Amongst those I must mention especially hay fever and paroxysmal sneezing. In the post-nasal region the cure of adenoid vegetations has resulted in the prevention of deafness to such an extent that there are probably at least 100,000 persons now hearing well who, had it not been for Dr. Meyer's valuable discovery twenty years ago, would be hopelessly deaf. In this region, however, there remains a disease which will tax all your energy and perseverance, all your talents and skill to overcome. I allude to the more severe form of post-nasal catarrh. Any specialist who can discover the means to cure this disease will deserve to rank by the side of Harvey or Jenner!

In your future studies I would especially urge on you not to confine your attention to the graver or more out-of-the-way diseases. I feel convinced that there is a good deal to be done in the somewhat uninteresting region of the minor aphonic ailments. Let me remind you that, however dull such cases may be to the doctor, they are quite otherwise to the patient. It is important, therefore, that even the most commonplace affection should be carefully studied. It is the experience of everyone, I suppose, that such cases, trivial as they are, are often the most difficult to cure. May not this be in part due to the very fact that they are uninteresting? Those who are content perseveringly to interrogate Nature in her everyday dress will, I am persuaded, be fully compensated for such courageous humility.

Let me also point out to my younger *confrères* that our knowledge of the relations of the various constitutional dyscrasias, such as scrofula, gout, and rheumatism, with affections of the throat, might be developed with great advantage; at present, it must be owned the sacred lamp of laryngology sheds only a "dim religious light" on those subjects.

Further, I would urge upon you that various methods of treatment should be perseveringly tried, and the results, whether good or bad, honestly recorded. I think there is, in the case of complaints which are generally looked upon as incurable, far too great a disposition to fold one's arms and acquiesce in the inevitable, laying the flattering unction to one's soul that our duty to our patient is discharged by attempting to relieve his symptoms. Thus one never really tries to cure a cancer because one never hopes to be able to do it. Some exuberance of enthusiasm would, I venture to say, be advantageous even in the most hopeless cases; at any rate, I would have the doctor carry on the battle to the last gasp, by every means his ingenuity can devise. It is only in this way that the secret of coping with these terrible diseases will ever be wrested from Nature. For this reason, among others, I would earnestly impress on young specialists the necessity of keeping themselves well abreast of the progress of their department in every particular. Let them not be satisfied with being merely good "practical" men, jogging contentedly through their professional career with only their own experience to guide them. However large a man's opportunities of observation may be, he should remember that, as Johnson said, "An Athenian blockhead is the worst of blockheads," and should make himself acquainted with what is being done and seen by others. By this the mind is kept open, and premature crystallisation, the penalty of routine, is avoided. This Society will give you opportunities in the direction here indicated which your predecessors never had; and I have no doubt you will use them to the best advantage.

If, as a specialist of some length of days, I might hazard a further word of advice to my younger brethren, it would be this—to give your attention mainly to pathology and therapeutics, seeking to enlighten darkness and eradicate error in these important matters. I would earnestly advise you to give your attention to these subjects rather than to the invention of apparatus. One may earn some cheap renown, no doubt, by modifying the mechanism of a snare, or applying the electric light in some slightly novel fashion to laryngoscopy, but an ambition that is satisfied with such triumphs can hardly be called "an infirmity of noble minds."

I have here indicated, in the briefest and most cursory manner, only a few of the points on which independent observation and research will be well employed; but there are many others. Do not allow yourselves to underestimate the importance of the field which you cultivate because it is of limited extent. Small as the larynx is, it is of immense importance, both in itself and in its relations to other parts. These relations can be satisfactorily studied only by the specialist. How often is the existence of grave mediastinal disease, such as an aneurysm or a solid tumour, first disclosed by the laryngoscope? And, conversely, how often

is it the means of dispelling the suspicion that some such formidable condition exists by showing that the loss of voice is merely functional? The little mirror may in like manner give the first hint of serious disease in the brain.

Again, in the case of phthisis, do we not know that the laryngoscopist can often detect signs of danger invisible to others, and give effectual warning which may prevent the onset of the disease? Thus, gentlemen, we may, not figuratively but literally, call ourselves watchers by the gate of life: scientific sentinels whose duty it is to note the cloud when it is still no bigger than a man's hand, and sound the alarm. Surely this is no ignoble function, but a field of activity presenting opportunities for brain-work which may well tax the highest powers and satisfy the most ambitious.

Work steadfastly then, whether the subject be recondite or apparently trivial. Observe and test everything, and bring your results here to be criticised by your fellow-workers. This will give a definite method and aim to your clinical studies which cannot fail to be fruitful of good. This is not merely a "counsel of perfection;" it is a duty incumbent on all, even the humblest among us, who are engaged in building the ark of medical science for the benefit of the human race. No man with the opportunity of making even the most trivial original observation has the right to keep it to himself; it must be added to the common store. I do not think I can conclude my address better than in the words of Carlyle, which have a special application to members of such societies as this over which I have the honour to preside: "Be no longer a chaos, but a world, or even worldkin. Produce! produce! were it but the pitifulest infinitesimal fraction of a product, produce it in God's name. 'Tis the utmost thou hast in thee: out with it then!" I will only add that however "infinitesimal" your "product" may be, if only it is honestly come by, we shall be glad to welcome it here.

A NEW AND ONLY WAY OF RAISING THE EPIGLOTTIS.

By BENJAMIN HOWARD, A.M., M.D., F.R.C.S.E.

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THE epiglottis, mysteriously described by the ancients as "standing at the gateway of life," attracted from a very early period a good deal of curious attention and speculation. Concerning its functions Hippocrates wrote, Plato disputed, Galen experimented, but nearly all of them disagreed.

As a factor in apnoea—to which my remarks will be confined—the introduction of anaesthetics gave to the epiglottis a new, familiar, and momentous interest; but, in contrast to the contentions which, down to the time of Magendie and Pinel, continued about its functions, what was taught at first respecting the epiglottis and the method for its supposed elevation in apnoea has been taught ever since, and is everywhere taught now. This teaching, which to-day governs universal practice, is, I think, correctly expressed as follows:—

1. When the unconscious state deepens into the insensitive state called apnoea, the epiglottis falls backwards and closes the glottis.

2. In this condition the elevation of the epiglottis is the first thing in order and in importance, as, without this, respiration, whether natural or artificial, is impracticable and the result fatal.

3. The only way by which the epiglottis can be raised is by means of the tongue; as the tongue is brought forwards the epiglottis is moved upwards.

For the proposed elevation of the epiglottis by the moving forward of the tongue, the great and good Marshall Hall—who, like most of us, must have experienced the frequent difficulty of getting at it—instituted the protraction of the entire patient. In 1856-57 he wrote: "The tongue gravitates forward, and draws with it the epiglottis." In another place, without saying how it is to be done, he writes, that to this end (the raising of the epiglottis) the tongue might be "drawn forward." To make the drawing forward possible, Sir James Simpson and Mr. Syme

¹ Read before the Medical Society of London, October 22nd, 1888.

² Address to Royal Humane Society, London, 1856. "Prone and Postural Respiration," London, 1857.

used forceps, the practice of applying them to the tongue—not at its tip, but as far back from it as possible—being particularly urged by Sir Joseph Lister.

The only suggestion of a doubt even, not of the practice but of the theory involved, was by the quick-sighted Sir Joseph Lister, who from observations upon his own person, and therefore far removed from the conditions of apnoea which we are considering, inferred, and doubtless for sufficient reasons, that traction of the tongue by forceps induced the elevation of the epiglottis in some cases perhaps, rather from the irritation by the forceps and the reflex action thereby excited than by mechanical action. This suggestion was made without any anatomical explanation, and, though offering another theory, was accompanied by a specially emphatic direction to use the artery forceps upon the tongue without delay, and thus rather confirmed than disturbed what I have just stated as the universal practice, and to which the tongue forceps and jaw priser in every operating theatre bear witness.

Having at intervals, for some years past, continued investigations and experiments in connection with the upper air-passages, I will endeavour to submit in the briefest outline I can some things I have found containing lessons of practical importance on the subject indicated, reserving such details as might be wearisome to you for publication in such form that you may read them or leave them, according to your future inclination or convenience.

In making the examinations and experiments I shall refer to, I have been careful to secure the conditions identical with those of complete apnoea, the subjects being used within forty-eight hours after death, and when free from rigor.

In certain of the subjects a fenestrum was made in the throat, which exposed the epiglottis without disturbing it. In others, this exposure was effected by the removal of cervical vertebrae, with corresponding parts of the posterior wall of the pharynx. In others, the sections were made so that from one or the other a view was obtained of each of the parts desired, while avoiding interference with the movements and results to be observed.

I started with no theories; I have none to suggest now; and in submitting just the facts, I guarantee their correctness only as regards the completely insensitive state, except when I state otherwise.

The diagrams before you I made from drawings which I sketched at the time of examination, and from Nature in each instance, and their accuracy will, I think, be in no particular contradicted by the actual dissections before you. By their aid we will consider:—

1. The effect of traction of the tongue; what is done by it, and what is not done by it.

2. A new and only way of raising the epiglottis.

3. Some other important changes in the relations of certain parts of the upper air-passages to each other induced by a position which I call complete extension of the head and neck.

Looking at the structure of the upper air-passages from the cricoid cartilage to the posterior nares, roughly speaking, they are bounded above by the base of the skull, behind by the cervical vertebrae, anteriorly by the posterior nares, hard palate, velum palati and uvula, the base of the tongue, the hyoid bone, the epiglottis. All these are susceptible of motion more or less extensive. The cavity of the larynx does not now concern us, because it is always the same; the arytenoid cartilages are always entirely separate, the chink of the glottis or entrance to the trachea widely open. The upper boundary, by means of the occipito-vertebral articulations and also of the first and second cervical vertebrae, is susceptible to extensive flexion. The posterior boundary is susceptible to moderate flexion at points corresponding to the first and second cervical vertebral articulations, also between the fifth and sixth and the seventh; while between the seventh and the first dorsal the flexion is greater. Between the third, fourth, and fifth there is practically no flexion; the application of force does not flex them beyond a straight line. The susceptibility to extension, on the other hand, is throughout these parts very great. By careful measurement I find that by means of the occipito-vertebral articulation the base of the skull—including, of course, the anterior nares, os palati, etc.—can be extended upon the cervical column about 60 degrees, and that the cervical column can be extended upon itself in all about 30 degrees, giving an aggregate extension of the head and neck of about 90 degrees. The bearing of these facts will appear further on.

In the ordinary supine position, I have found always three anatomical causes of obstruction lying across this upper airway.

The first of these is the velum palati and uvula. Whether the mouth is open or shut, the velum is quite flaccid, its free border inclining upwards and backwards, nearly approaching or resting upon the posterior wall of the pharynx; while the uvula, if long, is curled upon itself, in some instances almost completely closing the airway at that point.

The second is the tongue. Equally, whether the mouth be open or shut, this is invariably found with its dorsum more or less resting upon the posterior wall of the pharynx, the obstruction from this cause as tested by water being sometimes complete.

Third, the epiglottis. This is always found fallen backward over the glottis, its free edge resting upon the posterior wall of the pharynx.

Flexion of the head, in proportion as it is more than that of a right angle with the cervical column, increases the obstruction from each of these causes. This is chiefly due to the fact that as the head is flexed the hard palate descends upon the tongue, pressing it downwards and backwards, wedging the tongue between the hard palate above and the os hyoides and upper border of the thyroid cartilage below. The resistance of the posterior wall of the pharynx in that case causes the tongue to bulge below, pressing downwards still further the epiglottis, causing impaction of the pharynx there, and a bulging above against the velum, making the closure of the pharynx at that point complete. These observations respecting the falling back of the tongue and of the epiglottis are simply confirmatory of what has been stated often enough before. That respecting the velum confirms what was observed by Dr. Robert Bowles, of Folkestone, in 1860.³ The observations he made respecting the effect he had in some cases observed from opening the mouth seem also to be partly confirmed; but what in a single dissection he thought he observed—that the connections between the tongue and the symphysis were too short to allow the dorsum to reach the posterior wall of the pharynx when the mouth was shut—is contrary to my own observations in every instance. Turning the head on one side, as he recommended, to correct stertor, I found sometimes partially, but in a slight degree, shifted the upward edge of the tongue, but not if the head was flexed at an angle more acute than a right angle.

With this reminder of the anatomical facts before us, we will, if you please, consider:

1. *Traction of the Tongue: What is done by it, and what is not done by it.*—As the tip of the tongue is pulled forwards, the body of it, I need scarcely say, becomes elongated, thinner, and narrower. Next, the dorsum is shifted forwards from contact with the posterior wall of the pharynx. Resistance is now encountered; this is found to be from the frænum linguae, which is become very tense. Traction being continued, a second point of resistance is met with, this time from the anterior pillars of the fauces, which, in their turn, become quite tense also. Add to the force, and with it a prising motion, and at the expense of the frænum linguae, which, where it crosses the lower incisors, becomes lacerated, the anterior pillars of the fauces become slightly more tense. Looking beyond, the glosso-epiglottidean folds, by which the force employed upon the tongue has been supposed to be communicated to the epiglottis, will be found, however, to be quite relaxed. If you get larger forceps and pull with greater force, as I have often done, the laceration of the frænum linguae will be found to increase, the anterior pillars of the fauces to remain nearly as before, while beyond is a dead calm. The relaxation of the glosso-epiglottidean folds still continues as before, while the supreme disappointment of all is this: the epiglottis is seen to be unlifted, undisturbed.

In elucidation of the results described, if a vertical section of the tongue in question be made along the median line, some of the anterior fibres of the genio-hyoglossi muscles will be found to be lacerated. If the traction be now repeated on either of the two sections, the force will be seen to be chiefly expended through the remaining of these fibres, upon the genial tubercles of the inferior maxilla to which they are attached, while the posterior fibres of the hyo-glossi will be comparatively relaxed. I had supposed the posterior fibres of the genio-hyo-glossi muscles, and, still more certainly, the glosso-epiglottidean ligaments, would serve as media by which the tractile force upon the tongue would, in the former indirectly and in the latter directly, be communicated to and draw upward the epiglottis. The reasons for the disappointment, I believe to be chiefly these. In the case of the genio-hyo-glossi, their attachments to the hyoid bone are not so

³ "Observations on Stertor," *Transacts. Royal Med. and Chir. Soc.*, 1860.

much to its body as to its greater cornua, and though some surviving force did reach these, their elevation would tend to depression, rather than elevation, of the epiglottis. In the case of the glosso-epiglottidean ligaments; while these consist almost entirely of mucous membrane, the few fibres found within their folds have their origin as we know, not in the tongue, but from near the sides of the tonsils; hence a gap where the supposed line of communication between the tongue and the epiglottis is broken and the tractile force is lost.

An experiment which I have many times repeated by way of demonstration is the following. A subject with a large larynx, well exposed by a fenestrum, is firmly held in an erect position, in which it will be noted the glosso-epiglottidean fossa has for its floor partly, and for its anterior wall entirely, nothing less than the fallen epiglottis itself. The glosso-epiglottidean fossa being then filled with water, traction upon the tongue has been made with various degrees of force. In no case has the water been overturned or spilled.

I will now anticipate the question already doubtless in your minds, and will endeavour to show:

2. *A New and Only Way of raising the Epiglottis.*—That the essential condition of life—an open glottis—may, in whatever extremity, be surely maintained, there is a distinct mechanism, superficial, always available, so that, whether by volition, instinct, reflex action, or by the effort of another person, the fallen epiglottis may be instantly, surely, and completely elevated.

The central part of this mechanism is the body of the os hyoides. This is the central link of a three-linked chain. By the lower link, the hyo-epiglottic ligament, the body of the freely-movable hyoid bone, is attached to the freely-movable epiglottis below; while the upper link, consisting of three pairs of muscles, the genio-hyoidei, mylo-hyoidei, and the anterior bellies of the digastrici, proceeding from the body of the hyoid bone, are attached to the body of the inferior maxilla above. Thus, the body of the inferior maxilla above is coupled to the epiglottis below.

As the attachments of these muscles to the inferior maxilla are near and on either side of the median line, where is the greatest range of motion, it follows that, if the head be extended but a certain distance, the chain in question becomes straightened and tense. Beyond this point, however slight the additional extension may be, the epiglottis is raised in unison. Continue the extension sufficiently, and the epiglottis becomes instantly, completely, inevitably erect.

As if in anticipation of the critical emergencies connected with apnoea, this special provision is so strictly mechanical, that whether the extension of the head be by volition, instinct, reflex motion, or by the action of another person, whether in health, apnoea, or after death, the same cause produces beyond prevention precisely the same effect.

If you will allow me to go along this same line but a little further I will next point out—

3. *Some important Changes in the Relations of Certain other parts of the Upper Air-passages to each other, as induced by Extension of the Head and Neck, when carried to its utmost.*—I have already remarked that in the insensitive state, and in the ordinary recumbent position, in addition to the epiglottis, if not of equal importance, there are other anatomical respiratory obstructions, not one of which is without consequence; and for all of which I will endeavour to point out a means of prompt, simultaneous, general correction.

By a series of measurements, I have found, as I have said, that the cervical vertebræ may be extended upon themselves, in all, about 30 degrees; that the occipito-vertebral articulation admits of the head being extended upon the neck about 60 degrees. That is, the head and neck are susceptible of the rather surprising aggregate extension of about 90 degrees, and this by moderate force, in which there is no manner of risk or inconvenience to the unconscious patient.

The correlative changes which are induced in the anatomical causes of respiratory obstruction referred to, as well as those throughout the entire pharynx, by complete extension of the head and neck, are as follows: Posteriorly, the wall of the pharynx, which was horizontal, is now, at its upper and lower parts in particular, bent strongly backwards, and in its general direction is nearly vertical. The base of the skull and the hard palate, which were vertical, are now horizontal. By this extension the naso-pharynx is correspondingly enlarged, and the course of the nares is almost in line with the pharynx.

Anteriorly, this extension of the head acting upon the hyoid bone through the genio-hyo-glossi and mylo-hyoidei muscles in combination with the very strong dragging of the sterno-thyroidei and thyro-hyoidei, pull very forcibly forwards all the rest of the anterior wall of the pharynx, including to some extent the base of the tongue also.

The Tongue and Velum Palati.—Gravitation, which before precipitated the dorsum of the tongue into the pharynx, now precipitates it out of the pharynx and into the cavity of the mouth, the roof of which now forms a floor to receive it. The velum palati, by means of the palato-pharyngeal muscles, which have for a fixed point the posterior part of the thyroid cartilage and wall of the pharynx, is pulled from the direction of the posterior wall of the pharynx, the entire membrane being stretched tightly forwards and downwards behind part of the dorsum of the tongue, forming a partition which helps to shut the tongue out of the pharynx and into the mouth where it belongs, and with part of the dorsum forms the anterior wall of a now post-oral airway, thus created and maintained. Thus, in its antero-posterior diameter, the entire pharynx is very greatly enlarged throughout, and the upper airway, which before was a tortuous, angular, flaccid canal, barely and, if at all, uncertainly permeable, is made an enlarged, firm, but slightly curved tube, free throughout, from the glottis to the nares.

This sufficiently completes, I think, the outline I proposed to give of facts observed repeatedly by myself, and verified by distinguished anatomists much more competent than myself to judge of them, at demonstrations made by me at the Royal College of Surgeons of England, at King's College Hospital and Guy's Hospital, London, and at the Hôpitals Salpêtrière and La Pitié, Paris.

I am not unmindful of the bearings these facts respectively have on questions of vital importance in daily practice; but the proposed scope of this paper precludes the consideration of them at length from that aspect.

THE WAY TO MAKE COMPLETE EXTENSION OF THE HEAD AND NECK.

Having, by bringing the patient to the edge of the table or bed, or by elevation of the chest, provided that the head may swing quite free,

With one hand under the chin and the other on the vertex, steadily but firmly carry the head backwards and downwards. The neck will share the motion, which must be continued until the utmost possible extension of both head and neck is obtained.

The degree of extension to be made simply to correct commencing stertor or irregularity of breathing must in each case naturally be left to the judgment of the operator. Simply shutting the mouth or pushing up a flexed chin may of itself give relief in some cases, because by either of these—as also by jerking forward the angle of the lower jaw, or by turning the head over upon the face—a jarring motion is communicated to the tongue; and by close watching I have observed that, if the head be not too much flexed to allow it, this in some cases causes the occluding tongue at some point in the mouth, but more often in the pharynx, to be slightly dislodged, the water test showing that the airway at that point has thus been slightly opened and is more permeable.

That there may be no possible mistake, however, about the all-important raising of the epiglottis, I wish this to be very precisely and distinctly understood; assuming the mouth to be shut and the inferior border of the inferior maxilla to be at a right angle with the cervical column, as in the average recumbent posture, the head must be continued to be extended from 30 to 35 degrees more before it is possible for the epiglottis to be affected at all. Not until after the skin from the symphysis to the sternum is quite tense do the relaxed muscles in question beneath it become tense at all. These being tense, from this point the elevation of the epiglottis begins. In a nut-shell: Make the line of skin from the chin to the sternum as straight as it can be made, and the complete elevation of the epiglottis is assured.

It is always better to make the extension rather more than rather less than appears to be necessary, because, while an excess can never do any harm, a slight insufficiency might bring to the operator failure, and to the patient death. The further effects of extension, as I have described them, upon the tongue, the velum palati, and the entire pharynx, with the establishment of a free post-oral airway, I wish particularly

to emphasise, cannot with certainty be secured except by making the extension of the head and neck quite complete, as directed.

My discovery of the failure of traction of the tongue to raise the epiglottis was to me only a great disappointment, for I had just been publishing what I thought to be an improved way of seizing the tongue for that purpose.

Over against the facts I have submitted I find is the dictum for which I had almost a reverence, but no counter-facts; for, to my surprise, a thorough search has up to this moment failed to discover a single record in which any observer states that he has himself seen the epiglottis raised by traction of the tongue, or in which any reference is made to anybody who has ever been said to have so seen it. Any other way of raising the epiglottis I could not find had ever been contemplated. In the midst of this dilemma I felt sure there must be some way of raising the epiglottis, and that which I have submitted I confess I did not discover until I had looked not a little.

Fig. 1.—The ordinary recumbent position, and the three anatomical obstructions of the airway always found in it, namely, a, the velum palati and uvula; b the dorsum of the tongue as indicated by the dotted lines; c, the epiglottis, each lying across the airway and against the posterior wall of the pharynx. Traction of the tongue, and what is done by it: The dorsum of the tongue drawn forward from dotted line to thick line b; the resistance at the firmum and genial tubercles d; the further resistance at the anterior pillars of fauces e. What is not done by it: The wavy relaxed hyo-epiglottic ligaments b are not straightened; hyoid bone below not raised; epiglottis c is not lifted.

I have ventured to call this way a new way. I do this not because I pretend to say that never before has the epiglottis been thus raised, but because till now we did not know how to do it. In a prize essay published by the Medical Society of the County of New York—I think in 1866—as well as in my lectures at that time in the University of New York, the position I described and illustrated for the treatment of apnoea is exactly that which inevitably raised the epiglottis; but I did not know it. The “tête-à-bas” position, which Nélaton found so useful in restoring breathing—in which he not only inverted the head, but the entire patient, his motive being hydraulic correction of the cerebral anemia which he said the chloroform induced, and by which it killed—where it did good, it elevated the epiglottis; but he did not know it.

The swinging by the feet as high backwards and forwards as possible, as I have seen practised on still-born children in Bonn; as also the trick of clucking under the chin, or of seizing and urging forwards the angle of the lower jaw—each of these practices, though done for the only and all-sufficient reason—“the good it did”—effected that good only in so far as it respectively raised the epiglottis. There is no evidence, however, that any of the operators knew it. I know that in 1870 Sir Joseph Lister wrote of pushing up the lower jaw as one of the things which may be tried before using forceps, but he gives no intimation of the way in which it may act to produce that relief beyond what I have already stated, Dr. Robert Bowles, of Folkestone, wrote in 1860, namely, by its drawing forward the tongue, and which, as I have said, a number of experiments by myself have quite failed to corroborate. The dorsum of the tongue, when the mouth is shut,

falling against the posterior wall of the pharynx, as much as when it is open. Neither by Sir Joseph Lister nor by Dr. Bowles, however, is the epiglottis once mentioned in this connection.

In this paper my purpose is confined to showing demonstrable facts as I have actually observed them, so I will not discuss the “inference,” as Sir Joseph Lister himself calls it, of the suggested elevation of the epiglottis by reflex irritation from the wounding of the tongue, except to remark that I find nothing in the epiglottis itself, nor any direct muscular attachment of it to anything outside of it, by which the always purely passive epiglottis could be thus raised. Its elevation is possible only through the medium of the hyoid bone, by which it is raised, if raised at all, mechanically, and in no other way.

Fig. 2.—Position of complete extension of head and neck. From symphysis of inferior maxilla, genio-hyoides, mylo-hyoides dotted lines k, tightly pull upward hyoid bone h, hyo-epiglottic ligament g, and make erect epiglottis at c. Tongue rests on horizontal roof of mouth; is further retained within its cavity by velum palati a, stretched tightly behind dorsum by dotted lines, palato-pharyngeal. Anterior enlargement of pharynx by dragging of sterno-thyroides, dotted lines d, in conjunction with dotted lines genio- and mylo-hyoides k. Antero-posterior enlargement by extension of cervical vertebrae on themselves, greatest opposite glottis e. Course of airway shown by upper arrow at posterior nares; post-aural airway at middle arrow; to trachea at lower arrow. The thyroid cartilage, epiglottis, and hyoid bone are much further from the posterior wall of the pharynx, and nearer the surface, and the antero-posterior diameters greater than here represented.

If it be desired to excite the respiratory act by reflex irritation, I am quite unable to understand why the cutaneous peripheral distribution of the nervous respiratory centres, Nature's special provision, should be passed over, and a comparatively inaccessible and less sensitive part should be selected for that purpose.

Any other laryngeal obstruction than those mentioned which seems sometimes to be vaguely implied or hinted at does not, I think, exist, as in the insensitive state I find the arytenoid cartilages are always widely separated, the chink of the glottis completely open.

I have called this way a new way, then, because, with the how and the why in it, this procedure enables us for the first time imperatively to raise the epiglottis, and know that we raise it. I have allowed myself to call this way the only way; but not lightly. That it is Nature's way is plainly seen in the frequently intense trismus, when apnoea threatens death—which in our ignorance we have deemed it imperative, by some means, or by any means however violent, to resist and overcome. Every day this (Nature's way) is seen, too, in the position instinctively assumed by the croupous, the diphtheritic, the asthmatic; in the position taken just before extraordinary efforts by the opera singer, the wrestler, and, too, in that of the dying. That, except through the hyoid bone, any surface procedure for raising the epiglottis is impracticable, I am confident; that it is the only available way known to us, I feel sure; that any way could be more

prompt is indisputable; that any way could be more simple, it would be hard to imagine. What I have endeavoured to show may be summarised as follows:—

1. Contrary to general belief, traction of the tongue, however and whatever the force employed, does not and cannot raise the epiglottis as supposed, because: *a.* The tractive force supposed to be exercised upon the epiglottis is arrested chiefly by the frænum linguæ, and through the muscular fibres within it is expended upon the inferior maxilla, into the genial tubercles of which they are inserted. *b.* The surviving force is expended almost entirely upon, and intercepted by, the anterior pillars of the fauces. *c.* For any tractive force which might survive, a continuous and sufficient medium for its transmission to the epiglottis is wanting.

Proof.—The glosso-epiglottidean fossa being filled with water while the body is erect, traction upon the tongue, however forcible, does not spill it.

2. The only way by which the epiglottis can be certainly raised is by extension of the head and neck; by this means its elevation is instant and complete, because: *a.* By a three-linked chain, in which the hyo-epiglottic ligament is the lower link, the body of the hyoid bone the central link; and the combined genio and mylo-hyoidei muscles the upper link, the epiglottis is so connected to the body of the inferior maxilla, that above a certain point, as the body of the lower jaw is moved upwards, the epiglottis instantly, irresistibly, and inevitably moves upwards exactly in unison till it is erect. The violent wrenching asunder of the clenched teeth, in proportion as it depresses the body of the inferior maxilla, antagonises a distinct effort of Nature to maintain the elevation of the epiglottis.

3. By extension of the head and neck carried to the utmost, the remaining obstructions from the backward-fallen tongue, the velum palati, and uvula, are also simultaneously removed, and the entire pharynx is enlarged throughout. Because: *a.* The tongue, the dorsum of which before fell by gravitation upon the then horizontal posterior wall of the pharynx, falls upon the now horizontal arch of the palate. *b.* The velum palati, by means of the great tension of the palato-pharyngei muscles, is pulled away from the posterior wall of the pharynx, the entire membrane being stretched tightly forwards and downwards, behind part of the dorsum of the tongue helping to complete the shutting of the tongue out of the pharynx and into the mouth, and, together with its dorsum, forming a partition—the anterior wall of a now post-oral air way, thus created and maintained. *c.* The pharynx, anteriorly, from the base of the tongue to the cricoid cartilage, is stretched strongly forwards by the extreme tension of the sternothyroid muscles. While above, the extension of the head by the occipito-vertebral articulation about 60 degrees shifts far forwards the anterior wall of the naso-pharynx, posteriorly, by the extension of the cervical vertebra upon each other, in all about 30 degrees, the entire part of the pharyngeal wall is shifted backwards, this being observable in the greatest degree, opposite, and just above, the now widely open glottis. Thus, as I have previously said, the upper airway, which before was an angular, flaccid canal, barely permeable, is now an enlarged but slightly curved tube, free throughout from the glottis, which in this position is above, to the nares below. It may be mentioned, too, that for tracheotomy this position makes the skin tense, and the parts beneath accessible and firm. For operations upon the naso-pharynx such as the removal of adenoid growths, the space concerned is greatly enlarged, and in all cases blood or other matters are thus precluded from draining into the trachea.

I have been asked, only this afternoon, to answer to-night a question, and if you will excuse an unintended digression, I will do so now. The question is this: If the pulling forward the tongue, as always practised, does not always raise the epiglottis, how do you account for the relief it always and unquestionably affords, the very evidence of which is in the continuance of its universal practice? I answer, the relief alleged I admit, in some cases, but in some cases only, and then, it is not by raising the epiglottis. In commencing irregularity of breathing the cause of obstruction is sometimes chiefly one thing, sometimes it is chiefly another. When, as often happens, the chief cause is a backward-fallen tongue, if the tongue be pulled forward, that cause is removed, but mark, nothing more is done, except that by the usual depression of the body of the lower jaw in the doing of it, any tendency to a falling of the epiglottis has been already favoured.

And now in turn let me make one remark, and ask also one question. Unfortunately, it is not true that pulling forward the tongue does afford relief always; on the contrary, there are occa-

sional cases in which it does no good at all, and it is these occasional cases which not exclusively, but chiefly, concern me.

For example, out of over thirteen thousand cases of death from asphyxia which during the past three years occurred in England alone, I have selected over one hundred, unequivocally attributed to the administration of anæsthetics—cases which, beyond reasonable doubt, received the most skilful treatment, and in which the tongue was conscientiously pulled forward in the recognised way—but they died. Of what did these unfortunate persons die?

I commenced this paper with the axiom, with which you all undoubtedly agree, that “in the insensitive state, or complete apnoea, the epiglottis falls backwards and closes the glottis.” “That in this condition the elevation of the epiglottis is the first thing in order and in importance, as without this, respiration, whether natural or artificial, is impracticable, and the result fatal.”

The question I have asked I should be sorry even to pretend to answer. How many of these deaths may have been due to alleged “constitutional peculiarity,” or the always convenient, and indisputable “heart-failure,” I cannot judge.

From all the facts which I have now presented, however, I am unable to avoid the belief that, in every instance, the epiglottis was not raised, but continued unlifted till death was complete. The perplexing, painful obscurity enshrouding many of these deaths, may, I think, hereby be somewhat lightened, and a certain proportion of them at least be fairly and intelligently accounted for.

It is a happy feature that instruments—the delays in getting them and in using them, the occasional violence and the wounding with them, yet the utter helplessness without them—are, in the procedure recommended, so entirely superseded.

These facts emphasise the still further observance of the well-known fact that the nose, not the mouth, is to be used for breathing. Before administration of anæsthetics, not the heart only, but the upper air-passages should be carefully examined. From the commencement and throughout inhalation the head should be as low as is consistent with convenience, and so arranged that no obstacles exist to instant complete extension, should it seem expedient. With these precepts observed, stertor will be an unusual occurrence, and always under control. As far as it goes, this applies also to ordinary sleep, in which the habitual snoring of some persons may be largely avoided simply by the use of a sufficiently low pillow.

From long habit, to most operators the inaccessibility of the tongue will be a cause of disquietude. To such I commend an actual inspection of its disposition as I have described it on the fresh cadaver, and as regards any obstruction from it, they will be at rest.

The order to be observed in the treatment of suspected apnoea is—1, to secure a completely free airway; 2, to induce the respiratory act by reflex action; 3, artificial respiration. Heretofore, with an unsuspected but closed airway, incomplete respiratory effort with slight heaving has sometimes been induced, but no breathing. Artificial respiratory motions have been practised, but often without respiration or exchange of air; hence have resulted inexplicable deaths.

The most important facts I have submitted are:—

1. That, contrary to universal belief, traction of the tongue cannot raise the epiglottis.

2. By sufficient extension of the head and neck, whether by volition, instinct, reflex action, or by the effort of another, whether in the healthy, the dying, or the dead, the epiglottis is instantly, and beyond prevention, made completely erect.

3. By complete extension of the head and neck the tongue and velum are as respiratory obstructions, simultaneously with the epiglottis, removed; and without a moment's delay the entire airway can be straightened, enlarged, and be made free throughout by the nearest person.

4. If syncope happens to be the chief factor, or only incidental, this also gets thus the quickest and best corrective.

The author expresses the hope, as he has the confident belief, that the facts above submitted will be found to be permanent additions to our means of averting death.

MEDICAL MAGISTRATE.—On the recommendation of the Lord Lieutenant of Lincolnshire, the name of Mr. William Harding Sissons, M.R.C.S., etc., Burton-on-Humber, has been placed on the Commission of the Peace of the Parts of Lindsey.