the pharynx, and a sort of valvular covering to the otherwise patulous orifice of the larynx. In the postural method, when the body is turned on the face, no doubt the tongue falls forwards and draws with it the epiglottis, and leaves the glottis open. This, however, is of little consequence so far as respiration is concerned, for the very compression of the chest by the weight of the body itself forces out the air from the lungs, and so lifts up the valvular covering of the larynx, so that in fact the tongue does not offer any serious obstacle to *expiration* when it is induced by compression of the thorax.

Moreover, in the postural method, the moment the patient is rolled "on the side and a little beyond," in order that *inspiration* may take place, the tongue is liable to fall back into the throat, and its semi-lifeless relaxed tissue to cover securely the orifice of the glottis, and its accurate closure is probably further insured by the suction generated by the return of the thoracic parietes to their natural level, so that the greater the previous compression of the chest, the more firmly is the tongue drawn down as a plug into the throat, when the pressure is relaxed, and the more effectually does it prevent the entrance of air into the lungs.

With reference to the amount of air respired in the Marshall Hall method, Mr. Wildbore states in a letter to the *Medical Times and Gazette*, Nov. 28th, 1858: "I believe that I am correct in saying that the experiments performed by Mr. Hunter and other gentlemen at St. George's Hospital on the dead subject, proved that nearly as much air entered the lungs as would be inhaled in an ordinary inspiration in a state of health;" that is, from six to thirty cubit inches.

I think there must be some fallacy here. The method of performing the experiments just mentioned is by no means satisfactory, and is, I believe, open to obvious objections.

The tube of the pnaemometer was passed into one of the nostrils of the patient, the other nostril and lips being closed with adhesive plaster. The want of rigidity of the cheeks and the amount of air in the respiratory tract, and even in the stomach, etc., of the patient could scarcely fail to render the indications of the instrument, however perfect in itself, liable to suspicion, if not entirely valueless, in point of scientific accuracy.

In the Marshall Hall method, the amount of air displaced from the chest and returning there is exceedingly small, being according to my experiments a fraction of one cubit inch.

III.

Dr. Henry Silvester's, or the Physiological Method of Inducing Respiration.

The *new method* which I venture to bring before the profession is an imitation of natural deep respiration, and is effected by means of the same muscles as are employed by nature in that process. In ordinary deep inspiration we lift the ribs and sternum by the pectoral and other muscles which pass between the chest and the shoulders, and thus produce the threatened vacuum which inflates the lungs. In my method we lift the ribs and sternum by the pectoral and other muscles, which pass from the shoulders to the parietes of the thorax, by steadily extending the arms of the patient up by the side of his head: by elevating the ribs the cavity of the chest is enlarged, a tendency to a vacuum is produced, and a rush of air immediately takes place into the lungs. Expiration is brought about by simple compression of the sides of the chest by the patient's arms.

The Principle. Forced enlargement of the capacity of the chest, producing a tendency to a vacuum, and consequently an inspiration of air into the lungs, induced by the constrained action of the muscles of ordinary and extraordinary inspiration upon the moveable walls of the thorax.

Diminution of the capacity of the chest and expulsion of the air from the lungs, and consequently an expiration, induced by compression of the moveable walls of the thorax.

The arms of the patient are to be used by the operator as handles to open and close the chest.

This new method has been tested by experiment on the

dead body by the same apparatus, the elastic tube being securely fastened into the trachea, in order to avoid the sources of fallacy mentioned above.

The body was placed on its back, supported and a little raised by a small pillow placed under the shoulders. The

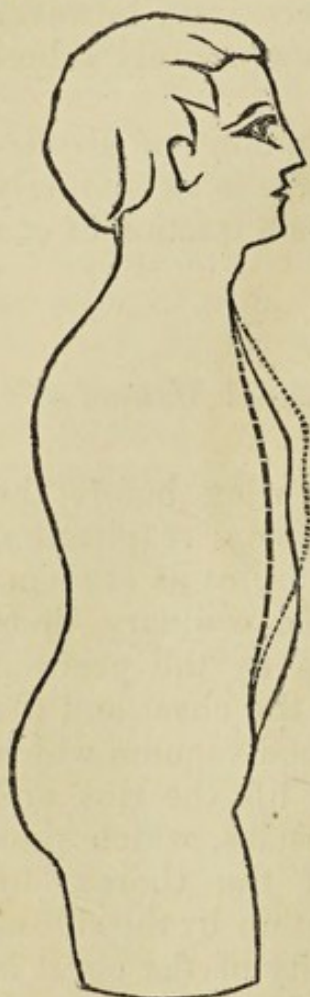


Fig. 2.—Continuous line represents the ordinary state of the chest. Broken line represents the depression of the chest under pressure. Dotted line represents the enlargement of the chest, produced by the *forced action* of the muscles of inspiration. The space between the continuous line and the broken line indicates the extent of respiratory movements in the postural method. The space between the dotted line and the broken line indicates the extent of respiratory movements in my method.

height of the column of fluid having been first carefully noted, the arms of the subject were raised, and then steadily extended upwards by the sides of the head, so as to draw up the shoulders and put the pectorals on the stretch, elevate the ribs, and consequently enlarge the cavity of the chest. The result was that the fluid in the bent tube rapidly fell, and so considerably as to recede high up in the leg of the instrument nearest the body, that is to say, the tendency to a vacuum produced in the chest drew the air into the lungs.

The shoulders and arms were next pressed down upon the sides of the chest, and immediately the fluid rose as much above its usual level in the further leg of the apparatus as it did in the foregoing experiments; demonstrating:

1stly. That the actual capacity of the chest was increased, and air drawn into the lungs by the constrained action of the muscles of respiration upon the moveable walls of the thorax.

2ndly. That expiration was produced by pressing the arms and shoulders down upon the sides of the chest.

3rdly. That the distinguishing feature of my method is the actual enlargement of the cavity of the chest—the elevation of the ribs above

their ordinary or natural level.

It is, of course, of consequence to get as much air into the lungs as possible, because there can be but little doubt that fresh air is the proper stimulant to the respira-

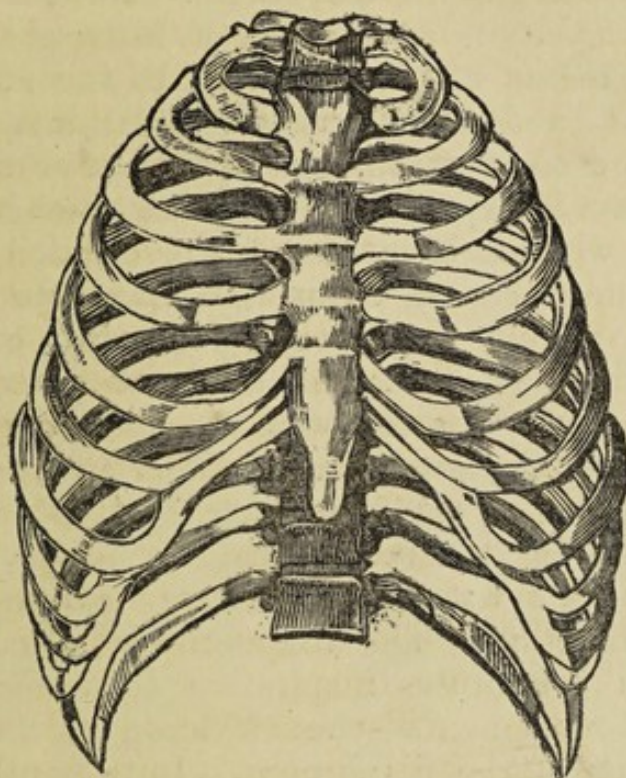


Fig. 3. Front view of the Bones of the Thorax.

tory efforts, just in the same way that light is to the eye and sound to the ear, but acting more entirely by reflex action. The quantity of air respired, according to my experiments on the dead body, appears to be about ten times greater in my method than in the postural method of Dr. M. Hall, and would be amply sufficient to supply fresh air to the lung of an asphyxiated person.

Before laying down practical rules for the treatment of apnœa, we may consider shortly the mechanism of respiration in man.

THE MECHANISM OF RESPIRATION IN MAN.

The general principle of the operation is this:—The lungs are divided into cavities of extreme minuteness; and these cavities or air-cells are all connected with the trachea by means of the bronchial tubes. The lungs themselves are suspended in a cavity that is completely closed, being

bounded above and around by the bony framework of the thorax, the interspaces of which are filled up by muscles and membranes, and being entirely cut off from the abdomen below by the diaphragm. Under ordinary circumstances, the lungs completely fill the cavity. But the capacity of the thoracic cavity is susceptible of being greatly altered by the movements of the ribs, and by the action of the diaphragm and abdominal muscles. When it is diminished, the lungs are compressed, and a portion of the air contained in them is expelled through the trachea. On the other hand, when it is increased, the elasticity of the air within the lungs causes them immediately to dilate so as to fill the vacuum that would otherwise exist in the thoracic cavity, and a rush of air takes place down the air-tubes and into the remotest air-cells, to equalise the density of the air they include (which has been rarified by the dilatation of the containing cavities) with that of the surrounding atmosphere. The lungs themselves appear to be almost entirely passive instruments of the respiratory function. The dilatation of the cavity of the chest, which constitutes inspiration, is accomplished by two sets of movements—the elevation of the ribs, and the depression of the diaphragm. In tranquil breathing, the contraction of the diaphragm is alone nearly sufficient to produce the necessary enlargement of the thoracic cavity, the position of the ribs being very little altered. In the act of deep inspiration, the ribs (whose ordinary direction is forwards, sloping downwards), under the influence of their elevator muscles, namely, the pectoralis muscles, major and minor, the serratus magnus, the scalmi muscles, and the intercostals, pass from the sloping to the horizontal position. By this change, the dimensions of the chest are enlarged in the transverse as well as in the antero-posterior direction, for the middle curved portions of the ribs are carried outwards, and therefore brought further apart from each other, and their sternal extremities are moved forwards, accompanied by the sternum, the distance of which from the dorsal vertebræ is thereby increased. When the respiratory movement is very forcibly performed, the scapula is itself drawn upwards, thus producing an increased elevation of the ribs and an unusual enlargement of the upper part of the thoracic cavity. When deep expiratory action is to be

performed, the ribs descend by the action of the muscles of the spine and the abdomen, the diaphragm being altogether passive. In this manner, by the regularly alternating dilatation and contraction of the thoracic cavity, the air within the lungs is alternately increased and diminished in amount, and thus a regular exchange is secured. The number of the respiratory movements (that is, of the acts of inspiration and expiration taken together) may be estimated at from fourteen to eighteen per minute. (Carpenter's *Physiology*.)

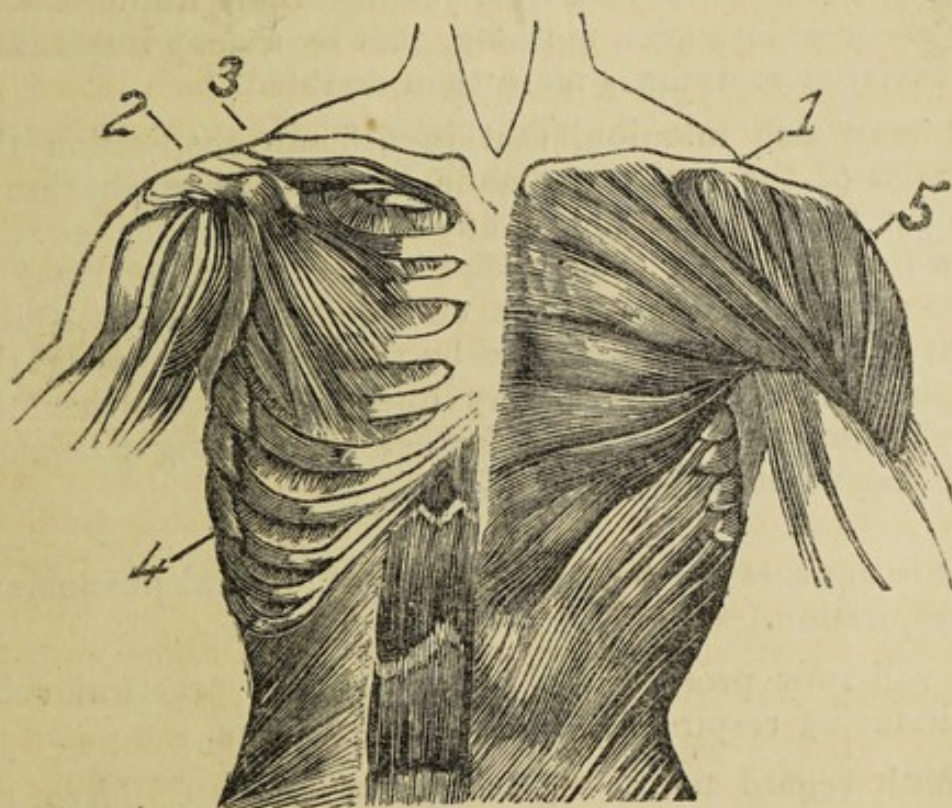


Fig. 4. Diagram of the Muscles in Front of the Chest.

1. The *pectoralis major* arising from the clavicle and from the cartilages of the true ribs, and converging towards the tendon of insertion into the bicipital groove of the humerus.
2. The *pectoralis minor*, arising from the third, fourth, and fifth ribs, near their cartilages, and converging to a tendon, which is inserted into the coracoid process of the scapula.
3. The *subclavius muscle*, which arises from the first rib, and is inserted into the costal aspect of the clavicle for nearly half its length.
4. The *serratus magnus*, placed upon the upper and lateral parts of the thorax, arising from the eight upper ribs, and inserted into the scapula.
5. The *deltoid*, which arises from the external third of the clavicle and from the spine of the scapula, and is inserted into a prominence on the middle of the outer side of the humerus.

All these muscles are put on the stretch, and tend to raise the ribs, when the arms are extended upwards by the side of the head, as described in my method.

I may also remark that, from the peculiar mode in which the ribs are articulated with the spinal column at one extremity, and from the angle which they make with the cartilages that connect them to the sternum at the other, the act of elevation tends to bring the ribs and their cartilages more into a straight line, and to carry the former to a greater distance from the median plane of the body, whilst the sternum is also thrown forwards. Consequently the elevation of the ribs increases the capacity of the thorax, upwards, forwards, and laterally. Although the range of motion between each vertebra and the ribs attached to it is very limited, yet the whole framework of the chest enjoys such mobility, that by a deep inspiration its cavity is sometimes more than doubled.

I may also mention, that in difficult respiration the muscles of the limbs are made to assist in respiration—the patient seizing hold of any fixed object for the sake of a firm point for the muscles to act from; and that in deep respiration the greatest enlargement of the thoracic cavity in both sexes is made by the ribs, and not by the diaphragm. It appears very questionable whether the diaphragm is affected any further than being flattened, and that without descending.

It is unnecessary to enter upon the chemical phenomena of respiration.

I will now proceed to lay down a few practical rules for inducing respiration in cases of asphyxia.

With regard to the *Apnœa of Still-Born Children*, respiration may generally be excited by dashing cold water on the face and body, by blowing in the face, or by a slap with the flat of the hand on the nates.

Should these measures fail, the following rules for inducing respiration should be put in practice.

In cases of *Narcotic Poisoning*, artificial respiration may by these rules be kept up for any length of time, or until the poisonous matter is eliminated.



Fig. 5.—Diagram to illustrate the manner of performing my method. The asphyxiated patient is supposed to be in the act of drawing a deep inspiration. The ribs being elevated by the operator, who is stretching upwards the patient's arms.

The following Rules for the treatment of apnœa are deduced from actual experiment, and are in accordance with established physiological principles.

DR. HENRY SILVESTER'S RULES FOR RESTORING SUSPENDED ANIMATION.

RULE I.

To adjust the Patient's Position.

Place the patient on his back, with the shoulders raised and supported on a folded article of dress, and secure the feet.

RULE II.

To Maintain a Free Entrance of Air into the Windpipe.

Wipe the mouth and nostrils. Draw forward the patient's tongue, and keep it projecting beyond the lips. If the lower jaw be gently raised, the teeth may be made to hold the tongue in the required position. Should it be found necessary, the tongue may be retained in that position by passing a handkerchief under the chin and fastening it over the head.

RULE III.

To Imitate the Movements of deep Respiration.

Raise the patient's arms upwards by the sides of his head, and then keep them stretched steadily but gently upwards and forwards for a few moments. (This action enlarges the capacity of the chest by drawing up the ribs, and induces *inspiration*.)

Next, turn down the patient's arms and press them gently and firmly for a few moments against the sides of the chest. (This action diminishes the cavity of the thorax, by pressing down the ribs, and produces a forcible *expiration*.)

Repeat these measures alternately, deliberately, and perseveringly fifteen times in a minute.

RULE IV.

To Induce Circulation and Warmth, and to Excite Inspiration.

Rub the limbs from the extremities towards the heart.

Replace wet clothing by warm and dry covering. Occasionally dash cold water in the patient's face. These measures are perfectly compatible with the systematic performance of the imitation of the movements of respiration. A similar remark applies to the use of the warm water bath, or hot air bath, if required.

Explanatory Remarks.

RULE I. The posture recommended is not essential; but in this position the vital capacity of the chest is larger than in any other recumbent attitude. The bony framework of the chest is more free to move, and both sides can be expanded at the same time. This, in fact, is precisely the posture chosen by persons suffering from dyspnoea.

RULE II. In this way the patulous orifice of the wind-pipe is raised and drawn forward, so that nothing intervenes between it and the natural channel of air through the nose. The tongue is entirely prevented from falling back into the throat, whilst the extent to which the wind-pipe is put on the stretch is clearly indicated. The pharynx also is sufficiently opened to allow of the removal of liquids, etc., from the mouth, nose, pharynx, etc., if those have not been completely displaced by previous suitable treatment.

RULE III. This process in short accomplishes artificially for the patient exactly what he would himself effect, and by the same muscles, if he had but the will and the power to draw a deep inspiration.

When the ribs are raised the capacity of the chest is enlarged, and a tendency to a vacuum is induced.

The ribs are raised by the pectoral muscles, and the pectoral muscles are put on the stretch by the arms of the patient, and the arms of the patient are drawn up by the operator; the result is that the ribs are raised and the fresh air passes into the chest to occupy the enlargement thus produced; and alternately with this the vitiated air is expelled from the lungs by compression of the sides of the chest.

Should there be any spontaneous efforts to respire—and these efforts at first may not be repeated perhaps more often than twice in a minute—they should on no account be checked by officious interference. Great care

must be taken not to disturb the natural rhythm. The expirations might be made a little more forcible or the inspirations deeper, but that is all.

Possibly the elevated position of the arms, together with the muscular compression exerted on the veins of the upper extremities, might favour the descent of blood from them into the chest at the same time that the tendency to a vacuum produced in the thorax by the elevation of the ribs would induce a rush of fresh air into the lungs.

At the same time that the arms are extended steadily upwards, the lungs might be filled with air by a mouth to mouth inflation.

The following are some of the advantages of my Method :—

1. Inspiration may be made to precede expiration, or it may be second in order at the will of the operator.

2. The expansion of the thorax is artificially insured, and is wholly under the control of the operator.

3. It may be carried out when the patient is in the warm bath.

4. The patient is not liable to be injured by the manipulation.

5. The contents of the stomach are not liable to pass into the windpipe.

6. The tongue is prevented from obstructing inspiration.

7. Both sides of the chest may be equally inflated.

8. This process is entirely in harmony with that of nature.

9. A larger amount of air is inspired than by any other method.

10. This method is most easy of adoption.

11. Pure atmospheric air is inspired.

12. No apparatus is required.

Several successful cases of resuscitation have been recorded in the medical journals.

I subjoin a report from the *Lancet*, of Dr. Christian's paper on "Restoration from suspended Animation," read before the Royal Medical and Chirurgical Society, with some comments by Dr. Sharpey, F.R.S.

Also two letters from Sir Benjamin C. Brodie, Bart, F.R.S., which will be read with much interest.

Royal Medical and Chirurgical Society, Tuesday, January 22nd, 1861. MR. SKEY, F.R.S. President, in the Chair. On the Restoration of suspended Animation in persons apparently drowned. By DR. CHRISTIAN.

“As to the mode of performing artificial respiration, the method recommended by the Life-boat Institution is what Dr. Marshall Hall called his ‘Ready Method,’ while that now used by the Royal Humane Society is the method of Dr. Silvester. On Dr. Marshall Hall bringing his method under the notice of the Royal Humane Society, the Committee adopted means immediately to give it a fair trial. Copies of his instructions were sent to all their medical officers, numbering 120, and the boats of the society on the Serpentine had a platform made on each, on which to manipulate directly the body was taken from the water, and the boatmen were instructed and practised in the performance of the operations as he directs. *After giving the method a full trial in about fifteen cases, the very intelligent superintendent, the boatmen, and the author became so satisfied of its inefficiency to restore animation, and of the difficulty of properly carrying out the manipulations, that he felt himself justified in representing those facts to the Committee, and in adopting the plan recommended by Dr. Silvester, which he believed in every way to be superior, more manageable, less likely to injure the patient, will fill the chest with and expel air from it more fully, and will not force the contents of the stomach upwards, and in the way of respiration.*”

The following are the directions for treating the asphyxiated at the receiving house, Hyde Park:—

“Wipe the mouth and nostrils directly the body is taken from the water.

“Use *Dr. Silvester’s method*; at the same time let the body be taken as quickly as possible to the receiving-house, and place it in the bath up to the neck.

“Raise the body in twenty seconds from the water, and dash cold water against the chest.

“Pass ammonia under the nose. Use again *Dr. Silvester’s method*, and the inflating apparatus if it fail.

“Remove the body from the bath and rub the surface

with dry hot towels, perseveringly continuing the other treatment."

After many experiments, the author had come to the conclusion that inflation of the lungs by Dr. Silvester's method, or by the Society's apparatus, is the first remedy, and the shock of the warm bath the second; that after eight minutes' complete submersion, recovery is hopeless; and that when ten minutes elapse, after being taken from the water, without any effort at respiration, it is equally so.

On the subject of the warm bath, which has excited so much discussion as a remedy, he remarked that it must be understood that it is used as an immediate and powerful excitant; and it had so frequently happened, (twice while he was actually present) that a person brought in as asphyxiated, who, to the bystanders, was apparently quite dead, immediately on being placed in the bath, gave the sob or gasp, which is the precursor of respiration, that it might be boldly stated to be a most valuable adjunct to treatment, and properly managed in no way pernicious.

Dr. Sharpey having had the honour of presenting the paper to the Society, could not let it pass without remark He would observe, with reference to the method of Dr. Marshall Hall, that he had on one occasion spoken favourably of it, but had seen reason to alter his opinion after more mature consideration of the subject, and after hearing the practical experience of the Royal Humane Society. Dr. Sharpey considered that Dr. Marshall Hall's method could only claim one advantage, and it was not clear that it had even that. This supposed advantage is that the tongue falls forward, and thus does not embarrass respiration. *He thought that Dr. Silvester's method attained this object without any of the disadvantages of the Ready Method.*

The disadvantages of the Ready Method were several.

It must be remembered that a body submerged for some time is practically a dead body, and serious mischief has not unfrequently arisen from rough handling. Again, the constant turning of the body renders it very difficult to apply warmth, or carry out the other auxiliary means systematically; but, above all, it does not even fulfil its first object of changing the air in the chest.

Dr. Marshall Hall cited experiments in support of his

view; but the want of precision in making them is very striking. He (Dr. Sharpey) could not attach any importance to the results of experiments so conducted. Dr. Silvester had repeated them in a more precise way, and could not get a displacement of more than one cubic inch of air.

It would be asked, however, what answer should be made to the many statements of the success of the Ready Method. He would reply, that many of them were in cases of still-born infants, a part of whom, he believed, would recover without any assistance if left alone to themselves, or, at least, by very simple means. Then again, as Dr. Silvester states, there is no air in the lungs of infants. In reference to adults, he (Dr. Sharpey) believed himself right in saying that in many of the cases of recovery after submersion, respiration commenced spontaneously as soon as the patient reached the air. If in such cases Dr. Marshall Hall's method is begun at once, it would be unfair to give the credit solely to it. May it not even be, as suggested by Sir B. Brodie, that recovery often follows, not from the means used, but in spite of them?

SIR B. BRODIE, BART, F.R.S., *on the Marshall
Hall Method.*

The restoration of persons apparently drowned has been attracting so much attention since Dr. Christian's able paper was read before the Medico-Chirurgical Society, that the two following letters from Sir Benjamin Brodie will be read with interest:—

“ 14, Savile Row,
“ February 13, 1860.

“ DEAR SIR,

“ I cannot say that I have ever entertained any favourable opinion of what the late Dr. Marshall Hall called his ‘Ready Method of restoring animation.’ It seems more than probable that the repeated compression of the chest, for the purpose of expelling all the air from the lungs, would have an injurious effect on the action of the heart. The air drawn into the lungs by the elasticity

of the parietes, or walls of the chest, would fall very short of that inhaled in an ordinary inspiration, and this opinion is confirmed by the experiment of Dr. Silvester.

“ Then the mechanical disturbance, occasioned by the continual rolling and tumbling about of the body, cannot, I apprehend, be otherwise than mischievous where the chances of life and death are equally balanced, and must, in all cases, interfere with the natural process of recovery.

“ *By the method proposed by Dr. Silvester, certainly more air would be drawn into the lungs than by that of Dr. Marshall Hall, and with much less disturbance to the body generally.* In some animals, as the rabbit, a very sufficient quantity of air can be drawn into the lungs by a similar method, that is, by the mere elevation of the ribs. How far in the human subject Dr. Silvester’s process would be a sufficient substitute for natural respiration, I do not venture to say; it is a question to be decided only by experiment.

“ Where the apparatus of the Royal Humane Society for the artificial inflation of the lungs is at hand, I have no doubt that this affords the surest and safest means for imitating natural respiration if the necessary precautions are observed in using it. At the same time, I have no doubt that the late intelligent medical assistant of the Royal Humane Society at Brompton, Dr. Woolley, was correct when he informed me that practically the cases of drowned persons, in which artificial respiration can be employed with advantage, are very few indeed. The first thing to be done is to take the body out of the water as soon as possible, it being always borne in mind that the case is one which admits of no delay, as except under some very rare and peculiar circumstances, there is little chance of life being restored where the period of complete submersion exceeds three minutes and a half. The next thing is to do nothing that can interfere with the natural process of recovery. It is only in those cases in which there is no sign of any effort to breathe spontaneously that artificial respiration should be had recourse to, and it is only in a small proportion of these that it proves successful. If you or any one else should be desirous of knowing what more I have to say on the subject of the treatment of those who suffer from strangulation or drowning, I would refer you to what I have published in my

volume of 'Lectures illustrative of certain points in Pathology and Surgery.'

" I am, dear Sir,

" Yours truly,

" B. C. BRODIE.

" Lambton J. H. Young, Esq.,

" Secretary to the Royal Humane Society."

" Victoria Hotel, St. Leonards-on-Sea,

" DEAR SIR,

" October 11, 1860.

" I observe that the first instruction of the Royal Humane Society with regard to the treatment of drowned persons is, 'that no time should be lost.' I conclude, therefore, that these instructions agree with those of the Life Boat Institution; that there should be no delay in carrying out whatever measures are necessary for the purpose of resuscitation. I also conclude, that it never could have been intended that the drowned person should be taken to a house if the house were not close at hand. The only real difference of opinion then seems to be as to the use of the warm bath and the method to be adopted, with a view to restore respiration. Now, with regard to the first of these points, what is really wanted is that the body should not lose its natural heat, and whether this be accomplished by dry application or by moist application, as the moisture cannot penetrate beyond the cuticle, would appear to be of small importance; and I own that the practical observations on the use of the warm bath, made by the officers of the Royal Humane Society, seem to me to be more likely to lead us to the truth, than the theoretical objections to it made by Dr. Marshall Hall. At the same time, I certainly think it important that the temperature of the bath should be rather below—certainly not above the natural temperature of the living body.

" With regard to the second point, I do not know that I need do more than refer to what I have said on the subject of Dr. Marshall Hall's proposal. In a letter which I wrote to you on the subject formerly, and which is printed in one of the Royal Humane Society's reports,* I may, however, take the opportunity of briefly stating:—

* The letter printed above.

“ 1st. That the interval, during which artificial respiration can be employed, is very limited.

“ 2ndly. That if the Royal Humane Society’s apparatus be at hand, and the medical man present knows how to use it, this affords by far the safest and surest method of imitating natural respiration.

“ 3rdly. That there is great danger, that the rolling and tumbling about of the body, as proposed by Dr. Marshall Hall, would interfere with the natural process of recovery; at the same time, that it is very doubtful, whether by this method a sufficient quantity of air could be drawn into the lungs to answer any useful purpose.

“ 4thly. *That, at any rate, of the two methods that of Dr. Silvester would be much more effectual, and much less calculated to do injury.*

“ In the treatment of drowned persons, as in the treatment of disease, the first rule of the medical art is to do nothing that may interfere with the natural process of recovery. When a drowned person is first taken out of the water, if the heart have not actually ceased acting, there is generally a spontaneous effort to respire; that effort may not be repeated perhaps more than twice in a minute, or even not so often in the first instance. But if the attempt to respire has once begun, it will, in the majority of instances, continue, the intervals becoming gradually shorter; and I cannot doubt that rough usage, as that which Dr. Marshall Hall recommended, would interfere with it, although it is not very improbable that every now and then some one may recover in spite of it. With regard to the authorities referred to in favour of the practice of rolling about the body, I may observe:—

“ 1st. That I do not know who are the medical bodies referred to as having approved of Dr. Marshall Hall’s method. I certainly never heard of the question having been submitted to any of the medical colleges or universities.

“ 2ndly. That I attach little importance to the names of three hundred medical men, who are said to have signed a memorial on the subject, knowing, as I do, how easy it is to procure a great number of signatures to any document, when you have two or three names to begin with; and knowing also that the question as to the mode of death from drowning, is altogether a physiological one, to which

the attention of very few medical men has been directed, with the exception of those who are actually engaged in teaching physiology.

“ I send you these observations in compliance with your request; my conclusions have not been hastily formed. The mode of death from drowning, and the treatment afterwards required, formerly occupied a great deal of my attention, and was the subject of a great number of experiments on animals; but I have not trusted to these alone, having had frequent conversations on the subject with a very experienced and intelligent officer of the Royal Humane Society, the late Dr. Woolley, and since then with Dr. Christian.

“ L. J. W. Young, Esq.,
“ Secretary.

“ Yours truly,
B. C. BRODIE.”

DIRECTIONS
FOR
TREATING THE ASPHYXIATED
AT THE
RECEIVING HOUSE, HYDE PARK.

WIPE the mouth and nostrils directly the body is taken from the water.

Use Dr. Silvester's Method; at the same time let the body be taken as quickly as possible to the Receiving House, and placed in the warm bath up to the neck.

Raise the body in twenty seconds from the bath, and dash cold water against the chest and face.

Pass ammonia under the nose; use again Dr. Silvester's Method, and, if it fail, the Inflating Apparatus.

Remove the body from the bath and rub the surface with dry, hot towels, perseveringly continuing the other treatment.