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ON THE LARYNGOSCOPE AND RHINOSCOPE.

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INTRODUCTION.—It is now almost a year since I had the pleasure and privilege of exhibiting to you the laryngoscope and rhinoscope in some auto-laryngoscopic and rhinoscopic demonstrations. You will recollect that I then displayed to you the larynx and its appendages, and the internal nares, with the turbinated bones, and the orifices of the Eustachian tubes. At that time nothing more was done than to exhibit the parts without any explanation. It is proposed in this paper to give an account of what I myself know in relation to the instrument, in the hope that my limited experience may benefit those who have no acquaintance with the practical workings of the instrument. It is perhaps unfortunate that such formidable names should be attached to such a simple instrument and such simple means of exploration. But as they have the great advantage of appropriate signification, and can be replaced by no better, the profession must excuse their employment. They should penetrate through the guise and distinctly understand that *this means of exploration is wholly within the reach of every practitioner, and that no physician is excusable who neglects to practise the examination of the laryngeal and nasal cavities.*

History.—Laryngoscopy is comparatively a very modern department of physical exploration. Rhinoscopy is of still later origin. As long ago as 1840, Liston suggested and employed laryngoscopy. Mr. Avery and Signor Garcia next followed. The latter gentleman has published some classical observations upon the effect of vocalization upon the larynx. It is, however, probable that the laryngoscope would now be comparatively unknown but for the labors and published observations and personal demonstrations of Prof. Czermak, of Prague, in Bohemia. This gentleman has made laryngoscopy a science, and has been very laborious, persevering and self-sacrificing in his endeavors to benefit his profession in this depart-

ment. He may be said to be the father of laryngoscopy. I had the pleasure of meeting with him in Paris, in the summer of 1862, and of witnessing his demonstrations in the Hôpital Laraboisier. He introduced me to Dr. Semeleder, of Vienna, who further demonstrated the *modus operandi* upon himself and upon the patients of the Gumpendorf Hospital. The visit of Dr. Czermak to London at the time of the Great Exhibition of 1862 was very well received, and he established so triumphantly the claims he asserted for his branch, that there has since arisen there some eminent and skilful observers, who have improved upon the instructions of their teacher, so that now London may be deemed a most important centre of instruction. Prof. Czermak waives the claim to the discovery, which is accorded to the English brain. Still, he stands first and foremost as the utilizer and practical demonstrator.

In this connection, I may allude to my own experience. When I was in my medical pupilage, sitting at the feet of the eloquent Professor of Anatomy and Physiology in the Massachusetts Medical College, his glowing descriptions and ingenious and successful demonstrations filled me with a longing desire to behold the living larynx *in situ naturali*, and to study the mode of the production of musical sounds and of the voice. I knew that in the book entitled "What to observe in Medical Cases," published by the London Society for Medical Observation, there was some allusion to a throat speculum; but no inquiry of mine sufficed to get me the instrument or give me an idea of its construction. I was forced to look within and around myself for the apparatus. It was not until the latter part of 1858 that I devised an instrument and sent drawings of it to the maker. The idea was derived from an Amici's prism contained within my microscope. It was for a long time a question with me whether the larynx could be illuminated and inspected with one ray of light. I conceived the idea of using the ophthalmoscopic reflecting mirror which is so commonly employed now. I thought that the temperature of the apartment should be raised to 98° to avoid the deposition of moisture upon the prism. I thought that a tube was necessary to hold the prism. I invented the name laryngoscope. In fact, Messrs. Clark, the telescope makers at Cambridgeport, made me my instrument. It did not work to suit me, and laying aside both it and my patience, I was roused up by Czermak's publication to find that I had the principles and the leading features all correct, but needed only a little more perseverance in manipulation to accomplish the desired results. It will be no wonder to you, then, that I take some interest in bringing to your notice the subject of the present essay. I shall attempt briefly to describe the instrument, its accessories, its method of employment, what can be seen by it, its uses, and its manufacture and employment as being within the reach of every practitioner of medicine.

The instrument.—The instrument is very simple. It is merely a plain

mirror mounted upon a wire, and provided with a handle long enough to reach into the pharynx. The mirror may be of polished metal or of glass silvered, as in ordinary looking-glasses, or by the reduction of the oxide of silver, as in the silvered glass door-knobs of the present day. Pieces of ordinary looking-glass answer well enough. The shape varies. That which Czermak used on himself was about one inch square, with rounded corners. This size I have found most convenient. The mirrors generally sold are too small. It was so in my own instrument. It is well to have several mirrors of different sizes, from one inch square downwards.

This mirror is set in a piece of metal, and at an angle of about 112° is attached by one corner to a wire of iron, known in commerce as No. 15. In the case of the looking-glass mirror, the fragment may be cut out by a glazier's diamond, the edges ground and the corners rounded by a fine-grained grindstone, and set in a piece of thin tinned iron. This should be as much larger than the mirror as twice the thickness of the mirror. Little square bits should be nipped out of the corners, so that the edges, when turned up, will nicely fit the sides of the glass. It can then be burnished and soldered to a moderately stout annealed iron wire, from four to six inches in length. Charriere supplies a perforated handle, which slides upon the wire and is set by a screw, thus enabling one to graduate the length of the instrument to the size of the mouth. I have found a good-sized bottle cork, perforated longitudinally, to answer very well indeed. Sometimes it is necessary to change the angle of the mirror with the staff, and when the wire is annealed it is easily bent as desired.

The Rhinoscope differs from the Laryngoscope only in size. It is smaller, three quarters of an inch square. Its angles and manufacture are the same as those of the laryngoscope.

The Accessories.—These are indispensable for securing illumination. They are first, *the light*. This may be the direct or reflected ray of the sun, or the direct or reflected ray of an artificial origin. This country is very fortunate in the universal employment of the kerosene lamp. The light from this lamp is superior, and can be obtained in the houses of the poor and the palaces of the rich. No better light is needed for laryngoscopic investigations. Dr. Semmler advises that one kind of light be used exclusively, either that of the sun altogether, or that of the artificial altogether.

(a) *Sun Light.*—When the direct ray of the sun is used, the patient or observer is so placed that the sun shines directly into the mouth. This can be best done at sunrise or sunset. In autolaryngoscopic investigations I have stood before a curtained window and drawn down the curtain so as to shield the eyes, but not the mouth, and have obtained very satisfactory views; but ordinarily, it is better to use some reflecting agent which will throw a horizontal ray into the mouth at any time of the day. I have devised a

simple stand for this purpose, which I have found to work well. It consists of a base (which in my stand happens to be a discarded hub of a wheel, sawn through the middle). Into this fits a stem, which may be of pine, or cane pole, or oak (a rake handle in my case), about four feet in length. This stem is divided by two joints into three pieces. The second joint turns at a right angle with the first. The joints I have made in two ways, which have answered well, but can be improved. In the first way, the stem is sawn across square. It is then sawn in the direction of the axis at right angles with the square end—for two to three inches; the corresponding portion of the stem is similarly sawn. The square ends are bevelled off parallel to the longitudinal cut. A piece of tinned iron is then fitted into the longitudinal cuts and secured by two screws, one in each contiguous segment of the stem. This gives a very good joint, and it may be strengthened by a piece of tinned iron tube slipping down over the joint. The second joint is similarly made, only its plane of motion must be exactly at a right angle with the plane of motion of the first joint.

Another joint may be made in the same manner as that just described, by dispensing with the tinned iron connection and sawing off one half of the segmental ends at the bottom of the longitudinal cuts, in such a manner that the ends fit each other, and may be secured by a screw, which may be regulated by a screw-driver, and the stem set at any desired angle. A small mirror is mounted on tinned iron soldered to a wire parallel to the long diameter of the mirror. This wire is inserted loosely into a hole bored into the free end of the stem, in the direction of its axis. This allows the mirror to be turned about freely, and, with the assistance of the two joints, I never have failed in getting a ray of the sun into the mouth. As the earth moves, the ray of the sun travels soon out of range, when the examination is protracted. I have then employed a large mirror, and given it into the hands of an assistant to hold. This has done well.

Artificial Light.—This may be used direct; but it is usual to employ reflectors. These may be the ordinary perforated ophthalmoscopic reflector, or concave reflectors of polished metal, say an old daguerreotype plate. These may be attached to (a) spectacle frame, (b) a band of vulcanized rubber surrounding the head of the observer, bringing the reflector upon the forehead, (c) to a simple handle to be held in the hand.

It is not necessary to strain the eye by peering through the perforation in the ophthalmoscopic mirror when attached to a spectacle frame.

An important accessory is a lamp with which to warm the laryngoscope, so that the moisture of the breath may not be condensed upon the mirror and the view obscured, which will be the case when it is below the temperature of the expired breath. The

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laryngoscope is held just above the flame, and then gently tested upon the cheek of the observer, to guard against burning the throat.

Two chairs are needed—they should be firm, strong, and that of the observer higher than the other. It is well to have a piece of chamois skin and napkins at hand to cleanse the mirror from mucus and saliva which will collect upon it. In auto-laryngoscopy, it is necessary to have a small mirror for the purpose of observation. This may be held in the hand or upon a stand, as Czermak did.

Method of Employment. (1) *Auto-laryngoscopy and Auto-rhinology.*

(a) *Direct Sun Light.*—Necessary articles—laryngoscope, hand mirror, lamp for heating. Stand in such a position that the sun will shine into the throat directly, and not shine into the eyes. Hold the tongue with the tip against the inside of the lower incisor teeth, depressing the longitudinal axis in the middle, and allowing the sides to rise close to the teeth. Warm the laryngoscope and test it upon the cheek, make the sound "ah" continuously with a tone which is represented by the letter F upon the upper line of the tenor and treble clef. Hold the hand mirror in the left hand, so as to command a view of the fauces. This is just above or just below the plane of the illuminating ray, taking care not to diaphragm off the ray from the throat. Hold the laryngoscope in the right hand, in the 6th position of the knife, or like a fiddle bow, having, of course, the back of the mirror directed towards yourself. Introduce the laryngoscope into the mouth so that the stem passes over the right molar tooth of the lower jaw, and the mirror comes under the uvula, or nearly against the posterior pharyngeal wall. The angle of the mirror which is attached to the stem may be turned to the right of the mouth or to the top of the mouth. A little patience and frequent trials, if the first does not succeed, will show you the epiglottis standing up straight, and seemingly at the back part of the throat, as the mirror reverses the position of things. You can see the white, glistening, inferior vocal cords, vibrating only a small segment of their length. If you can cease your sound and take a full breath, you can see, or we are told that you can see, the rings of the trachea, and perhaps the bifurcation of the primary bronchi. I have never recognized it yet. If you laugh, you see finely the superior vocal cords and the space between them. You see also the arytenoid cartilages. It is interesting to watch the changes of the inferior vocal cords in singing the diatonic scale, and trace the analogy to the vibrations, as far as length is concerned, with that of the viol strings. But you have got tired before this, and if you don't gag you will do well.

(b) *Auto-laryngoscopy by indirect or reflected Sun Light.*—Necessary articles, the same as in (a), with the addition of the laryngoscopic stand. Place the wire of the reflecting mirror in the hole in the extremity of the stem of the laryngoscopic stand described above. Arrange a chair in a convenient place. Throw the light, by chang-

ing the angles of the stem of the laryngoscopic stand, till it strikes about a foot above the back of the chair. Take your seat, and generally the light will fall into the mouth. If it does not, alter either your position or that of the mirror till it does come right. Then hold the hand mirror, the laryngoscope previously warmed and tested as above directed, and work quick, for the sun's apparent motion will take the ray out of your mouth. The appearances will be as before described.

(c) *Auto-laryngoscopy by direct artificial light. Necessary articles.*—A good clean kerosene lamp, with a steady flame; laryngoscope; hand mirror. Place the lamp and yourself in such a position as to illuminate the throat. Use the same precautions as given above, and you will obtain a view, but not a good one.

(d) *Auto-laryngoscopy by reflected artificial light. Necessary articles.*—Kerosene lamp, laryngoscope, hand mirror, reflector. The lamp should be placed as in ophthalmoscopy by the side of the head, behind the eyes of the observer, seated in a chair. The light may be thrown in by an assistant sitting in front and holding the reflector in the hand; on the head, over the eyes, or on the forehead. Or the reflector may be placed upon a stand. The precautions and steps to be observed are the same as mentioned above.

The difficulties that attend auto-laryngoscopic investigations are, first, gagging; second, attempts to vomit; third, weeping; fourth, the tongue's getting in the way; and, fifth, a want of proper holding of the head and neck. All these difficulties vanish upon repeated trials; the throat gets educated to the presence of the foreign body and the unusual demand upon it. I can now easily put my fingers against the uvula and posterior pharyngeal wall and hold them there for some time with convenience, which at first was impossible.

(2) *Auto-rhinoscopy.*—The illumination should be direct or reflected sun light, or reflected artificial light. The sun light is the best. The necessary articles are a lamp for warming, a hand mirror, and the rhinoscope. The positions are the same as the positions in laryngoscopy. The rhinoscope is warmed and tested on the cheek. It is introduced over the first molar of the lower jaw, right side. The attached angle of the mirror plate to the stem is placed downwards and to the right, so that the upper edge of the mirror makes an angle with the posterior bony wall of the pharynx. Of course the hand mirror is held in the left hand. Dr. Semeleder employs a fixed mirror for observation instead of the hand mirror, and uses a sort of hook to elevate and draw away the soft palate. In my own case, I have obtained good views of the turbinated bones, the nasal passages and the orifices of the Eustachian tubes *without* the palatine hook. I find these nasal investigations more nauseating than the laryngoscopic. These self-explorations are so easily conducted that the enjoyment afforded is richly worth twice the trouble.

(3) *Laryngoscopy Objective.*—Here are found the chief difficulties in this department of physical exploration. Sometimes the patient does not comprehend the instructions, gags, persists in pushing the tongue up in the way, or so contracts the muscles of the throat as to annoy if not frustrate the operator. All cases are not alike. Some hold these organs with perfect ease. But patience, perseverance and practice make way with the most disheartening obstacles. My experience in objective laryngoscopy is not so large as in auto-laryngoscopy. I cannot therefore speak so freely, but will endeavor to give you the methods as I have practised them.

The Illumination.—(a) Reflected sun light; (b) reflected lamp light. The artificial light is most used. I have liked the mirror held in the sun light by the hands of an assistant who may be an attendant or friend of the patient. The necessary articles are the laryngoscope, the lamp for warming, the reflector, the illuminating agent, two chairs—one higher than the other, a spatula to depress the tongue, or a clean pocket-handkerchief to draw the tongue forward.

Position of the Patient.—When the reflected sun's ray is employed, he should be seated in the lower chair in such a manner that the light will shine directly into the throat. A horizontal ray is best. He should hold his head somewhat forward and place both hands upon his knees in front of him. He should be instructed to press his tongue against his incisor teeth, depressing the middle line of the organ. A full and easy respiration should be practised, and all the parts relaxed. He should make a continuous sound, "ah," at the tone of the letter D on the fourth line of the tenor clef; or if a female, at the tone of the letter F, upper line of the treble clef. The observer should be seated in the higher chair, in front, and a little to one side, so as not to cut off the ray of light. The laryngoscope, warmed and tested, should be held in the right hand in directly the reverse position of that employed in auto-laryngoscopy. It should be introduced over the first molar tooth of the lower jaw, and brought near and under the uvula and soft palate, and turned so as to command a view of the larynx; the attached angle of the mirror should be turned towards the left of the patient's mouth, or towards the roof. The observer may move his head or the mirror till he gets a fair view. Generally the circumvallate papillæ and the root of the tongue are most distinctly revealed first, as it is a very natural thing for the patient to draw back his tongue. If this difficulty cannot be remedied by the patient, the observer may depress and pull forward the "unruly member" with the tongue-depressor, or the patient may hold it himself. Another excellent mode which I saw practised by Dr. Semeceder of Vienna, was to embrace the end of the tongue with a clean napkin, drawing it out over the incisors and holding it down close to the chin. This may be done by the left hand of the operator, or the right hand of the

subject. When the observer is ambidextrous, of course the hands can be changed to suit convenience.

When reflected artificial light is employed, the patient should be placed as in ophthalmoscopy, with the light on a stand by the side of the head and behind the eyes of the patient. The flame of the lamp should stand at about the same level as the mouth of the patient. The observer then sits as just described, with his reflector upon his forehead, held by an elastic band embracing his head or mounted upon a spectacle frame. By moving the reflector or the head, a ray can be thrown directly into the throat and the laryngoscope introduced as just directed.

One may understand all these details and the principles of the investigation, and yet fail from causes connected with the subject. There may be nausea, gagging, vomiting, generally there are tears, and the patient may make some movement of which his excitement renders him unconscious, and yet which defeats the examination. To obviate these, it is necessary to educate the throat, as the dentists do when they meet with the same difficulties in taking a cast of the mouth. This is done by the introduction of some smooth, innocuous foreign body into the fauces, and accustoming the parts to the contact of them. The dentists use a ball of wax, fastened to a bundle of flexible wires. A more convenient thing, is the hand and fingers of the patient. But care and perseverance will accomplish all that is desired. Because one is frustrated in a few attempts, there is no reason for discouragement.

Objective Rhinoscopy differs only in the size of the instrument, and in that the mirror is turned up instead of down. The directions for the position of the observer, subject, and the apparatus of illumination, are the same as for Laryngoscopy. The palate may be held up by Semeleder's palatine hook.

What may be seen by the Laryngoscope.—There is hardly a more interesting and instructive sight, to any intelligent person, than the inside of the living larynx. How many interests are associated with the functions of this organ;—Respiration, Phonation, and Cantation. Physiologists and musicians have long been puzzled about the production of the voice in speaking or singing. Now the mysteries have been somewhat unravelled. When a fair view is obtained of the healthy living larynx *in situ* and in action, the epiglottis is seen first standing upright. It appears to be at the further side of the throat, as the parts are reversed by the mirror. Opposite stand the aryænaoid cartilages. Between are the vocal cords, white, glistening, cartilaginous, the included aperture forming a vibrating chink of a length corresponding to the pitch of a sound made, which we suppose is that of the syllable "ah." The superior vocal cords appear passive, or rather hardly appear at all.

In order to see the ventricles of the larynx, the person whose organ is examined should laugh, or attempt to do so. This brings

out the superior cords nicely. Let a relaxed movement be made, as in yawning, and the glistening rings of the trachea are clearly perceived. I have not recognized the bifurcation of the trachea.

The movements of the internal parts of the larynx in the act of swallowing are interesting. Dr. Semeleder showed this to me. In the first place the inferior vocal cords close firmly together, forming step number one; next, the superior vocal cords close, forming step number two; lastly, the epiglottis covers the glottis, forming step number three. The several parts of this triple act are successive, distinct, and well defined. How admirable the wisdom and skill displayed by the Creator, in thus appointing a triple-valved sentinel to exclude foreign bodies from the delicate door-way of so vital an organ as the lungs.

In order to become familiar with the healthy color and appearance of the mucous membrane of the parts, one needs to make frequent acquaintance with his own and others' larynges. Only then can the morbid appearances, among which are excrescences and polypi—thickening or ulceration of the vocal edges—want of parallelism of the vocal edges in paralysis—diphtheritic and croupal deposits—ulceration of the epiglottis.

What may be seen by the Rhinoscope.—In the healthy nares you see the vomer, the turbinated bones, scrolled and covered with their mucous membrane (which, on cold winter mornings, I have observed to be of a deep purple color, like that of the injected wattles of a turkey cock), the orifices of the Eustachian tubes.

The uses of the Laryngoscope are physiological, diagnostical, operative and therapeutical. No one can now entertain a doubt that the larynx can be catheterized—therapeutical agents can be accurately applied to the diseased structures, laryngeal outgrowths can be removed by the laryngeal ceraseur, the diagnosis of the hitherto obscure affections mentioned above can now be made out, and the physiology of this most wonderful organ can now be more fully understood.

The Rhinoscope is useful in detecting syphilitic and other ulcerations of the nasal bones and posterior nares—nasal polypi, catarrh of the nares and of the Eustachian tube; the lachrymal and Eustachian ducts can be catheterized with precision. These are enough to render the instrument a boon to the physician.

The patients upon whom these means of exploration are practised are adults, although one London expert announces that children can be explored.

The employment and manufacture of these Instruments are within the reach of every physician. From the minute details given in the course of this paper, I hope that the making of the Laryngoscope is put within the reach of every physician at a very trifling expence. Broken fragments of looking-glasses can be found about every house; glaziers' diamonds are in every town; grindstones are on every

farm; tin workers are generally within reach; the sun shines everywhere; and perseverance, tact and ingenuity are traits of common cultivation. Let these instruments be adopted, not to supersede but to supplement the ordinary methods of exploration in these parts which are so often affected by disease, and which ordinary therapeutics fail to reach.

Woburn, Nov. 18th, 1863.

**CLINICAL DATA RESPECTING AMAUROSIS, MORE ESPECIALLY
RESPECTING THAT FORM OF IT SUPPOSED TO BE
INDUCED BY TOBACCO.**

BY JONATHAN HUTCHINSON, ESQ., F.R.C.S., ASSISTANT SURGEON TO THE ROYAL
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THE author stated that his attention had been drawn to the question of the possible influence of smoking in causing amaurosis by some papers which had recently appeared in the medical journals. He had collected together all the cases of true cerebral amaurosis of which he had taken notes during the past four years; they did not comprise all that had come under his care, but most of the more interesting ones. The cases quoted were 65 in number, and were allotted to three groups:—First, cases in which both eyes were affected and the patients were adults (47); secondly, cases in which both eyes were affected and the patients were children (11); and, thirdly, cases of amaurosis of only one eye (7). The subjoined table will show the relative proportion of the two sexes in each group:—

		Males.	Females.
Series I.—Symmetrical, and in Adults:—			
Cerebral amaurosis, uncomplicated (idiopathic)		37	3
Ditto, probably complicated or secondary . . .		3	4
Series II.—Symmetrical, and in Children:—			
Cerebral amaurosis, uncomplicated (idiopathic)		3	7
Ditto, probably complicated or secondary . . .		0	1
Series III.—Unsymmetrical (all ages)		3	4

In this table, all the cases in which there was good reason to suspect that the amaurosis was secondary to other disease were considered as complicated; in the others (idiopathic) he had been unable, on careful inquiry, to discover any satisfactory explanation of the disease. It would be noted that a most remarkable difference in the relative proportion of the two sexes existed in the idiopathic class of the first series, and that this discrepancy was not found in the other groups. Mr. Hutchinson then proceeded to inquire as to how this great disproportion (37 men to 3 women) could be explained. The possible influence, 1st, of different occupations; 2d, of intemperance; 3d, of sexual irregularities; 4th, of venereal diseases; 5th, of injuries; and lastly of tobacco, were severally exa-