

them ; and the typhoid malignancy of some cases, and the tendency of others, to become so appear to me strongly corroborative of this opinion.

The plain treatment which I adopted in this epidemic was, at the commencement, upon the antiphlogistic plan ; venesection, which invariably relieved the pain and tension of the head, I made use of in the majority of cases, with decidedly beneficial effects ; this was particularly marked in example 4, which terminated favourably in half the usual time that the others did. The other part of the treatment consisted in the exhibition of the chloride of mercury, combined with antimonial at bed-time, followed by gentle purgatives the following morning, and of salines in the intermediate time. This plan of treatment varied according to circumstances, was continued as long as the swelling and inflammation remained, after which stomachics and tonics were given, and where, as was the case in some instances, no abscess made its appearance in the neck, the patient recovered rapidly.

#### ON THE

### MECHANISM OF RESPIRATION,

AND THE ARTIFICIAL AND NATURAL  
INFLATION OF THE LUNGS.

*By* MALCOLM W. HILLES, ESQ., *Surgeon,*  
*Westminster.*

As there are some points connected with the mechanism of respiration, which are but imperfectly understood, and others which are overlooked altogether, I beg leave to offer a few observations on the subject, especially as it is one that is intimately connected with the several departments of professional practice.

I, am still farther induced to consider this subject from the appearance (of late) of some observations which I consider to be completely erroneous, and which, if allowed to pass unnoticed, might, at no distant period, exercise a material and injurious influence on the judicial investigation of infanticide.

It is unnecessary for me to occupy your pages with any remarks on such parts of the respiratory process as are fully described in almost all physiological works ; I shall, therefore, confine myself to those which have been but little, if at all, noticed.

In entering upon the consideration of this subject, we must bear in mind that two principal agents are employed in the mechanical act of respiration, namely, the lungs, and the parietes of the thorax ; of these the former may be considered the passive, the latter the active, agents.

Many are inclined to consider the lungs as active agents in respiration, and assign to them a degree of contractility which they certainly do not possess in the healthy state ; indeed, if they be endowed with any innate power of contraction whatever, it is too trifling to have any material influence in the several acts of inspiration and expiration, and, therefore, it is hardly worthy of being taken into account. That these organs do not assist in the act of inspiration is manifest, as they decidedly do not possess any power in themselves of expanding their bulk, and that they are equally passive in the act of respiration, under ordinary circumstances, we may reasonably conclude, if we reflect for a moment on the phenomena that take place when the air is being expelled from the lungs ; the thoracic parietes are then forced upon the surface of these organs by the contraction of the respiratory muscles, and thus, they being compressed, the air is expelled from them. Now, during this act, contractility in the lungs is wholly uncalled for, as the muscles of respiration are sufficiently powerful for its completion ; indeed, the weight of the thoracic parietes, and the elasticity of the ribs, would produce this result, unaided by muscular contraction, although that is required in order that respiration may be the more completely performed, and with a sufficient degree of rapidity, particularly as impediments will occasionally present themselves that cannot be removed without the aid of muscular contractility.

Had the lungs, therefore, possessed contractility, a power would have been conferred upon them which was not required, as the parietes of the thorax are sufficient to reduce the lungs to their quiescent state, and we know of no property in those organs which could contract them further, unless we concede to them the power of overcoming the resistance of the thoracic parietes, or of producing a vacuum in the interior of the thorax, or assign to the cellular tissue of the lungs a degree of elasticity which is not acknowledged by anatomists in general, or consider that the contraction of the air cells so produced is counterbalanced by the rush of blood into the lungs, a theory which would be completely opposed to the prevailing opinions of the day, which advocate the expulsion of the blood from the lungs during *respiration*.

Again, if the lungs possessed contractility for the purposes of mechanical respiration, there should be (to render this beneficial), a consent of action between these organs and the muscles of respiration, sustained here, as elsewhere, in the human body, either by the nerves which supply those parts being derived from the same source, or by their frequent anastomosing with each other. This, however, is not the case, but rather the reverse, as we observe a remarkable want of

communication between the pneumo-gastric (which supply the lungs) and the other principal respiratory nerves, viz., the phrenic, inferior external respiratory, and intercostals.

Notwithstanding these remarks, I cannot but concede to the air cells a certain degree of muscular contractility, as advocated by Reisseisen, Dr. Carson, and others, supported by the phenomena presented in the disease of spasmodic asthma; but this contractility, I consider, is not bestowed on them that they may assist the parietes of the thorax in the expulsion of the air from the lungs, but rather that they may, by these means, exert a certain degree of pressure on the air contained in them, whereby this fluid may be forced into more immediate contact with the venous blood in the extreme branches of the pulmonary artery, and thus those chemical changes be effected which form the principal feature in the act of respiration. We may, then, look upon the oxygen of the atmospheric air as the direct excitant of the muscular fibres of the air cells, throwing those into a state of contraction for the purposes already mentioned, to be followed by relaxation as soon as a portion of the oxygen has been transferred from the atmospheric air to the blood. This opinion is supported by those cases of asthma which are much benefitted by removal from a pure to a vitiated atmosphere, which, containing less oxygen, does not excite the spasmodic contraction of the air cells.

When inspiration is being performed, the cavity of the thorax is increased in size by the expansion of its parietes. The lungs are now compelled to expand, as otherwise a vacuum would be formed between those organs and the inner surface of the thorax, and the air rushes in to fill the distended lungs. Thus this act is completed, to be immediately followed by that of expiration. An interesting question here presents itself, —are the same parts of the lungs and thorax always in immediate contact? Few questions have, perhaps, given rise to more contradictory statements than this; some consider that such is the case; others, observing the elongated bands formed between the pleura pulmonalis and costalis by the effusion of lymph, contend, that so far from such being the fact, there is a considerable degree of attrition between the opposed surfaces of the lungs and thoracic parietes. There cannot be a doubt of this latter theory being the correct one, as, if we examine the mechanism of the thorax we shall find that some parts of that cavity are possessed of great mobility; others are nearly, if not altogether, immoveable; amongst the former may be classed its inferior, lateral, and anterior walls; amongst the latter its superior extremities, or apices, when they are formed by the cones of the pleura, and bounded by the first rib, and parts in the lower regions of

the neck; as, also, the posterior part of the thorax formed by the spinal column and the ribs, as far outwards as their angles. Now, as those parts afford lodgment to portions of the lungs, it follows that those portions can only become expanded by encroaching on the other regions of the thoracic cavity, and thus the same surfaces of the lungs and thorax are not always in contact. This opinion is still further supported by the difficult respiration which is induced by extensive adhesions between the pleura pulmonalis and costalis.

The influence which this variation in the relations of these parts must have in cases of wounded or diseased lungs, is apparent; to this may we attribute the great liability to general emphysema, which is observed when these organs have been injured by any external agent. The mechanism of respiration is frequently elucidated by comparing it to the ingress and egress of air caused in the common bellows, by the alternate separation and approximation of its sides. It should be remembered, that the analogy is not perfect; to render it so, the interior of the bellows, as Halliday has observed, should be provided with bladders; it is, however, sufficiently correct for the object intended by the comparison.

When we reflect on the practical bearings of this subject, we shall see the impropriety, in many cases, of empyema, of withdrawing the whole of the purulent fluid from the cavity of the thorax, as in some instances the lungs are so consolidated that they cannot dilate in proportion to the expansion of the thoracic parietes; should this occur, the large vessels in the interior of the thorax will be deprived of that support which they had previously derived from the presence of the fluid, and thus one or more may give way, and a fatal hæmorrhage ensue. One case of paracentesis thoracis came under my partial observation, in which death could be attributed to this cause alone.

Intimately connected also with this, is the question of foetal respiration during the act of parturition. I have no doubt that respiration can, and frequently does, take place during this process; nay, that even the dead foetus may be made to respire, if the simple inflation of the lungs can be called respiration. I have clearly shown that the lungs are obedient to the parietes of the thorax, following carefully their different states of contraction and expansion. Now, if any force, no matter what, should compress the thorax during parturition, and this force be suddenly removed, the thorax will expand by the resiliency of its parietes, and thus the air will enter the lungs as a necessary consequence, and particularly so if the compressing force should be now applied on the abdomen, so as to restrain the abdominal viscera from ascending and filling

the vacuum that is formed in the thoracic cavity.

To elucidate this subject, let us suppose that, during a difficult labour, the thorax of the foetus is forcibly compressed as it escapes from the os uteri; it makes its way into the vagina, being now freed from pressure; the resiliency of the thoracic parietes restores the parts to their original condition; the thorax expands, the abdomen being now, in its turn, compressed, the lungs are dilated, and the air rushes in to fill the vacuum that should otherwise be formed. In this way we may explain the partially-inflated state of the lungs which is frequently observed after difficult parturitions.

How important are those facts in a medico-legal point of view; how culpable the practitioner who should hazard the assertion that such is impossible; and ascribe this inflation of the lungs to a living action, and on this assertion sacrifice the life of an innocent female! I may here observe (and I do so with regret), that we possess no means of accurately distinguishing between the artificial and natural inflation of the lungs. I am, Sir, your obedient servant,

47, Duke-street, Westminster.  
April 26, 1837.

## ASTHMA THYMICUM.

*To the Editor of THE LANCET.*

SIR:—The following case so completely agrees, in its essential character, with the cases mentioned in your Journal of April 15th, under the article headed "Asthma Thymicum," and called by the late Dr. Ley "Laryngismus Stridulus," that I think it my duty to transmit it for publication in your Journal:—

The infant child of Mr. R., of Queen-street, Cheapside, between 8 and 9 months old, afflicted with whooping cough, was frequently seized with sudden and alarming fits of suffocation, but which lasted only for a few minutes. On one of these occasions I was hastily sent for, the parents thinking their child to be in a dying state, but, on my arrival, the attack had subsided, leaving the little patient apparently as well as usual. I imagined that some viscid mucus, adhering to the rima glottis, had been the cause, and that the separation of it had afforded equally sudden relief. Frequent alarming and sudden attacks have subsequently recurred, and subsided before medical attendance could be procured. However, on Friday last, although the child was improving in its general health, and the whooping cough was much abated, without

any previous appearance of indisposition, another of these attacks occurred, and, in a few minutes, the infant was a corpse. I had permission to examine the body, when I found that the only deviation from a normal state was an enlargement of the thymus gland, which filled the whole of the anterior mediastinum, pressing upon the bronchial tubes, the inferior portion of the gland covering the apex of the heart, and being firmly adhered to the pericardium, which contained more fluid than usual. The lining membrane of the trachea was slightly vascular, as it always is in whooping cough, but I found no other appearance of disease. The gland weighed eight drachms and five grains, but the structure was natural. Not having seen Dr. Ley's book, I am unable to say how far my case agrees with his description of the disease, but the similarity of this with the two cases mentioned in *THE LANCET* as having been described by Dr. Malin is so striking that I am induced to believe it worthy of being transcribed for your professional readers, considering the disease to be of more frequent occurrence than is generally supposed. I remain, Sir, your obedient servant,

WM. HUGHES.  
90, High Holborn, May 4th, 1837.

VIDAL only once saw Dupuytren lose his presence of mind. He had to extract a very large calculus: he considered a long time how he should proceed. He appeared to adopt the idea of cutting the fundus of the bladder; but still he hesitated. At last, what was most extraordinary, he allowed himself to be influenced by the advice of another surgeon, who advised him to combine the bilateral with the rectoprostatic incision. He operated, but did not succeed, for the calculus was not extracted till next day. On that day, Vidal observed his lower lip to quiver, and his cheeks to change colour several times, and this because the school disapproved of his mode of operating.

AFTER operating Dupuytren held a consultation for the benefit of his patient. It was a kind of clinical lecture, in which he heard the opinions of the advanced students. This ought to have fatigued him. But if, in departing from the hospital, a journalist who had not obtained sufficient matter for an article, came up to him to request some, Dupuytren in his walk prolonged his lecture, so as to allow the writer to take hasty notes. Vidal has seen Dupuytren, when the snow was on the ground, walking along the bridges and dictating to M. Paillard who accompanied him. Thus, many lectures which have been published as having been delivered at the *Hôtel Dieu*, were actually produced on the *Pont Neuf*.