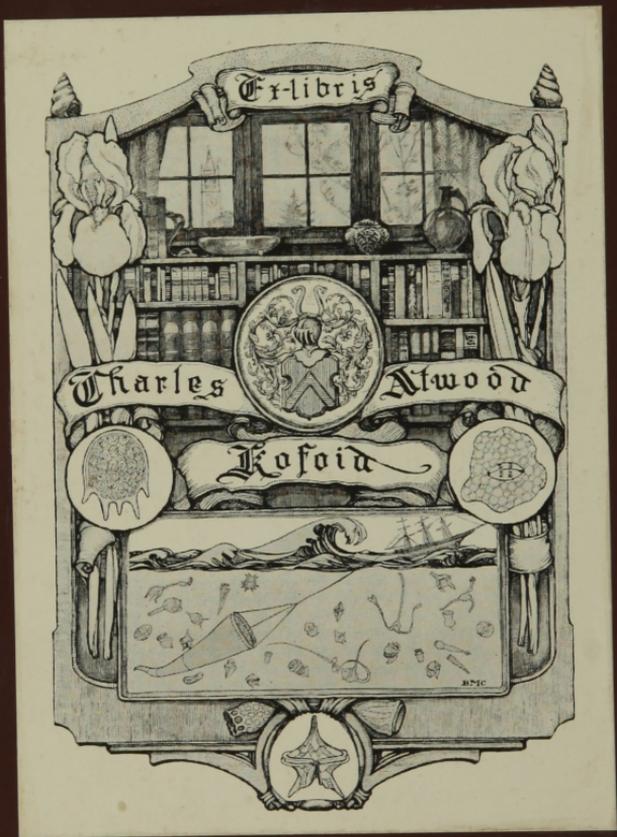
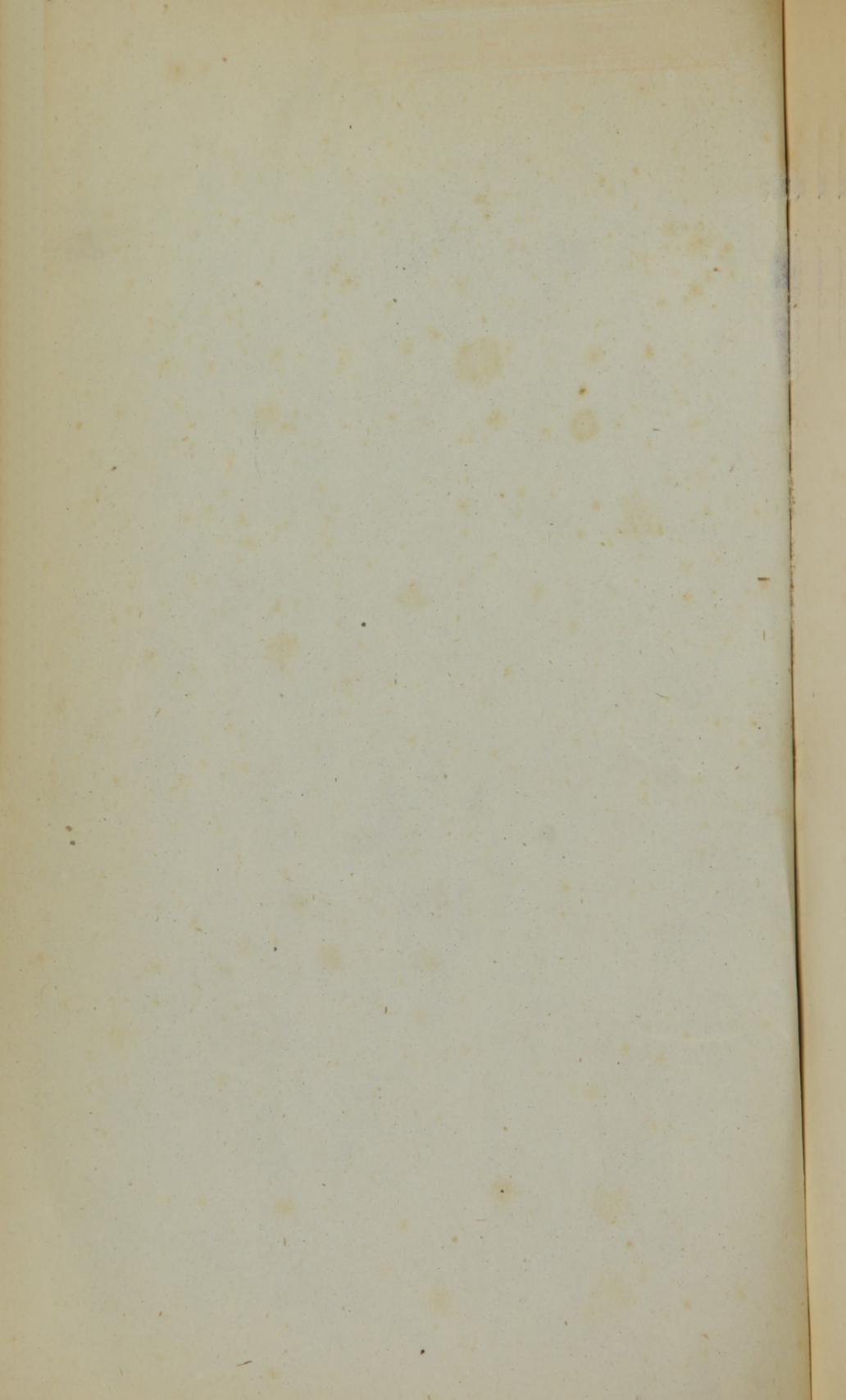


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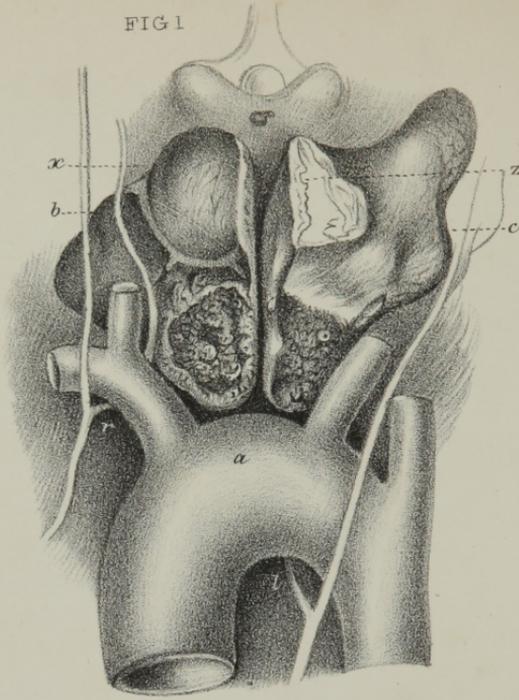


FIG 2

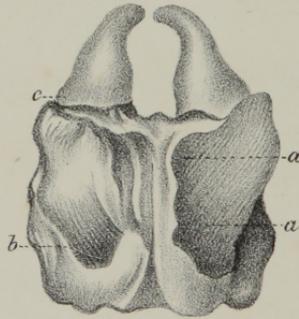


FIG 3



THE
USE OF THE LARYNGOSCOPE
IN
DISEASES OF THE THROAT:
WITH AN ESSAY ON
HOARSENESS, LOSS OF VOICE,
AND
STRIDULOUS BREATHING,
IN RELATION TO
NERVO-MUSCULAR AFFECTIONS OF THE LARYNX.

BY MORELL MACKENZIE, M.D.,
LONDON, M R. C. P.,
PHYSICIAN TO THE HOSPITAL FOR DISEASES OF THE THROAT, AND ASSISTANT
PHYSICIAN AND CO-LECTURER ON PHYSIOLOGY AT
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Second Edition.

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AUTHOR OF "INHALATION: ITS THERAPEUTICS AND PRACTICE," ETC.

WITH TWO LITHOGRAPHIC PLATES AND FIFTY-ONE
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P R E F A C E.

THE appearance in England of a second edition of Dr. Mackenzie's "Treatise on the Use of the Laryngoscope," within a comparatively short period after its reprint in this country, has rendered it necessary for the American publishers to make their edition equally complete. At their request I have incorporated into the present edition the new matter of the Second London Edition, and the Author's recent essay on "Hoarseness, Loss of Voice, and Stridulous Breathing," etc., but omitting the Appendix on Atrophy of the Vocal Cords. I have added some more explicit instructions with regard to the manipulation of laryngeal instruments, and have described some which are more readily procurable in this country than those of Dr. Mackenzie, and which my own experience has proved most serviceable. To have described all the numerous instruments which have been devised abroad and at home, would have been a useless labor.

J. SOLIS COHEN, M.D.

PHILADELPHIA, 723 BROWN STREET,

December, 1868.

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THE LARYNGOSCOPE.

CHAPTER I.

HISTORY OF THE INVENTION OF THE LARYNGOSCOPE.

“Honor belongs to the first suggestion of a discovery, if that suggestion was the means of setting some one to work to verify it; but the world must ever look upon this last operation as the crowning exploit.”—BAIN.

IT may seem strange to some that it was not till the middle of the last century that an instrument was invented for examining the lower part of the throat during life, nor till more than a hundred years later that that instrument was sufficiently improved and simplified to be capable of general application. The dentist's mirror seems to have been used from time immemorial,* and polished tubes for passing into the external canals

* In the Augustan age, dental surgery had attained a degree of perfection which implies the employment of mirrors for examining the inner surface of the teeth.—Celsus, lib. vii, cap. xii.

of the body, and thus obtaining an inspection, are of very ancient origin.*

A mere transfer of the dentist's mirror from the mouth to the back of the throat was not however sufficient to give birth to the laryngoscope; and the speculum (which is simply a rigid tube meant to press back the flaccid walls of a straight canal, and thus allow luminous rays to pass through it) was not applicable to the examination of a part situated at an angle to the line of vision. It was only by a combination of these two elements (reflection and illumination) that the interior of the larynx could be seen in the living subject. This fact, together with the circumstance that it was not till comparatively recently, that physicians attempted to discriminate between diseases of the fauces and those of the windpipe, will perhaps account for the non-invention of the laryngoscope at an earlier date. Whatever the cause may be, however, there is no trace of a laryngoscope before the middle of the eighteenth century.

* Some of my readers who have been in Italy may have seen the speculum found in excavating the buried city of Pompeii.

In the year 1743, and probably some years previously, M. Levret, a distinguished French accoucheur, whose highly inventive genius had led him to contrive surgical instruments of almost every description, occupied himself in discovering means, whereby polypoid growths in the nostrils, throat, ears, and other parts, could be tied by ligatures.* It is unnecessary to describe here, the various ingenious instruments which he invented for the purpose, and it is only requisite to observe that in using them he employed a speculum which differed from the various *specula*

* "Mercure de France," 1743, p. 2434. The extract from the "Mercure de France," which relates to the employment of the speculum, forms the first article of the appendix to M. Levret's well-known work "L'Art des Accouchemens" (second edition, Paris, 1761). In this article the term "Gozier" is used in one place, and "Gosier" in another. In the latter, the expression used is, "mais pour en appliquer l'usage [of the instrument for carrying the ligature] aux Polypes du Gosier, situés derrière la voile du Palais, il a fallu pratiquer . . ." From this, it may seem probable to some, that Levret, in using the term "Gosier," meant the posterior nares. Such an employment of the word would, however, be quite exceptional, and it is much more likely, that he referred to the "throat" generally. In the third edition of Levret's work (the only one I have had the opportunity of consulting) the particular extract from the "Mercure de France," which is quoted above from the second edition, has been omitted. I have to thank Dr. Christie, of Aberdeen, who was the first to call attention to Levret's claims, for very kindly copying the entire extract and placing it at my service.

oris then in use. It consisted mainly of a plate of polished metal (*plaque polie*) which "reflected the luminous rays in the direction of the tumor," and at the same time received the image of the tumor on its reflecting surface. It is evident that this little mirror was regarded as a mere appendix of that which Levret considered much more important,—viz. his method of applying ligatures; and that he did not recognize its value as a means of diagnosis in diseases of the larynx. The whole subject was soon lost sight of, and it was not till more than fifty years later that it again excited attention.

Then it was that a certain Dr. Bozzini, of Frankfort-on-the-Maine, made a great sensation throughout Germany, with his invention for illuminating the various canals of the body. About the year 1804, he first made known his ideas, which in the beginning were treated with derision. Gradually, however, the fame of the physician spread, the value of his invention was enormously exaggerated, and not only the professional press, but even political and literary journals, teemed with accounts of the wondrous apparatus. In the year 1807 Dr. Bozzini published a

work on the subject of his invention, entitled "The Light-Conductor, or Description of a Simple Apparatus for the Illumination of the Internal Cavities and Spaces in the living Animal Body."* About this time the public seem to have become still more impressed with the value of Dr. Bozzini's invention, and an absurd idea appears to have got abroad that the apparatus would enable practitioners to inspect, not merely the outlets of the body, but even the internal viscera. There was nothing in the work except perhaps its rather ambitious title to encourage this idea; but this did not save it from incurring the wrath of the profession. It is curious that the feeling against the invention should have been strongest in the very city, from which so many of the earliest and most valuable laryngoscopic observations afterward issued. The Faculty of Physicians of Vienna, in concert with the members of the Joseph's Academy, passed a very damaging

* "Der Lichtleiter, oder Beschreibung einer einfachen Vorrichtung, und ihrer Anwendung zur Erleuchtung innerer Höhlen, und Zwischenräume des lebenden animalischen Körpers." Von Philipp Bozzini, der Medizin und Chirurgie Doctor, mehrerer gelehrten Gesellschaften Mitglieder, u. s. w. 23 Seiten in Fol. geheftet. Weimar, 1807.

opinion on Dr. Bozzini's invention. They prefaced their admonition by remarking that "premature conclusions were likely to be arrived at concerning the instrument;" and "that perhaps even there might be an outlay of money (!!), which might afterward be regretted." They then went on to say that "only very small and unimportant parts of the body could be examined;" that "the illuminated spot was so small—its diameter being never more than an inch—that if a person did not know beforehand exactly what he was to look at, he would not generally be able to tell what part of the body was presented to view."*

This was the spirit in which Bozzini's invention was received; a description† of it will show that it deserved a better fate. It consisted of two essential parts: 1st, a kind of lantern; and 2dly, a number of hollow metal tubes (*specula*) for introducing into the various canals of the

* "Salzburg Med.-Chi. Gaz.," Feb. 23, 1807.

† I have not been able to find Bozzini's original pamphlet; but an abridgment of it appeared in the "Salzburg Medico-Chirurgical Gazette," February 26, 1807, and another in the seventeenth volume of Hufeland's "Arzeneikunde." The latter is illustrated with plates.

body. The lantern was a vase-shaped apparatus made of tin, in the center of which there was a small wax candle. The top of the apparatus was covered; but a large aperture at the upper part, and some holes in its base, allowed sufficient supply of air for the candle; the latter was fixed in a metal tube and forced upward by a spring, after the manner of a Palmer's lamp. In the side of the apparatus there were two round holes, a larger and smaller one, opposite each other. To the smaller one an eye-piece was fixed, to the larger the speculum was fitted. The flame of the candle came just below the level of these two apertures. The mouth of the speculum—a tube of polished tin or silver—was always the same size; but the diameter of the tube beyond varied according to the canal in which it had to be introduced. The apparatus was about thirteen inches high, two inches from before backward, and rather more than three from side to side. These measurements were considered necessary, in order that there should be sufficient space for the candle to burn steadily,

and that the lantern should not become too hot. The eye-piece was arranged to fit the eye, so that everything was hidden from view, except the spot seen through the speculum. It may be remarked, that the vase-shaped chamber lined with tin constituted, in fact, two concave mirrors, one behind and the other in front of the reflector; the posterior reflector (if the expression may be used) being perforated by a hole for the eye-piece, and the anterior by another for the speculum.

It is not necessary to enter into details concerning the different canals for which this "simple apparatus" was recommended; but the following quotation* shows that the requisites for making a laryngoscopic examination were fully appreciated by Dr. Bozzini: "*If a person wishes to see round a corner into a part of the throat,† or behind the palate into the posterior nares, the rays must be broken, and a mirror is required for illumi-*

* Hufeland's "Arzneikunde," Bd. xvii, S. 116.

† The word used is "Schlund." This term is now employed, anatomically speaking, for the pharynx; but it is often used to express the throat generally, and by Hilpert is considered synonymous with "Kehle," the larynx.

nation and reflection." In employing reflected light, Bozzini had the speculum divided by a vertical partition, so that there were, in fact, two canals and two mirrors. One of these mirrors was intended to convey the light, the other to receive the image. We know that this arrangement is quite unnecessary, as one mirror is able to serve both purposes. The annexed wood-cut shows Bozzini's speculum; it is seen to bear a strong resemblance to the instrument invented at a later period by Avery. (*See Fig. 3.*)

FIG. 1.

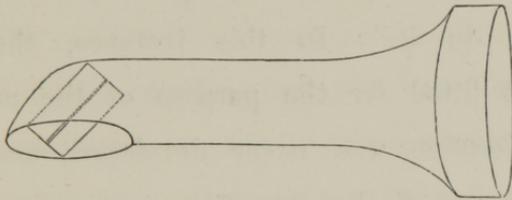


Fig. 1.—BOZZINI'S LARYNGEAL SPECULUM (*after Hufeland*).

The speculum was divided by a vertical partition, and two mirrors were placed at its extremity. In the drawing from which this is taken, the mirrors are directed upward, as they would be, when employed in rhinoscopy.

This ingenious apparatus has ceased to attract attention, and even the historical fact of its former existence was entirely overlooked for several years after the invention of the modern laryn-

goscope. Whether its neglect was due to the exaggerated expectations, and subsequent disappointment of the public, to the organized opposition of the profession, or to certain constructive defects in the apparatus, it is now impossible to say; but probably they all combined toward the same end. The elements of laryngoscopy were undoubtedly contained in the "Light Conductor;" but it has been justly remarked* by one of the greatest living writers, that "no art is complete, unless another art, that of constructing the tools *and fitting them for the purpose of the art*, is embodied in it." In this instance, the tools were not fitted for the purpose of the art; the latter therefore was never developed, and even the existence of the apparatus soon passed away from the burdened memory of the medical practitioner.

In the year 1827, twenty years after the publication of Bozzini's pamphlet, Dr. Senn, of Geneva, tried to examine the larynx of a little girl, suffering from difficulty of breathing, and

* "System of Logic," Introduction, § 7. By John Stuart Mill.

extreme dysphagia. The case was not a favorable one for the trial, and the attempt failed; but as Dr. Senn did not employ any means for throwing a light into the larynx, it is not likely that his efforts would, under any circumstances, have proved more successful. He did not, like Bozzini before and Babington after him, perceive that in laryngoscopy, two factors (illumination and reflection) must always be employed. The following are Dr. Senn's remarks upon the subject: "I had a little mirror constructed for introduction to the back of the pharynx; with it I tried to see the upper part of the larynx,—the glottis; but I gave up its use on account of the small size of the instrument. However, I believe that this method could be employed with advantage in the case of adults, and that in certain cases of laryngeal phthisis, it might assist in diagnosis."* Though this attempt was made in the year 1827, it was not recorded before the end of the year 1829; even then the account of the employment of the mir-

* "Journal des Progrès," 1829, p. 231, note.

ror was not embodied in the text of the report, but was merely appended as a note to the communication. The case was one of considerable interest, both on account of its general features, and especially from its having been one of the first in which a canula had been worn in the trachea for any length of time. It was particularly with reference to this circumstance, that the case had been brought before the Académie des Sciences on the 10th December, 1827.* In the published account of the séance there is no mention of any attempt at laryngoscopy.

In the year 1829† Dr. Benjamin Guy Babington exhibited, at the Hunterian Society of London, an instrument closely resembling the laryngoscope now in use. Two mirrors were employed by this physician: one, the smaller, for receiving the laryngeal image; the other, larger one, for concentrating the solar rays on the first. The patient sat with his back to the sun, and while the illuminating mirror (a common hand

* "Journal Général de Médecine," tom. cii, January, 1828.

† "Lond. Med. Gaz.," vol. iii, p. 555. London, 1829.

looking-glass) was held with the left hand, the laryngeal mirror—a glass one coated with quicksilver—was introduced with the right. By a very simple mechanism, a tongue-depressor was united with the laryngeal mirror, and thereby one of the most serious obstacles to laryngoscopy was attempted to be overcome. A spring was fixed between the shanks of the laryngeal mirror and spatula, in such a way, that, by pressing the two handles together, the tongue was depressed. At a later period (between the years of 1829 and 1835) Dr. Babington abandoned the attractive combination of mirror and spatula, and had mirrors made, which closely resemble those now in general use. The mirrors were made of polished steel, and were, like those now in use, inclined to the shanks at an angle of about 120° . Though Dr. Babington used his laryngoscope on many patients, there are no cases recorded in which the instrument was employed.

Priority of publication has long been the established touchstone, by which the disputed claims of inventors have been tested. Tried by this

FIG. 2.

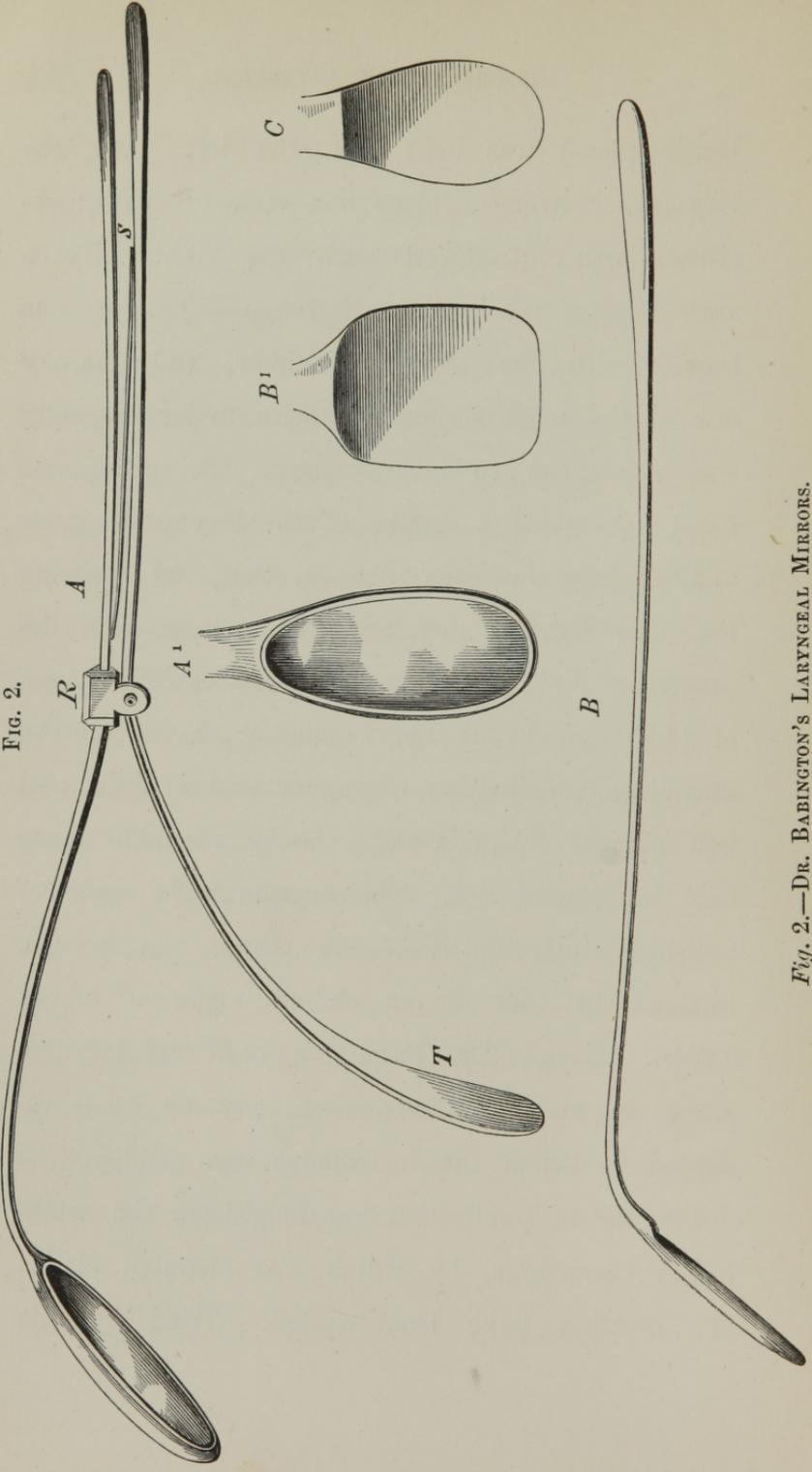


Fig. 2.—DR. BABINGTON'S LARYNGEAL MIRRORS.

DR. BABINGTON'S LARYNGEAL MIRRORS.

- A. The instrument from which this drawing was taken was exhibited by Dr. Babington at the Hunterian Society in 1829, and it was again shown, together with Dr. Babington's other mirrors, by me at the Medico-Chirurgical Society, April 27th, 1864.— (*Medical Times and Gazette*, vol. i, 1864, No. 723.)
- L. The laryngeal mirror. The steel stem of the mirror widens at one extremity into a frame which contains the glass.
- T. The tongue-depressor.
- R. A ring which connects the two instruments.
- S. A spring which presses the tongue-depressor down, when the two handles are held together.
- A¹. Front view of the mirror made in 1829.
- B. Side view of steel mirror made between the years 1829 and 1835.
- B¹. Front view of the same mirror.
- C. Oval mirror made between 1829 and 1835.

(These drawings are the exact shape and size of the instruments themselves.)

criterion, Babington must be regarded as the inventor of the laryngoscope; for while an account of his invention was published in London, in March, 1829, Senn's attempt to examine the larynx was not recorded in Paris till after August in the same year.* The claims of Babington, however, rest on something better than a technical basis; for while Senn merely attempted to employ a *laryngeal mirror*, Babington invented a *laryngoscope*. With the mirror alone it was impossible to see the interior of the larynx; but when a method of illumination was at the same time employed, the inspection became, if not easy, at any rate practicable. The only difference between Dr. Babington's laryngoscope and the one now in general use is, that while in the latter the light is thrown into the larynx (or rather on to the laryngeal mirror) by a circular mirror attached to the head of the operator, in the former the illumination was effected by a mirror held in the operator's hand. Dr. Babington, moreover, does not appear to have

* Dr. Senn's letter to the editor of the "Journal des Progrès," which accompanied the report of the case, is dated August. Probably it was not published till a month or two later.

employed artificial light; and his mirrors were of more clumsy construction than those now used. Those who have learned to use the laryngoscope, will readily appreciate the difficulties of illuminating the larynx with a hand mirror; while in this country, where the sun very often does not shine brightly for weeks together, the art of laryngoscopy could never have flourished till artificial light had been substituted for the uncertain solar rays.

In the year 1832,* while Babington was still working with his "glottiscope," to use the term employed by him at the time, Dr. Bennati, of Paris, asserted his ability to see the vocal cords. A mechanic named Selligue, who was suffering from laryngeal phthisis, had invented "a double-tubed speculum, of which one tube served to carry the light to the glottis, and the other to bring back to the eye the image of the glottis reflected in the mirror, placed at the guttural extremity of the

* "Recherches sur le Mécanisme de la Voix Humaine," p. 37, note. Bennati uses the expression "au moyen d'un speculum que j'ai imaginé." As Trousseau, however, speaks emphatically of *Bennati's experiments with Selligue's mirror*, and as there is no doubt that Selligue did invent a laryngeal mirror, I have adopted the view that his instrument was employed by Bennati.

instrument." A complete recovery rewarded the ingenious patient for his clever invention, and with this instrument Bennati professed to be able to see the glottis. Trousseau, however, disbelieved his statements, and devoted several pages of his well-known work* to prove, that the epiglottis formed an insuperable impediment to a view of the interior of the larynx. This renowned physician had an instrument constructed after the model of Selligüe's, but he does not appear to have attempted its use. It is worthy of note, that Selligüe's laryngeal speculum closely resembled that of Bozzini, for while the latter was made in one tube divided by a vertical partition, the former consisted of two tubes.

In the year 1838,† M. Baumês exhibited at the Medical Society of Lyons, a mirror about the size of a two-franc piece, which he described as being very useful for examining the posterior nares and larynx.

In the year 1840,‡ Liston, in treating of œdema-

* "Mémoire sur la Phthisie Laryngée." Par MM. Trousseau et Belloc. "Mémoire de l'Académie de Médecine," tome vi, 1837.

† "Compte Rendu des Travaux de la Société de Médecine de Lyons, 1836-38," p. 62.

‡ "Practical Surgery," third edition, p. 417. 1840.

tous tumors which obstruct the larynx, observed as follows: "The existence of this swelling may often be ascertained by a careful examination with the fingers, and a view of the parts may sometimes be obtained by means of a speculum,—such a glass as is used by dentists on a long stalk previously dipped in hot water, introduced with its reflecting surface downward and carried well into the fauces." When the real art of laryngoscopy was founded almost twenty years later, the name of our talented countryman was prominently associated with its invention. But it is obvious from the above passage, that Liston never contemplated an inspection of the vocal cords. It is plain that in his estimation the sense of touch was more to be relied on than that of sight; and the fact that the fingers were to be used, indicates pretty clearly that Liston was referring rather to the epiglottis than the parts below.

In the year 1844,* Dr. Warden, of Edinburgh,

* Royal Scottish Society of Arts. Description, with illustrations, of a Totally Reflecting Prism for illuminating the open cavities of the body, &c., &c. May, 1844. See also "Lond. Med. Gaz.," vol. xxxiv, p. 256.

conceived the idea of employing a prism of flint glass for obtaining a view of the larynx. The success which had attended his efforts to inspect the membrane of the tympanum, induced him to apply the principle of the prism to other canals. He reported two cases* in which he considered that he had had "satisfactory ocular inspection of diseases affecting the glottis." The possibility of inspecting the larynx in this way admits of no doubt,† but Dr. Warden's method of employing the prism was not calculated to bring about very favorable results. The particulars of one of the cases referred to are given, but in the other "the appearances were so far similar as to render their detail unimportant." The patient whose case is narrated was a lady, "who had been the subject of medical treatment for chronic inflammation of the pharynx of nearly a year's duration;" the inflammation had latterly spread in the direction of the glottis, and painful deglutition and paroxysms of suffocation now supervened. "After the pre-

* "Month, Journ. Med. Science," July, 1845, p. 552.

† See page 44.

liminary examination and *quietening the irritability of the parts by touch with the finger*, there was no longer any impediment or inconvenience experienced from the tendency to retching.

. *The dilator faucium was employed to depress the tongue and expand the isthmus of the fauces.*" The result of the examination was that the epiglottis was seen to be very much thickened and inflamed, "but it was only when efforts to swallow were made or repeated that the arytaenoid cartilages, in a similar condition of thickening, were raised out of concealment, and brought brilliantly to show their picture in the reflecting face of the mirror." For the purpose of illumination Dr. Warden employed "a powerful argand-lamp, with a large prism attached, so as to throw the full light of the lamp into the fauces and pharynx." That is to say, instead of the two plane mirrors we use (one for illumination, and the other for reflection), he employed two prisms. In concluding the report of these cases Dr. Warden remarks that "the experience afforded by both gives ground for the same conclusion, that the instrument made use of can

have no farther range than the bottom of the pharynx and mouth of the glottis,* and of the latter only so often as it is raised from its natural depth, by the contraction of the muscles employed in the act of deglutition. By this means, therefore, we can obtain no assistance in the investigation or treatment of diseases below the pharynx." It is not surprising that Dr. Warden should have expressed himself thus unfavorably concerning his attempts to examine the larynx. What with "quietening the irritability of the throat by touch with the finger, depressing the tongue, dilating the fauces, and encouraging the patient to swallow," it was utterly impossible for him to have succeeded. No disciple of Czermak could hope to see the vocal cords were he to prepare his patient in the way described by Warden; and when we remember how limited was his experience, and how imperfect his

* In using the expression "mouth of the glottis," Dr. Warden probably meant the upper opening of the larynx, that is to say, the opening bounded by the ary-epiglottidean folds. He could not possibly have imagined that in deglutition the true vocal cords would be left uncovered by the epiglottis. It should be borne in mind (especially in reading cases reported a few years ago), that the term "glottis," now very properly confined to the aperture bounded by the true vocal cords, had till quite lately a very vague signification. —See "Dunglison, Dict. Med. Science."

instruments, the appearances described by him can scarcely be regarded otherwise than the baseless fabric of a very imperfect vision.

In the year 1844, while Dr. Warden was still trying to employ the prism for examining the various canals of the body, Mr. Avery, of London, was seeking to accomplish the same end with the aid of the speculum and reflector. In principle Mr. Avery's laryngoscope was very similar to that now in use; and even in its details it did not differ widely from the modern instrument. Like Bozzini forty years previously, Mr. Avery perceived the value of artificial light, and like Czermak after him he employed a large circular reflector, perforated in the center for concentrating the luminous rays on the laryngeal mirror. The reflector was attached to a frontal-pad; and this was retained in its place by two springs which passed over the operator's head to the occipital protuberance, where there was a counter-pad. There were two defects, however, in Avery's apparatus: the one was, that the laryngeal mirror (instead of being fixed to a slender shank) was placed at the end of a speculum; the

other, that instead of employing the reflector for receiving the rays from a lamp placed on the table or elsewhere, Avery used his large circular mirror for the purpose of increasing the luminous power of a candle held near the patient's mouth. This candle was (like Bozzini's) a miniature Palmer's lamp, and was also attached to the frontal-pad.

A piece of bent wire terminating in a circular loop projected from the candle-lamp, and was meant to steady the speculum and keep its axis in a line with the hole in the reflector. The reflector was five inches in diameter, and the apparatus which had to be worn by the operator weighed altogether nearly a pound. For those who preferred it, however, the candle-lamp and reflector could be fixed into the top of the box, which contained the apparatus when not in use. The candle and the reflector, fixed in this way and placed on a table, bore a strong resemblance to the "Light-Conductor" of Bozzini, except that in the latter the light was entirely enclosed within the cavity of the vase-shaped lantern. By an ingenious double-rack movement, the reflector could be made to move either laterally

or horizontally. This arrangement allowed for considerable range of distance between the nose and eyes, a high or low forehead, &c., and thus permitted different people to employ the same reflector, and still have the circular hole always opposite the pupil. It was difficult, indeed almost impossible, to introduce Avery's speculum, without irritating the base of the tongue and other contiguous parts, and thus causing a disposition to vomit. This feature alone would have been sufficient to insure the failure of Mr. Avery's attempts at laryngoscopy, had not the cumbersome reflecting apparatus combined to produce the same result. The resemblance which Avery's laryngoscope bears to Bozzini's on the one hand, and to Czermak's on the other, is very striking. In all of them artificial light, circular reflectors, and small laryngeal mirrors were used. In the laryngoscope of Bozzini and Avery, the lamp and the reflector are combined, while in the modern instrument they are separate. The laryngeal mirror of Bozzini and Avery was placed at the end of a speculum; Czermak's was a modification of the dentist's mirror. Mr. Avery's invention was not placed

FIG. 3.

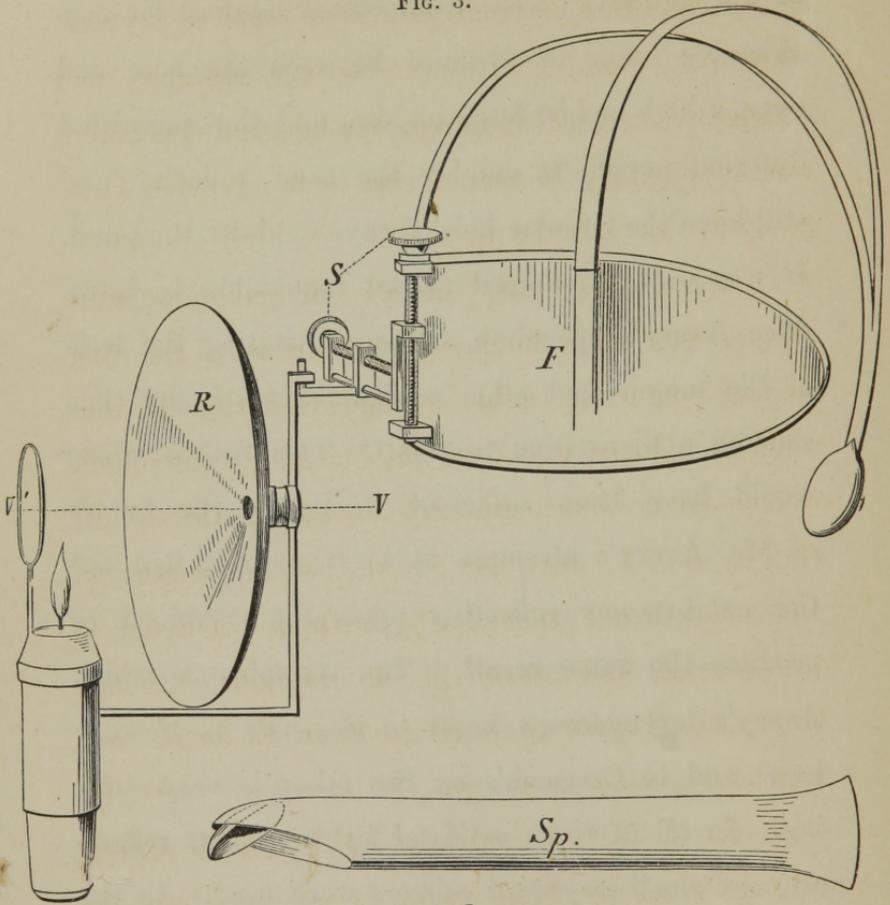


Fig 3.—AVERY'S LARYNGOSCOPE.

- F.* One side of the frontal-pad which supports the mirror. From it a double spring passes backward to a counter-pad which, when the instrument is worn, rests under the occipital protuberance. In the drawing, the occipital-pad is drawn forward by the unopposed strength of the spring.
- S.* Screws by which the reflector can be made to move laterally and perpendicularly.
- R.* Reflector.
- VV*¹. Line of vision.
- Sp.* The speculum.

on record* till some time after the modern laryngoscope had come into use. The laryngoscope from which the drawing on the preceding page was taken was supplied by Messrs. Weiss to the London Hospital, in the year 1846.

In the year 1854,† “the idea of employing mirrors for studying the interior of the larynx during singing” occurred to M. Maunal Garcia. He had often thought of it before, but believing it impracticable, had never attempted to realize the idea. M. Garcia, though long a distinguished singing-master in London, was a Frenchman by birth, and a Spaniard by descent; and though his observations with the laryngoscope were first published in England, they were first made in France.

In the month of September, 1854, while Garcia was spending the holidays in Paris, he determined to clear up his doubts concerning the possibility of inspecting the larynx. His efforts were crowned with success, and the following year he presented a

* “Med. Circ.,” vol. xx, June, 1862; and Introduction to the Art of Laryngoscopy,” by Dr. Yearsley. London, 1862.

† “Notice sur l’Invention du Laryngoscope.” Par Paulin Richard. Paris, 1861.—See M. Garcia’s letter to Dr. Larrey, dated May 4, 1860. (Page 12 in Pickard’s Pamphlet.)

paper to the Royal Society of London, entitled "Physiological Observations on the Human Voice."* This paper contained an admirable account of the action of the vocal cords during inspiration and vocalization; some very important remarks on the production of sound in the larynx, and some valuable reflections on the formation of the chest and falsetto notes. M. Garcia's laryngoscopic investigations were all made on himself; indeed, he was the first person who conceived the idea of an autoscopic examination.

His method, which he believed had never been employed by any one before, consisted in introducing a little mirror, fixed to a long stem, suitably bent, to the top of the pharynx. He directed that the person experimented upon should turn toward the sun, so that the luminous rays falling on the little mirror should be reflected into the larynx;† but he added in a foot note, that "if the observer

* "Proc. Royal Soc. London," vol. vii, No. 13, 1855. "Philosoph. Magazine and Journal of Science," vol. x, p. 218, and "Gaz. Hebdom. de Méd. et Chir.," Nov. 16, 1855, No. 46.

† It is worthy of note, that Garcia really never followed this plan, but, in point of fact, always used a second mirror for throwing the solar rays on to the laryngeal mirror. In the mirror which he used as reflector, he also saw the autoscopic image.

experiments on himself, he ought, by means of a second mirror, to receive the rays of the sun, and direct them on the mirror which is placed against the uvula." In practicing auto-laryngoscopy after the manner of Czermak, three mirrors are employed: one for illumination, another for introducing to the fauces, and a third to enable the observer to see the image in the mirror held in his own throat. Garcia employed only two mirrors: a small one at the end of a long stem for introducing to the pharynx, and a large one which served the double purpose of illuminating the little mirror, and enabling the operator to see the image formed on it. It will be seen that Garcia's method was precisely similar to that employed by Babington; the one, however, limited his observations to his own larynx, the other never made an attempt at auto-laryngoscopy. Garcia's communication to the Royal Society, though causing little stir at the time, was destined to experience a fate in many respects similar to that which befell the paper of our countryman, Mr. Cumming.* Treated with apathy, if

* "Transactions of Med. Chir. Soc.," 1846.

not with incredulity in England, both papers passed into the hands of foreign professors, and while Helmholtz matured the ophthalmoscope, Czermak developed the laryngoscope.

In the year 1857, during the summer months, Dr. Türck, of Vienna (who had read Garcia's paper), endeavored to employ the laryngeal mirror in the wards of the General Hospital. He was not successful, however, at first, and at the end of the autumn he seems to have abandoned his fruitless attempts. Trusting entirely to the solar rays, having no apparatus (no second mirror) for concentrating the light on the laryngeal mirror, and the latter being a clumsy hinged instrument, it was scarcely possible for him to succeed. When at a later period, however, Czermak proved the practical value of the laryngoscope, Türck put forth his claims to priority. Nevertheless, in the very communication* in which he asserted his pretensions, he observed that "he was very far from having any exaggerated hopes about the employment of the laryngeal mirror in practical medicine." This unfortunate remark shows

* "Zeitschrift der Ges. der Aerzte zu Wien.," April 26, 1858.

that he did not even then recognize the value of the laryngoscope.

In the year 1857, in the month of November, Professor Czermak, of Pesth, borrowed from Dr. Türck the little mirrors which that gentleman, in spite of the exhortation of his friends, had thrown aside as useless.* In a short time his superior genius, untiring perseverance, and natural dexterity enabled him to overcome all difficulties. When the dentist's mirror passed into the hands of Dr. Czermak, the examination of the larynx was dependent—so to speak—on the clock and the barometer, but he soon relieved it from both these troublesome monitors. Artificial light was substituted for the uncertain rays of the sun; the large ophthalmoscopic mirror of Ruete was used for concentrating the luminous rays; the awkward hinge which united the laryngeal mirror to its stem was dispensed with; and mirrors were made of different sizes. Thus it was that Czermak created the art of laryngoscopy. Others before him had contrived instruments, with

* Professor Brücke's Letter to Czermak. "Selected Monographs: New Syd. Soc.," vol. xi.

which they had sometimes succeeded in inspecting the interior of the larynx, but "the tools fitted for the art" of laryngoscopy were not constructed before his time. His first publication appeared in March, 1858,* and a month later a very important paper of his was brought before the Academy of Sciences of Vienna.† In claiming for Czermak the honor of having so modified the laryngoscope, that its application became comparatively easy, it would not be right to withhold from Dr. Türk the merit of having patiently and productively worked at the subject at a later period. A careful investigation of facts and dates, however, must convince every disinterested person, that Türk's subsequent successful labors were prompted by the proofs which Czermak had given of the value of the laryngoscope.

Czermak's investigations were at first confined to his own larynx, and his success must in part be attributed to his great physical advantages. Possessed of a most capacious pharynx, small tonsils

* "Wien. Medizin. Wochenschrift."

† "Physiolog. Unters mit Garcia's Kehlkopfspiegel," mit iii. Tafeln. Sitzber d. k. k. Akademie d. Wiss in Wien" vom April, Bd. xxix, p. 557 (Afterward reprinted in a separate form.)

and uvula, and a large laryngeal aperture, it would be difficult to find a subject better suited for laryngoscopy. Notwithstanding the beautiful simplicity effected by Czermak in the details of the laryngoscope, the profession might not have become impressed with the value of the instrument, had not his brilliant demonstrations delighted and astonished the medical public throughout Europe. The general employment of the laryngoscope in practical medicine must be attributed not less to his enthusiastic and universal teaching—to his brilliant demonstrations and personal influence, than to his entire remodeling of the instrument itself. The fact that no improvement has been made in the mechanism of the laryngoscope for the last five years, though a great number of practical men in all parts of the world have been constantly working at the subject, is the strongest testimony to the value of Czermak's labors.

CHAPTER II.

DESCRIPTION OF THE LARYNGOSCOPE.

DEFINITION.—An instrument for obtaining a view of the interior of the larynx during life. It consists of two parts: 1st, a small mirror fixed to a long slender shank, which is introduced to the back of the throat; and 2dly, an apparatus for throwing a strong light (solar or artificial) on to the small mirror. For thus projecting the luminous rays, most laryngoscopists employ a second (larger) mirror, which reflects the light from a lamp or the solar rays. When artificial light is employed, this illuminating mirror is slightly concave; when sunlight is used, its surface is plane.

SECTION I.—*The Laryngeal Mirror.*

THE laryngeal mirror may be made of polished steel, or of glass backed with amalgam. Though, on theoretical grounds, the steel mirrors give the more perfect image, they so readily become tarnished and rusty from the least moisture, are so immediately spoiled by the accidental contact of the medicated solutions used in treating laryngeal disease, and so soon become scratched in cleaning, that they

are not found convenient in practice. The glass mirror is generally mounted in German silver; for though the metal is too favorable to the rapid cooling of the mirror and the consequent deposit of moisture upon it, it is more easy to fix the shank of the instrument to a frame of metal than to any other substance of inferior conducting power. The mirrors should not be more than one-twentieth of an inch in thickness.

The reflecting surface of the laryngeal mirror may vary from half an inch to an inch and a quarter in diameter. It is well to be provided with at least three mirrors, varying in size between the dimensions specified.

For ordinary purposes a mirror about eight-tenths of an inch in diameter will be found most convenient. It may be of square, circular, or oval shape. The circular mirrors cause least irritation, except when enlarged tonsils are present. In these cases the oval mirrors are most suitable. The use of concave mirrors for magnifying the laryngeal image has been suggested (Wertheim); but while they only enlarge the image very slightly, their employ-

ment is objectionable optically, on account of the varying distance from the mirror of the parts reflected (Türck). The shank of the mirror should be of German silver; it ought to be about four inches in length, and one-tenth of an inch in thickness. It should be soldered* to the back of the mirror, so that the latter forms with it an angle of about 120°. The shank or stem of the mirror slides into a hollow wooden handle, and is fixed there by a screw. By this arrangement the stem can be made shorter or longer, according to the depth of the mouth from before backward in different cases. The handle should be about three inches in length, and rather more than a quarter of an inch in thickness.

By my directions some totally reflecting prisms have been constructed,† with which I have frequently examined patients and demonstrated my

* In the construction of the instrument, the shank should be bent at the desired angle before it is soldered to the back of the mirror; for if fixed to the mirror first, the angle (instead of being formed at the junction of the mirror and the shank) is obliged to be about one-tenth of an inch or more from the mirror. The space (viz. that between the mirror and the angle of the shank) which is thus lost would afford room for the employment of a larger mirror.

† By Mr. Ladd, of Beak Street.

own larynx. As the base of the prism is, however, necessarily almost a third larger than its refracting surfaces, the use of this kind of mirror implies a considerable loss of space. The prismatic mirrors are also much more difficult to introduce than the common flat ones, and the inferior surface of the prism is extremely likely to come in contact with the tongue; this, of course, for the time interferes with the passage of light through the prism. In the application of remedies to, or at all events in delicate operations on, the larynx, the projecting triangle of the prism is likely to be in the way. Finally, the prismatic mirrors are much more expensive and more easily damaged than the flat ones. These conclusions from my experiments with prismatic mirrors are briefly related here for the purpose of deterring others from fruitless trials of a similar character.

SECTION II.—*Illumination.*

For throwing a light on to the laryngeal mirror, and thus into the larynx, it will be found most con-

venient to employ a circular mirror about three inches and a half in diameter, with a small hole in

FIG. 4.

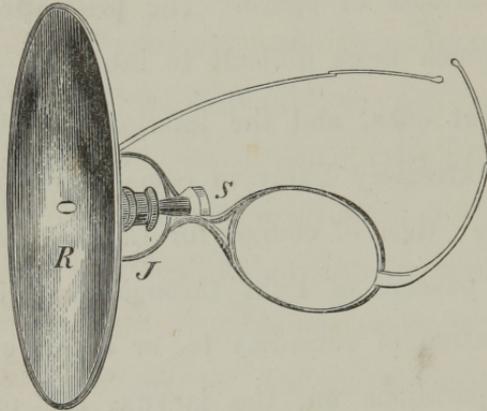


Fig. 4.—REFLECTOR ATTACHED TO SPECTACLE-FRAME.

At the back of the reflector (*R*) is a small cup, into which a ball connected with the spectacle-frame fits. A ring is screwed over the ball and the joint is thus formed at *J*.

its center.* When artificial light is employed, the mirror should be slightly concave and have a focal power of about fourteen inches; but when solar light is made use of, the surface of the mirror should be plane. The mirror may be attached in some way

* The reflector should not merely be left unsilvered in the center, but should be actually perforated. In the former case, the glass makes a slight focal inequality between the two eyes. Laryngoscopes, made in every respect according to my directions, are sold by Mr. Krohne, 241 Whitechapel Road.

to the operator's head, or fixed to a horizontal arm which is connected with the body of the lamp (Tobold). The former plan is by far the most convenient, and the mirror may be worn either opposite one of the eyes (Czermak), in front of the nose and mouth (Bruns), or on the forehead (Johnson, Mason, &c.). Of these positions, the first is on theoretical grounds the most perfect, the last the easiest in practice. It is only in the first position, however, that the observer can look through the hole in the reflector; if, therefore, either of the other methods is practiced, the reflector need not be perforated. The reflector may be attached to the operator's head either by a spectacle-frame (Semeleder), or by a frontal band (Kramer). In either case the mirror should be connected with its support by a ball-and-socket joint. The hole in the center of the reflector should be oblong, and when placed in front of the eye, its long diameter should correspond with the long diameter of the eye. A hole of this shape allows for the varying distance between the nose and eyes in different people, and for the varying

position of the center of the reflector, in its different degrees of inclination.

It should be remarked that, though the employment of the reflector greatly facilitates the inspection of the larynx, a laryngoscopic examination can be effected without it. In this case a strong light must be thrown directly on to the laryngeal mirror.

Any lamp that gives a bright steady light answers the purpose perfectly well. Many of the most valuable observations have been made with a common "moderator." An argand gas-burner will be found very convenient, especially if constructed so that it can be fixed at different heights. The power of the light may be advantageously increased by one or more lenses placed in front of the flame.

Various lamps or lanterns have been recommended by different foreign laryngoscopists (Tobold, Voltolini, Moura-Bourouillou, &c., &c.), but the arrangement of lenses in each of them is only applicable to the particular lamp for which it was contrived. This serious objection to the various kinds of illuminating apparatus hitherto in vogue, led me to contrive a

light-concentrator of more extensive application.* It not only gives a very brilliant light, but is at the same time much smaller, and therefore much more

FIG. 5.

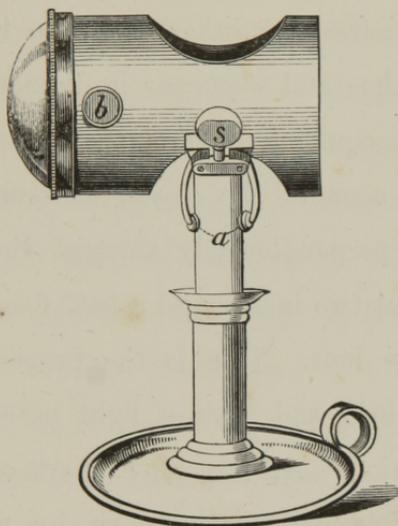


Fig. 5.—THE LIGHT-CONCENTRATOR.

In the drawing, the concentrator is fixed on to a candle by means of the two arms(*a*). In using a lamp, the arms embrace the chimney.

portable than any of those hitherto in use, and it can be employed with any kind of lamp, or even a candle. It consists of a small metal cylinder three and a half inches long, and two and a half in diameter. This is closed at one end, and at the other

* These "light-concentrators" are made for me by Mr. Mayer, of 51 Great Portland Street.

there is a plano-convex lens, the plane surface of which is next the flame. The lens is two and a half inches in diameter, and is about one-third of a sphere. In the upper and under surfaces of the cylinder (opposite each other) are two round apertures, two inches and a quarter in diameter. These holes are not equidistant from the two ends of the tube, but so near to the closed extremity, that a line passing perpendicularly through their centers would be about two inches and a half from the plane surface of the lens. This is the proper focal distance of the lens, and rays of light pass through in parallel direction. At the lower part of the tube are two semicircular arms, which by means of a screw at the side can be made to grasp tightly the largest lamp-chimney, an ordinary candle, or even the narrow stem of a single gas jet. The practitioner, therefore, who, in visiting patients, carries my light-concentrator, can always feel certain of being able to illuminate the fauces. The apparatus is passed over the chimney, till the center of the lens is opposite the most brilliant part of the flame, and then by a few turns of the screw, the concen-

trator is fixed in position. When a candle is employed, the flame is in the center of the tube.

In the side of the tube near the lens are two ivory knobs covered with cork, which enable the practitioner to hold the concentrator and remove it from the lamp, even when it is extremely hot. For the consulting-room the light-concentrator may be most advantageously employed either with an argand gas-burner, a parafine, moderator, or reading lamp. The latter kind of lamp made to burn parafine, or having an argand gas-burner, will be found most convenient, as it can be fixed at any height.

The light of a candle, strengthened by this concentrator, will be found to equal that given by an ordinary lamp. When the practitioner has only a center gaselier at his command, the light-concentrator should be applied to the only jet which is lighted, and as it is not generally possible to pull a gaselier sufficiently low down to make the examination in the ordinary way, under these circumstances, both patient and practitioner must stand upright.

Besides the concentrator just described, I have had a smaller illuminating apparatus constructed,

which is called my "miniature light-concentrator." The principle is the same in both; but in the latter the metal cylinder is only two inches in length, and an inch and a half in diameter; it is only suited for the small parafine lamp, which is sold with it. This lamp, which measures only four inches from its foot to the top of the chimney, is like a little phial, and has a metal screw stopper, so that it can be carried about with safety. Of the two, I recommend my larger concentrator, because in using the smaller apparatus, the body of light, though very brilliant, has, of course, a very small diameter; and if the practitioner is not very experienced, he will find it rather difficult to keep the reflector in the exact line of light. In the construction of an apparatus for increasing the light, it may be well to observe,—1st. That if a lens is used, it should always be placed at its exact focal distance from the flame: this causes the luminous rays to pass through the lens in parallel direction, and thus throws a body of light a considerable distance. 2dly. That since, when rays fall on a convex surface, a certain number are refracted, and do not pass through it, the plane

face of a plano convex lens should be placed next the flame. 3dly. That no mirror or reflector should be placed behind the flame for the purpose of strengthening the light; for any scratches or spots on it are apt to be reflected on to the illuminating mirror, and thence again on to the laryngeal mirror. This, of course, interferes with the distinctness of the laryngeal image.

It has been already observed that the employment of a reflector is not absolutely necessary for throwing a light on to the laryngeal mirror. When the observer does not make use of a reflector, the lamp must be placed very near to the patient's mouth, or else the luminous rays must be projected from a lamp in less close proximity by a lens placed in front of the flame. For this purpose either an ordinary plano-convex lens may be used, or a large glass globe about six inches in diameter, filled with water. The latter kind of concentrator (the so-called Schuster-kugel) was first recommended by Türk, and afterward adopted by Stoerck; but while the former has abandoned its use in favor of the reflector, the latter still employs it. This apparatus is also

recommended by Dr. Walker,* of Peterborough, who has greatly improved it by substituting an elegant metal frame for the cumbersome wooden affair of Stoerck. It gives a brilliant light, which is most intense, about twenty inches from the globe. As it is quite impossible to carry this enormous glass globe about, its use is necessarily confined to the practitioner's consulting-room.

A comparison of the respective merits of direct and reflected light, will show that the advantages are principally on the side of the latter. For merely making an examination, it is quite possible to employ a powerful direct light, but when both hands are employed, as in the application of remedies to the larynx, the management of the light becomes much more troublesome. When the observer has the reflector opposite his eye, it is obvious that the visual and luminous rays pass in precisely the same direction, so that when the larynx is illuminated, the observer can see, and when the mirror is inclined at the proper angle for seeing, the larynx is also illu-

* "The Laryngoscope and its Clinical Application." By Thomas J. Walker, M.D., Lond., &c. London, T. Richards, p. 13.

minated. When, however, the reflector is placed opposite the forehead or nose, the lines of vision and illumination, though very near each other, do not correspond precisely; when the reflector is thus employed, therefore, the larynx may be illuminated, but the observer may not be able to see. Nevertheless the angle of inclination between these two lines (viz. that passing from the forehead or nose, and that from the eye) is so very slight, that practically it is not a matter of much importance which method is employed. When, however, the luminous ray, instead of corresponding, or nearly corresponding with the visual ray, forms a considerable angle with it—as it must do when direct light is employed—there is a great probability of the two rays not falling within the area of the larynx. Again, in employing direct light, as the rays must pass to the mirror from the side (instead of from before backward, as in using reflected light), they have also a lateral deflexion, and are thus likely to illuminate only one side of the larynx. In employing direct light, the side of the cheek often throws a shadow on the laryngeal mirror, and in the application of

remedies the practitioner is apt to get in his own light. Practice may overcome all these difficulties, as has been proved by Dr. Walker; but the creation of unnecessary obstacles cannot be recommended.

The solar rays, or diffused light, on a bright day may be concentrated on the laryngeal mirror. In the former case the surface of the reflector must be plane, in the latter the usual concave mirror may be used. The patient should sit with his back turned obliquely to the window, and the practitioner opposite him. The sunlight in this way passes over the patient's shoulder to the reflector, and is thence projected on to the laryngeal mirror. In other respects the examination is conducted in the same way, as when artificial light is used.

Before finally dismissing the subject of illumination, a few remarks may be made on what has been called illumination by transparency.

If sunlight is concentrated on the side of the neck, and the laryngeal mirror is then introduced, a more or less distinct image is obtained. Even under most favorable circumstances, however, where the neck is thin and long, the image is not suffi-

ciently clear to be of any real value; while if the neck is short and muscular, or the glands are at all enlarged, nothing at all can be seen. This kind of illumination was first suggested by Czermak, though he does not attach any importance to it.

CHAPTER III.

THE ART OF LARYNGOSCOPY.

The proper employment of the already described instruments constitutes the art of laryngoscopy. It may be practiced by the physiologist for investigating the healthy appearance and normal action of the larynx, or by the physician for inspecting, and if possible improving the condition of the parts when diseased. It is only with reference to the last purpose that it will be here considered.

SECTION I.—*Principles of the Art.*

THE only principle concerned in the art of laryngoscopy is the optical law, that when rays of light fall on a plane surface, the angle of reflection is equal to the angle of incidence. A small mirror is placed at the back of the throat, at such an inclination that luminous rays falling on it are projected into the cavity of the larynx; at the same time the image of the interior of the larynx (lighted up by the luminous rays) is formed on the mirror, and seen by the observer. The mirror is held obliquely, so that it forms an angle of rather more than 45° with the

horizon. The plane of the laryngeal aperture (bounded by the epiglottis, the ary-epiglottidean folds, and the ary-tænoid cartilages) is also oblique, the epiglottis being higher than the apex of the ary-tænoid cartilage.

The annexed diagram shows the position of the different parts, and explains their reflection. Let m

FIG. 6.

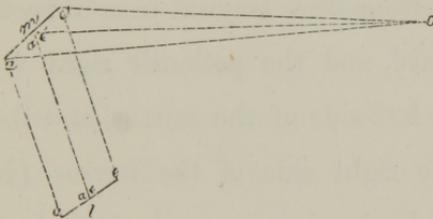


Fig. 6.—Diagram showing the relative positions of the planes of the larynx and laryngeal aperture.

represent the plane of the laryngeal mirror, l the plane of the upper opening larynx, and o the observer. In the plane of the larynx, a represents the ary-tænoid cartilages, ae the ary-epiglottidean folds, and e the epiglottis; the rays from these parts impinge on the mirror, as a' , $a'e'$, and e' , and are thence reflected to the observer at o . Thus the epiglottis, which is really the highest in the throat, appears at

the upper part of the mirror, the ary-epiglottidean appear rather lower and at each side of the mirror, while at the lowest part of the mirror are the ary-tænoid cartilages. These remarks apply to the antero-posterior reflection.

The lateral relation of parts in the image must now be considered. The mirror being placed above and behind the laryngeal aperture, the rays of light proceeding from the larynx pass directly upward and backward, and the patient's right vocal cord is seen on the left side of the mirror, and the left vocal cord on the right side of the mirror (just as the patient's right hand is opposite the observer's left, and his left hand opposite the observer's right). In examining a laryngoscopic drawing, a person must not make his own larynx the mental standard of comparison as regards right and left, but must recollect that the picture represents an image formed on a mirror held obliquely above and rather behind the larynx of another person. When the observer is looking at the mirror, he is not likely to make a mistake; but when the image is transferred to paper, the inclination at which the mirror is held is lost

sight of, and as the two sides of the larynx are symmetrical, that which really represents the right vocal cord appears as the left in the picture. The same remark of course applies to the left vocal cord, and indeed is of general application as regards the other parts on each side of the larynx. To make my meaning perfectly clear, let the reader take any laryngoscopic drawing in this book—say figure 23. Let him hold the book at the same angle that the mirror had when the drawing was taken; he will then have no difficulty in judging of right and left; and a small wart will be seen on the left vocal cord. Let him now place the book on a table (in the position in which it is usually looked at); in doing this, the plane of the paper on which the drawing is made will undergo a revolution of three-fourths of a circle. The arytenoid cartilages, which in the laryngeal mirror were farthest from, are now nearest to, the observer, and the epiglottis, which was nearest, is now farthest.

In this revolution, the image being as it were turned right over, and the two sides of the larynx being perfectly symmetrical, the right vocal cord in

nature becomes the left in the picture, and the small wart on the left vocal cord appears on the right in the picture.

SECTION II.—*Practice of the Art.*

The patient should sit upright, facing the observer, with his head inclined very slightly backward. The observer's eyes should be about one foot distant from the patient's mouth, and a lamp burning with a strong clear light should be placed on a table at the side of the patient, the flame of the lamp being on a level with the patient's eyes. The observer should now put on the spectacle-frame with the reflector attached, and directing the patient to open his mouth widely, should endeavor to throw a disk of light on to the fauces, so that the center of the disk corresponds with the base of the uvula. If the observer has much trouble in projecting the light on to the fauces, he will find it convenient to incline the reflector at a suitable angle before putting on the spectacle-frame. This may be done as follows:

Taking the spectacle-frame, with the mirror attached, in the hand, and fixing the joint so that the back of the mirror is parallel with the spectacle-frame, the outer edge of the reflector should be pushed rather more than a quarter of an inch forward or backward, according as the lamp is on the right or left side of the patient. If the observer has chosen his position and placed the lamp as directed, on putting on the spectacle-frame, a beautiful luminous disk will appear at the back of the throat.

The patient should be directed to put out his tongue, and the observer should hold the protruded organ gently but firmly between the finger and thumb of his left hand, the thumb being above and the finger below. To prevent the tongue slipping, the observer's hand should be previously enveloped in a small soft cloth or towel, and he should be careful to keep his finger rather above the level of the teeth, in order to prevent the frænum being torn. In cases that are likely to require local treatment, the patient should be taught to hold out his own tongue, in order that the operator may be able to introduce the mirror with his left hand, while with the right he applies the remedy to the affected part.

When the observer has practiced the two first stages, he should take a small laryngeal mirror about half an inch in diameter, and after warming its reflecting surface for a few seconds over the chimney of the lamp* (to prevent the moisture of the expired air being condensed on it), should introduce it to the back of the throat. Before thus introducing the mirror, in order to prevent its being unpleasantly hot, the practitioner should test its temperature, by placing it on the back of his hand. To pass the mirror to the back of the throat with as little annoyance as possible to the patient, the following method should be adopted: The handle of the mirror should be held like a pen in the right hand, and quickly introduced to the back of the throat, its face being directed downward, and kept

* A very ingenious plan of keeping the mirror at a suitable and uniform temperature, by the aid of the electric current, has been suggested, and indeed carried out by Dr. Henry Wright. At the back of the mirror is a small shallow cell, which contains a carefully insulated loop of platinum wire; this loop is in communication with a battery of two or three cells, by means of two fine copper wires, which pass through the hollow shank and handle of the mirror. This contrivance is calculated to prove useful in the consulting-room of those much engaged in laryngoscopy; but the fact that the mirror does not become dimmed, must not be regarded as a reason for keeping it a longer time than usual in the patient's mouth. Such a procedure could only end in failure.

as far as possible from the tongue. The posterior surface of the mirror should rest on the uvula, which should be pushed rather upward and backward,

FIG. 7.

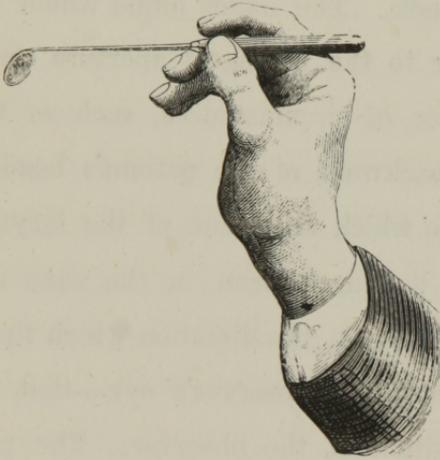


Fig. 7.—The position of the hand and mirror, when the latter has been properly introduced for obtaining a view of the larynx.

toward the posterior nares. When the mirror has been thus introduced without irritating the fauces, the observer should raise his hand slightly and direct it outward toward the corner of the mouth. This rotatory movement, which alters the inclination of the mirror, and turns its face more toward the perpendicular (while the hand is thereby kept entirely out of the line of vision), should be effected

rather slowly, so that it can be arrested directly the larynx comes into view. After introducing the mirror, the observer can, if he chooses, steady it, by resting the third and fourth fingers against the patient's cheek. The exact angle which the mirror should bear to the laryngeal aperture must depend on a number of circumstances, such as the degree of flexion backward of the patient's head; the particular angle which the plane of the laryngeal aperture bears to the horizon in the case undergoing inspection; and on the direction which the ray must take to reach the observer's eye—that is to say, on the position of the observer. The practitioner should learn to introduce the mirror with either hand, for by so doing any false ideas concerning a supposed asymmetrical condition will be at once corrected; but while for the purpose of diagnosis it is very desirable to be able to use either hand, in the application of remedies to the larynx, ambidexterity is absolutely essential.

Beginners in their anxiety to get a good view often give rise to faucial irritation, by keeping the mirror too long in the patient's mouth; the same

condition is also often produced by moving the mirror too much about at the back of the throat after its introduction. The practitioner should recollect that when an act of retching has once taken place, it is afterward often impossible to get a good view of the larynx at the same sitting. Moreover, the act of retching always causes considerable temporary congestion of the laryngeal mucous membrane, and thus is apt to lead the inexperienced to very erroneous conclusions. It is therefore better to introduce the mirror any number of times, keeping it in the throat only for a few seconds each time, than to let it remain longer, and thus limit the examination to one inspection. The novice must be careful to avoid touching the tongue with the mirror, for this procedure irritates the throat and spoils the reflecting surface of the mirror for the time. This can generally be avoided by keeping the back of the mirror in close proximity to, but not letting it touch, the palate. In some people, however, the uvula is in actual contact with the back of the tongue, and as in inspiration or vocalization the uvula is raised, such patients should be directed to

draw in their breath, or to produce some vocal sound (such as "ah," "eh," "oh," &c.); the mirror can then be easily slipped in between the uvula and the tongue.

The difficulties solely dependent on the practitioner's want of dexterity have been already considered, but a few words must be devoted to those in part due to the patient. The obstacle may be either undue irritability of the fauces, a peculiar action of the tongue, or a pendent condition of the epiglottis. As regards faucial irritability, it is to be observed that though this condition sometimes exists of itself, it is far more often caused by the clumsiness or inexperience of the practitioner. Most patients can be examined with facility at the first sitting, and only a small proportion require any training. With timid patients—especially women—on first using the laryngoscope, it is well to place the mirror for a second on the back part of the palate, without being too particular about seeing anything. By introducing the mirror once or twice in this way, the patient's confidence is secured, and a more fruitful examination may afterward be made.

For reducing the unusually irritable condition of the fauces, the internal administration of the bromides of potassium and ammonium has been recommended; but my experience has proved the total inutility of their employment. Some advise that the patient should be directed to inhale a few whiffs of chloroform; but in those rare cases, which present much difficulty, I have found the best effects result from sucking ice for about ten minutes before the mirror is to be introduced. The most irritable fauces cannot resist this plan. The conformation of parts sometimes causes some difficulty. Thus when the tongue is drawn out, it sometimes forms an arched prominence behind, which causes trouble in introducing the mirror, and difficulty in seeing it when *in situ*. It is due to reflex action, and will be best avoided by pulling the tongue less out than usual, keeping it level with the mouth (that is to say, not holding it down toward the chin), and by cautioning the patient not to strain. Enlarged tonsils sometimes embarrass the operator. In this condition a small oval mirror should be used.

An unusually large or pendent epiglottis causes a

more serious impediment to laryngoscopy. When the valve is very large, it sometimes shuts out the view of the larynx; but the same result is more often caused by unusual length or relaxation of the glosso-epiglottidean ligaments. In the production of high (falsetto) notes, the epiglottis is generally raised, and this also happens when a person laughs; the observer will therefore do well to take advantage of these physiological facts. In a certain number of cases, however, the epiglottis remains obstinately pendent. For elevating the valve in these cases, various instruments have been invented (by Voltolini, Bruns, Fournié, Lewin, and others), and I have myself had one contrived which has proved useful in some cases. (*See* page 48.) Most of the instruments hitherto invented, however, cause so much irritation, that they cannot often be employed with advantage. When the epiglottis covers the larynx in the manner described, the laryngeal mirror should be introduced lower in the fauces, and more perpendicularly than is usually suitable. In almost all cases, the ary-tænoid cartilages surmounted by the capitula Santorini can be seen, and from them we

can judge with tolerable certainty as to the mobility of the vocal cords; the state of the mucous membrane of the larynx in other parts cannot, however, be safely inferred from the condition of that which covers the arytænoid cartilages.

CHAPTER IV.

THE HEALTHY LARYNX (AS SEEN WITH THE LARYNGOSCOPE).

IT is not intended to enter into the anatomy of the different parts of the larynx as seen on dissection of the dead subject, for this is treated of in various works on general anatomy. In other words, the description will be confined to the internal surface of the larynx, and no mention will be made of parts, the contour of which cannot be seen in the mirror. The rationale of the formation of the image has already been explained (page 59), the special description of its individual parts will therefore be now undertaken. In some cases, on introducing the laryngeal mirror, only the epiglottis may be visible, with perhaps just the tips of the capitula Santorini at the posterior part; while in others the entire length of the vocal cords, the ventricular bands (false vocal cords), the small cartilages above the

glottis, the large cricoid cartilage, the rings of the trachea, and perhaps even the bifurcation of the

FIG. 8.

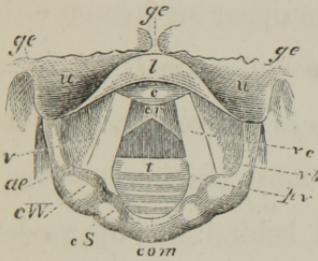


Fig. 8.—Laryngoscopic drawing, showing the vocal cords drawn widely apart, and the position of the various parts above and below the glottis, during quiet inspiration.

- ge.* Glosso-epiglottidean folds.
- u.* Upper surface of epiglottis.
- l.* Lip of epiglottis.
- c.* Cushion of epiglottis.
- v.* Ventricle of larynx.
- ae.* Ary-epiglottidean fold.
- cW.* Cartilage of Wrisberg.
- cS.* Capitulum Santorini.
- com.* Arytænoid commissure.
- vc.* Vocal cord.
- vb.* Ventricular band.
- pv.* Processus vocalis.
- cr.* Cricoid cartilage.
- t.* Rings of trachea.

FIG. 9.

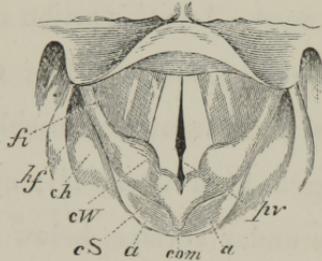


Fig. 9.—Laryngoscopic drawing, showing the approximation of the vocal cords, and the position of the various parts in the act of vocalization.

- fi.* Fossa innominata.
- hf.* Hyoid fossa.
- ch.* Cornu of hyoid bone.
- cW.* Cartilage of Wrisberg.
- cS.* Capitulum Santorini.
- a.* Arytænoid cartilages.
- com.* Arytænoid commissure.
- a.* Arytænoid cartilages.
- pv.* Processus vocalis.

bronchi below it, can be seen with perfect distinctness. The view varies in different cases between these two extremes.

The epiglottis varies very much in appearance in different individuals; for it may be large or small, broad or narrow, long or short. In most cases there is seen—1st, A portion of its upper surface on either side (*u*); 2dly, its free edge and a small portion of its under surface turned up in the center, and forming a kind of lip (*l*); and 3dly, another portion of its under surface, below and behind the lip, projecting as a rounded prominence,—the cushion (*c*). The upper surface is of a dirty pinkish hue; the lip is of a decided yellow color, though it has a slight shade of pink; and the cushion is invariably bright red. In some cases the whole of the under surface of the epiglottis is seen, and then it is of a bright red color. This normal coloration of the under surface of the epiglottis is apt to be mistaken (by those unaccustomed to the use of the laryngoscope) for congestion of the mucous membrane.

In some cases the epiglottis is broad (see Fig. 21, page 129), while in others it is extremely narrow (Fig. 26, page 138); and while in some people only the upper surface can be seen (Fig. 24, page 134), in others, where the epiglottis is drawn tightly to

the tongue, only the under surface is visible (Fig. 21, page 129). In the center of the free edge is a slight notch (Fig. 21), which gives to the epiglottis, when seen in its entirety, its foliate appearance. But the free edge of the valve is more often turned upon itself, so that in the reflection, the notch is lost sight of, and the border appears round (Figs. 8, 9, and others).

In some cases, on account of the inclination of the epiglottis, only the profile of its free edge is visible in the mirror (see Fig. 25, page 136). In these cases the valve is represented by a thin line. Above the epiglottis, the glosso-epiglottidean folds (*g e*) may be seen, passing upward and backward to the tongue; the profile of the latter—that is to say, of its posterior superior border—is seen as a horizontal line, which, on account of the projecting papillæ, is somewhat uneven.

The ary-epiglottidean* folds (*a e*), which form the lateral boundaries of the upper laryngeal aperture, can be seen in the mirror extending obliquely downward and backward from the epiglottis to the ary-tæ-

* On account of the extreme length of the term ary-tæno-epiglottidean folds, following the Germans, I have dropped the third and fourth syllables of this unnecessarily and inconveniently long word.

noid cartilages. Near the latter are the slight pinkish prominences of the cartilages of Wrisberg (*cW*), and a little beyond the cartilages of Wrisberg, in the same fold of mucous membrane, are two other small prominences, the capitula Santorini (*cS*), surmounting the arytænoid cartilages.

The cartilages of Wrisberg generally appear round, but sometimes, especially in thin people, they have a triangular shape,—the apex of the triangle being directed outward. The capitula Santorini have a roundish shape in the healthy larynx. Both these cartilages are most distinct when the vocal cords are approximated, but the clearness with which these small laryngeal cartilages can be seen, depends upon their degree of development, and also upon the amount of submucous areolar tissue surrounding them; sometimes the cartilage of Wrisberg is not to be seen at all, while occasionally there are small cartilages between it and the capitula Santorini. The breadth of the ary-epiglottidean folds varies in different people, and in different states of the larynx, appearing broad when they are relaxed, that is in inspiration, and narrow when they are tense, as in the approximation of the cords,—especially in the

production of high notes. The ary-epiglottidean folds have been well described by Stoerck, as having almost the same color as the gums. The cartilages of Wrisberg and Santorini are of a rather lighter color than the rest of the mucous membrane.

The arytaenoid cartilages (*a*) are usually recognized by the small cartilages of Santorini which surmount them. They can be best seen when the vocal cords are approximated. The mucous membrane covering them is generally of a rather redder tinge than that forming the ary-epiglottidean folds. Between the arytaenoid cartilages is a fold of mucous membrane, the inter-arytaenoid fold or commissure, which is most apparent when the glottis is widely open (Fig. 8, *com*); when the arytaenoid cartilages are approximated, the commissure folds together, and is directed backward (Fig. 9, *com*). It is of a yellowish-pink color.

The ventricular bands (*vb*), commonly called the false vocal cords,* are the folds of mucous membrane

* *Note on Nomenclature.* The retention of the term "false vocal cords" not only perpetuates the memory of a physiological error, but makes it necessary to qualify the real vocal cords by the term "true." While a subject attracts but little attention, its nomenclature is not

which are seen below the ary-epiglottidean folds, passing obliquely in the antero-posterior diameter of the larynx, from the ary-tænoid cartilages to the epiglottis. They are thick, rather prominent, and of a deeper red color than the ary-epiglottidean folds. Being rather thinner, and more prominent at their lower edge (which borders on the ventricle) than elsewhere, this part has a lighter tint when illuminated than the rest of the ligament. When the vocal cords are approximated, a small depression may be seen near the epiglottis between the ventricular bands below and the ary-epiglottidean folds above, which I propose to call the fossa innominata (*fi*).

The openings of the ventricles (*v*) can sometimes be seen, as dark lines, between the ventricular bands and vocal cords. They are best seen in the healthy

a matter of much importance, but when, on the other hand, it excites general interest, incorrect or inconvenient terms should be carefully avoided. The upper ligaments of the larynx have, in their normal state, no direct influence on vocalization, but merely bind the ventricular orifice. In calling these ligaments "ventricular bands," I may observe that the corresponding term, "taschenbänder," is beginning to be used in Germany. In support of my nomenclature I may further observe, that if the ventricular bands were called the superior ligaments of the larynx, the vocal cords would become, by contradistinction, the inferior laryngeal ligaments. The mistake of giving such a name to parts having so important a function would be manifest to every one.

larynx of a thin subject—especially when there is a slight disposition to spasm.

The vocal cords (*vc*), when visible, cannot be mistaken. They are seen as two pearly-white cords, passing from the base of the arytaenoid cartilages to the angle of the thyroid cartilage. On inspiration, they are seen almost to touch each other at their anterior insertion, but to be separated from a quarter to half an inch posteriorly. On phonation they become parallel, and appear to approximate. Each vocal cord is seen to terminate in the angle at the base of the arytaenoid cartilages, called the vocal process (*vp*). On inspiration, this angle is directed outward, and the glottis has a lozenge shape; but when the vocal cords approach one another, the angle is turned inward. This process divides the inter-cartilaginous and inter-ligamentous portions of the glottis.

Below the vocal cords, appears the broad yellow cricoid cartilage (*cr*), and below it again the rings of the trachea (*t*), are seen elevating the mucous membrane, which between them is of a pale pink color. Occasionally, two indistinct dark rings (the

openings of the bronchi), on either side of a bright projecting line (the angle of division between the bronchi), indicate the bifurcation of the trachea. In some rare cases a ray of light may be thrown down the right bronchus.

Though external to the larynx, it is necessary to mention the hyoid fossa (*hf*), in which foreign bodies are extremely likely to become lodged. It is bounded on the inner side by the ary-epiglottidean folds, and on the outer side by the inner surface of the thyroid cartilage. Projecting from the outer wall and sometimes forming the floor of the fossa, the greater cornu of the hyoid bone is sometimes seen glistening beneath the mucous membrane.

CHAPTER V.

ACCESSORIES OF LARYNGOSCOPY.

SECTION I.—*Auto-laryngoscopy.*

THOSE who desire to acquire dexterity in introducing the mirror at their own expense, rather than that of their patients, or those who wish to demonstrate their larynx to others, should learn to employ the laryngoscope on themselves.

When auto-laryngoscopy is practiced, it is requisite that, besides the circular reflector and laryngeal mirror, another mirror should be used: this must be placed in such a position that the image reflected in it from the throat-mirror can be seen by the auto-scopist.

For practicing auto-laryngoscopy, Professor Czermak contrived a special apparatus. It has a large reflector and quadrilateral mirror, each supported on perpendicular bars. These mirrors are fixed about a foot apart, and both can be turned in almost any

direction, and fixed at any height. In using this apparatus, the observer should sit at a table with the quadrilateral mirror a few inches in front of his mouth, and the reflector again a foot further back. The flame of the lamp should be near the quadrilateral mirror, the upper edge of which should be level with the lower edge of the reflector behind it. The observer now throws the light into his fauces with the reflector, introduces the warmed laryngeal mirror, and sees the image in the quadrilateral one. People facing the demonstrator can see the image in the laryngeal mirror, and those behind him in the one which he looks at. For those who wish to make accurate physiological observations, this is the best method of practicing auto-laryngoscopy.

Those who object to purchase a special apparatus can use the ordinary reflector for auto-laryngoscopy. In this case, all that is requisite is a perpendicular telescope-bar, capable of being made about a foot and a half in length, and having a broad firm base: at the top of the bar is a small projecting ball, which fits into the socket at the back of the ordinary reflector. The reflector is placed on a table, at about

eighteen inches from the observer, between whom and the reflector there must be a small toilet mirror or hand glass, the frame of which ought not to be very thick. In other respects, the examination will be conducted as already described.

A very ingenious, useful, and simple method of practicing auto-laryngoscopy has been recommended by Dr. George Johnson. The observer puts on his ordinary reflector, as though he were going to examine a patient, and sits facing a toilet mirror. A lamp is placed on the left side of the observer, in a line with the mirror, or slightly behind it. The observer now, by manipulating the reflector, throws the light on to the image of his fauces, as seen in the toilet glass. He then introduces the laryngeal mirror into his throat, and the image of the larynx formed on it is seen in the toilet glass, both by the demonstrator and by persons standing behind him. In practicing auto-laryngoscopy in this manner, the practitioner has to manage the light in the same way as in examining patients, and he thus learns to overcome one of the difficulties of laryngoscopy. The only disadvantage of this method, as

compared with that of Czermak, is that by it the rays of light undergo an additional reflection before they reach the larynx, and thus the image is not quite so distinct.

SECTION II.—*Recipro-laryngoscopy** (or the *Demonstration of a Patient's Larynx to others*).

In seeing patients in consultation, the laryngoscopist may often desire to have the benefit of the opinion of a colleague, who may not himself be able to use the laryngoscope; or a teacher may desire to demonstrate a patient's larynx to students. The inconveniences of showing the larynx to a third person in the ordinary way have been pointed out by Dr. Smyly, of Dublin, and he has contrived a means of overcoming them. To use his own words: "In the ordinary method, when the examiner has a full view of the vocal cords of the examinee, he calls

* Laryngoscopy is the term used when one person examines another's larynx. Auto-laryngoscopy means the examination of one's own larynx. Recipro-laryngoscopy expresses that particular mode of practicing the art, in which a person's larynx is reciprocal to two or more people. If any one can suggest a less pedantic, but equally correct term, I shall be ready to adopt it.

upon his colleague to view the parts; who, when he places his head beside that of the examiner, only gets a partial view—a portion of the epiglottis, one arytaenoid, and perhaps a vocal cord. In endeavor-

FIG. 10.

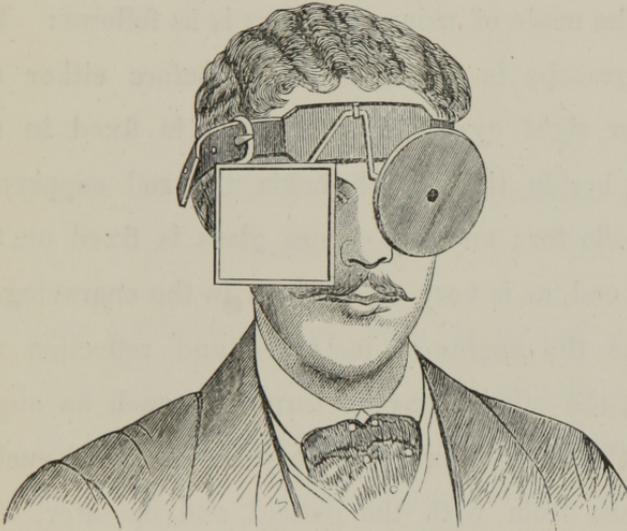


Fig. 10.—DR. SMYLY'S RECIPRO-LARYNGOSCOPE.

ing to see more, he pushes the examiner's head, so as to displace the light, or shakes his hand, so as to bring on nausea. Many other inconveniences will occur to the mind of the practical laryngoscopist which I shall not here allude to.

“My addition consists of a simple square piece of very good plate glass mirror, set in brass, like

the ordinary concave mirror. A second split tube is soldered on close to the tube which exists on all Weiss's frontal bands, and a brass rod, the ends of which are bent in opposite directions, at an angle of 45° .

“The mode of using this glass is as follows: The laryngoscope is fixed, as usual, before either the left or right eye. The brass rod is fixed in the tube, beside that which holds the rod supporting the reflector; and my square glass is fixed on the other end, as is very well shown in the engraving.

“As the angles of incidence and reflection are equal, the mirror may be turned to such an angle, that the second examiner may be placed at such a distance from both the patient and operator, that his presence cannot disturb the steadiness of either. The view the second examiner has of the larynx in the square mirror is not inverted, being twice reflected. The right vocal cord of the examinee is to the right-hand side of the examiner number two.

“The glass employed in the manufacture must be as perfect and parallel as possible, so that the loss of light may be a minimum.

“In conclusion, I may add that the additional weight of the square glass, when made in the artistic manner in which mine has been made, by Messrs. Spencer & Son, of Aungier Street, Dublin, is scarcely perceptible.”—*Dublin Quarterly Journal*, vol. xxxvi, Aug. 1863.

SECTION III.—*Infra-glottic Laryngoscopy, or Tracheoscopy.**

Where tracheotomy has been performed and a fenestrated canula is worn, a very minute mirror may be introduced through the tube with its face directed upward. In this way the observer obtains a view of the larynx from below.

This method was first suggested by Dr. Neudörfer, in 1858, and was first carried out by Dr. Czermak in the following year. Since then various observers have examined patients in this way, and I have myself had an opportunity of examining several

* As it is not the trachea which is examined, the term tracheoscopy is obviously incorrect, and the expression infra-glottic laryngoscopy would more correctly describe this method of investigation.

cases. Some very interesting observations made by a medical man on himself in this way, have been recorded by Dr. Semeleder. This mode of examining the larynx, though of very limited application, is extremely valuable, because it frequently happens that, in cases where a canula is worn, the epiglottis is bound down over the larynx by old cicatrixes, and consequently ordinary laryngoscopy is useless. It is well to remark that the vocal cords, when observed from below, have a reddish color, and do not present the peculiar white appearance which is seen when the laryngeal mirror is placed on the uvula.

SECTION IV.—*Magnifying Instruments.*

Various instruments have been invented for increasing the size of the laryngeal image, but they are of no use in the treatment of disease. As early as 1859, Dr. Wertheim, of Vienna, recommended concave laryngeal mirrors for this purpose, and later, Dr. Türck, calling attention to the fact, that the laryngeal image is made up of a number of parts at

different distances, suggested the use of a small telescope (!!) which he had fitted to his illuminating apparatus ; finally Voltolini by removing the ocular, adapted an opera glass (!!!) which, however, he was only able to use with sunlight.

SECTION V.—*Micrometers.*

For measuring the exact size of different parts of the larynx, and for estimating distances, Merkel, of Leipsig, and Mandl, of Paris, have suggested the plan of having a scale scratched on the laryngeal mirror. Dr. Semeleder objects to this mode of measuring, as it takes so much away from the reflecting surface of the mirror, and he recommends that the scale should be drawn on the frame of the mirror. Though these scales might perhaps be advantageously employed for physiological investigations, they are of no use to the medical practitioner.

SECTION VI.—*The Epiglottic Pincette.*

In a certain proportion of cases, it is impossible to obtain a satisfactory view of the larynx, on account of the pendent condition of the epiglottis. This peculiarity, which depends on the length of the glosso-epiglottidean ligaments, is probably more often congenital, but sometimes it may—to a certain extent—be due to a relaxed condition of the system generally. In cases where it does not occlude the whole of the larynx, it often hides the anterior third of the vocal cords. After inventing various instruments which did not answer the purpose, I hit upon the pincette of which the annexed wood-cut is a representation. In constructing an instrument to hold and draw forward the epiglottis, it must not only effect its end, but must do so without irritating the patient's throat. I have used the pincette in a few cases with advantage, but I would specially call the attention of inventive laryngoscopists to this subject, as I believe that a thoroughly effective instrument for drawing forward the epiglottis would be, without exception, the most useful addition to

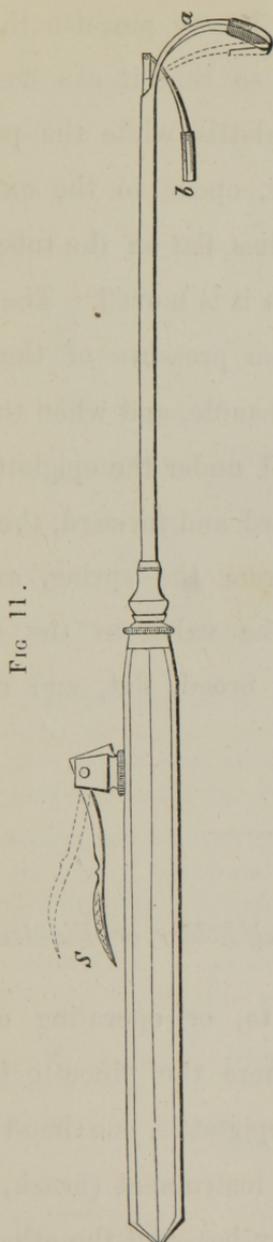


FIG. 11.

Fig. 11.—THE EPIGLOTTIC PINCETTE.

While the spring, *S*, is kept down, the two blades, *a* and *b*, remain widely open, and the blade, *b*, should come right up to the tube, which is about a quarter of an inch above it in the wood-cut. The operator passes the blade, *a*, behind and below the epiglottis, and draws the valve slightly forward and upward; he then raises his finger from the spring, *S*, when the blade, *b*, advances to *a*, and the epiglottis is held gently between them. The blades, *a* and *b*, are a quarter of an inch broad, slightly convex from side to side (the convexity being directed forward), and covered with india-rubber.

the art of laryngoscopy. In my pincette the anterior blade curves round, so that it can be passed behind and under the epiglottis, while the posterior blade, which alone moves, opens to the extent of almost half an inch, and lies flat on the tube which contains the wire by which it is moved. The instrument is kept open by the pressure of the index finger on a spring in the handle, and when the anterior blade has been passed under the epiglottis, and has drawn it slightly upward and forward, the operator removes his finger from the spring, and the blades close and hold the valve in the desired position. The blades are broad, flat, and covered with india-rubber.

SECTION VII.—*The Self-holder or Fixateur.*

In applying remedies to, or operating on, the larynx, in those cases where the pincette is used for drawing forward the epiglottis, one hand is employed in introducing the instrument (brush, lancet, or forceps, as the case may be), and the other holds

the pincette, so that it becomes necessary to employ some apparatus for holding the laryngeal mirror.

FIG. 12.

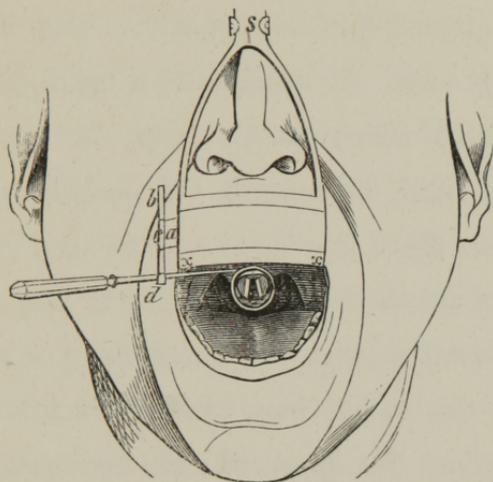


Fig. 12.—THE SELF-HOLDER, or *fixateur* for holding the laryngeal mirror after introduction. A broad plate of metal rests against the upper lip, and from its lower border, *x*, a small metal plate passes backward under the upper teeth.

s. Steel spring, which passes upward and backward over the head, to below the occipital protuberance, where there is a pad.

a. Small metal plate, which can be inserted into either the right or left side of the large hollow plate, which contains it. The small plate can be drawn out to any extent desired, so that its free extremity can always be brought to the corner of the mouth. It terminates in

c, a ring which holds—*b*, a perpendicular bar that can be fixed at any height in the ring.

d. Termination of the bar in a kind of spring forceps; the blades of the forceps are very broad, and each is curved outward, so that they form a kind of groove into which the stem of the mirror easily passes, and can be as easily withdrawn. As the perpendicular bar can be made to turn round in the ring, *c*, the blades can be made to open in any direction.

Various instruments have been invented for this purpose, and one of my own design was described in the *Medical Times*, Aug. 8, 1863. I have since greatly improved this instrument, so that it can be used in any case. It consists of a mouth-piece, and a steel band which passes from its upper part, round the head, to beneath the occipital protuberance, where there is a broad pad to keep it in position. The mouth-piece is composed of perpendicular and horizontal portions; of these the perpendicular portion is two inches long and one inch broad, and it rests against the upper lip; the horizontal portion is kept in the mouth, so that the inner angle of union of the two parts corresponds to the points of the front teeth; the upper surface of the horizontal portion is covered with a thin layer of wood, to save the teeth from coming in contact with the metal. In the perpendicular portion, there is a groove passing through its entire length, and in it a steel plate runs, which has a broad ring at its extremity. Through this ring there passes a perpendicular bar, having at its extremity two broad steel blades. These blades, which open at a considerable angle,

close by their own elasticity, and hold the mirror firmly. The perpendicular bar moves in the ring, so that it can be fixed at any height, and so that the blades can be turned in any direction. As the steel plate also can be drawn out of its groove, the laryngeal mirror can, in all cases, be brought as near to the corner of the mouth as desired. The steel plate can also be passed into the groove from either side, so that the laryngeal mirror can be fixed at either the right or left side of the mouth. The annexed wood-cut explains the action of the instrument, and shows the mirror *in situ*.

SECTION VIII.—*The Head-rest.*

Most people, when they are going to have the throat examined, lean back in the chair, throw up the head and open the mouth. This attitude, however, is very ill-suited for laryngoscopy, where both the head and body should be kept erect. In many cases also,—especially where the patient is at all nervous,—in applying remedies to, or operating on,

the larynx, it is very desirable to be able to steady the head. For this purpose I use a head-rest, very much like that employed by photographers, except that instead of having a stand of its own, it is fixed to a chair. A strong metal plate, terminating in a

FIG. 13.

*Fig. 13.*—THE HEAD-REST.

ring which projects behind the seat, is screwed to the back of an ordinary chair, to the under surface of the frame which supports the seat; and another similar projecting ring is screwed to the top bar of the chair. A strong iron bar passes perpendicularly

through these rings; just above the upper ring it bends obliquely forward for about half a foot, and then again passes perpendicularly upward for another foot. This bend in the bar prevents the patient leaning back. Sliding on the perpendicular bar, is a broad, curved, semicircular pad, which supports the head, and can be fixed at any height. It allows the patient to raise his head, but prevents any movement backward or laterally. The apparatus is not unsightly, if the metal part is made of brass; and when the support is not required, the perpendicular bar and head-rest can be altogether put away. The use of the head-rest not only saves the practitioner's time; but the patient's efforts to restrain himself are greatly spared, and he consequently suffers much less from exhaustion.

CHAPTER VI.

THE APPLICATION OF REMEDIES TO THE LARYNX
WITH THE AID OF THE LARYNGOSCOPE.SECTION I.—*Solutions.*

FOR applying solutions to the larynx, squirrel's or camel's hair pencils, cut square at the end, and firmly attached to aluminium wire bent at a proper angle, will be found most suitable. The angle at which the wire is bent may vary between 90° and 120° , according as the anterior insertion of the vocal cords, or the arytaenoid cartilages, have to be touched; but for most cases, an angle of 108° will be found convenient. Below the angle to the end of the brush, the instrument may measure from an inch and a half to two inches and a half, and between the handle and the angle from four to five inches. The handle should be of convenient shape and size. Great care should be taken that the brush is securely riveted to the wire. Instead of aluminium, stout copper wire coated with silver, or silver wire, may be used.

The practitioner should be provided with brushes of different sizes, and inclined at different angles. The laryngeal brush is well adapted for applying caustic, astringent, alterative, or sedative solutions to the larynx.

So many cases of acute and chronic inflammation of the larynx, successfully treated by topical remedies, have been related in the medical journals, that it is scarcely necessary to bring forward here any proofs of the value of local treatment. I shall therefore merely adduce the following two cases, to show what satisfactory results may be accomplished by very simple treatment.

Aphonia of more than two years' standing, from extensive disorganization of the vocal cords; a warty growth on the under surface of the epiglottis. Voice restored by the persevering local application of nitrate of silver.

Case 1.—Mr. W., of Sligo, consulted me in June, 1862, for loss of voice, which had existed since November, 1859. On examining the throat with the laryngoscope, the vocal cords were seen to be of a dirty gray color, and in a highly disorganized state,—their edges being serrated in a very peculiar manner; the rough toothlike processes of one vocal cord fitted into corresponding depressions in the edge of its fellow, and *vice versâ*. In the middle of the under surface, and near the edge of the epiglottis, was a

small round excrescence. There was nothing of a syphilitic character in this case, and the diseased condition of the larynx seems to have originated in a severe and prolonged catarrh. In this case, I enjoyed the advantage of a consultation with Professor Czermak. He agreed with me in thinking the case a very unfavorable one for treatment,—at least as regarded the condition of the vocal cords. He also concurred with me, in recommending the local application of strong solutions of nitrate of silver. Neither of us, however, were at all sanguine as to the effect it might produce. I applied this remedy to the interior of the larynx some eight or nine times, but without any apparent effect. Mr. W. then returned to Ireland, and the same treatment was continued by Dr. Wood, of Sligo. After many months' treatment, the whisper was replaced by a very gruff voice, and when Mr. W. came over to consult me in September, 1863, the edges of the vocal cords were much more even,—the right cord being almost smooth, and the voice, though rather hoarse, was distinctly phonetic. The small warty growth had diminished slightly in size. Fig. 14 shows the condition of the larynx when the patient first came under treatment.

FIG. 14.

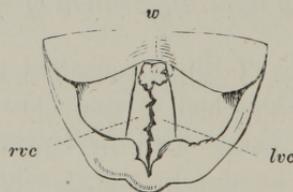


Fig. 14.—JAGGED CONDITION OF THE VOCAL CORDS, AND A WART ON THE EPIGLOTTIS.

- w.* Wart on the under surface of the epiglottis.
- rvc.* Right vocal cord.
- lvc.* Left vocal cord.

Warty Excrescences on the right ary-epiglottidean fold and ventricular band, destroyed by the application of solutions of nitrate of silver.

Case 2.—Mrs. A., æt. 42, from Diss, in Norfolk, applied at the Dispensary for Diseases of the Throat in April, 1863. This patient was the mother of a large healthy family. She had suffered from loss of voice for two years, but she was otherwise quite well. She attributes the aphonia to having taken cold. She had a constant inclination to clear the throat. With the laryngoscope, the aphonia was seen to depend on the presence of numerous small warty growths, situated on the right ary-epiglottidean fold and ventricular band. There was also slight congestion of the vocal cords. The appearance is shown in Fig. 15. Under the use of very strong solutions of nitrate of silver (5ij ad ʒj), applied very frequently for some weeks, this patient became able to speak in a fairly loud, though still rather harsh, voice. When the patient was obliged to return to the country, the greater part of the excrescence had been destroyed, but a small portion still remained on the ventricular band.

FIG. 15.

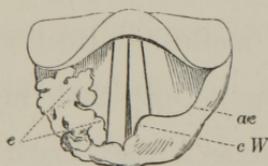


Fig. 15.—EXCRESCENCES ON THE RIGHT ARY-EPIGLOTTIDEAN FOLD.

e. The excrescences. They seem to have pushed the right cartilage of Wrisberg downward and outward and beneath the ary-epiglottidean fold, so that it is not seen.

ae. The left ary-epiglottidean fold.

cW. The left cartilage of Wrisberg,

The various forms of laryngeal inflammation are for the most part analogous to similar morbid conditions occurring in other parts of the body, and the practitioner, in the selection of particular remedies, will be guided by his general experience. I shall merely remark, therefore, that among the remedies I have found most efficacious, are solutions of nitrate of silver, perchloride of iron, sulphate of copper, sulphate of zinc, carbolic acid, and iodine. Glycerine will be found a useful solvent for most of these agents. The alternation of topical remedies is often as efficacious in the cure of chronic laryngitis, as it is in the treatment of chronic inflammation of other mucous passages.

Various kinds of syringes have been invented for injecting fluids into the laryngeal cavity. I do not recommend this method of treatment, but those who wish to practice it will find my modification of Rauchfuss's injector a very manageable instrument. It is a hollow tube made of vulcanite, and suitably curved for introduction into the larynx. Near where the tube is fixed to the handle, at the upper part of the instrument, is a small hollow caoutchouc ball,

which communicates with the interior of the tube. The injector is filled by pressing the air out of the ball, and inserting the point of the instrument into the solution to be used. This injector is made in two parts, so that the same handle can be employed with different tubes; the points of the tubes are also made in different ways, some having a number of small holes, so that the stream is diffused; some with only a hole at one side, so that the fluid only passes in one direction, &c., &c.

The principal objection to the use of injectors is, that they have a tendency to cause more spasm than brushes, and with them it is more difficult to limit the amount of the application, or to restrain it to certain spots. The injector is held between the thumb and second finger, and the index finger remains free to press on the ball, when the point of the instrument has been passed into the larynx.

For the application of liquids to the larynx in the form of a very fine spray, many kinds of *pulverisateurs* have been invented. Of these the apparatus employed by Dr. Lewin, of Berlin, will be found most convenient. The accompanying wood-cut ex-

plains the principle of its action. It may be advantageously used in cases of general congestion or relaxation of the mucous membrane. Its employ-

FIG. 16.

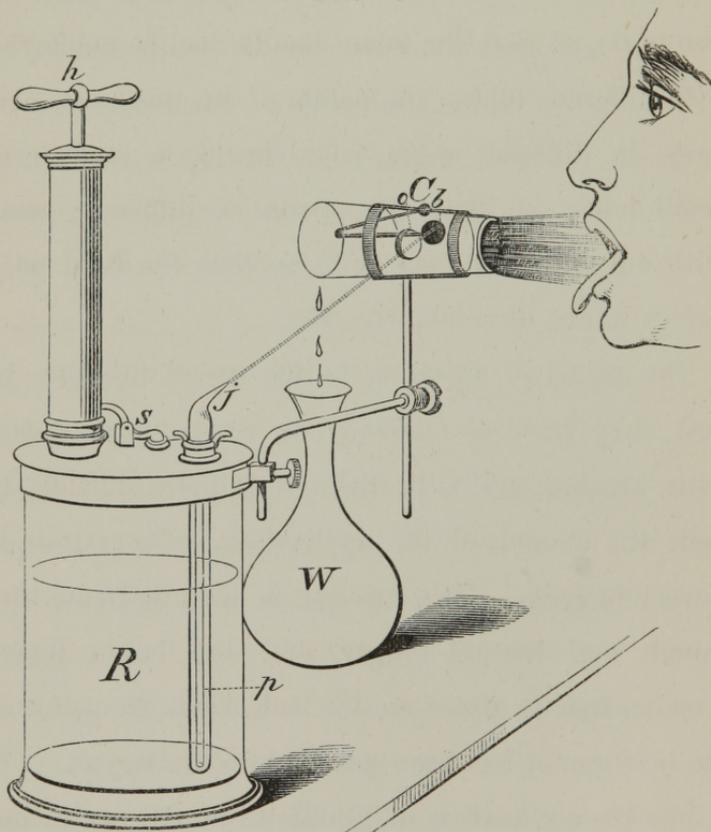


Fig. 16.—LEWIN'S PULVERISATEUR.

R, a glass receiver, into the metal top of which the air-pump is screwed. The inhaler is filled with the medicated solution by unscrewing the air-pump. Air is forced into the receiver by alternately depressing and raising the handle, *h*, with the right hand, while a finger of the left hand is kept on the extremity of the jet-thrower, *j*.

p. A fine glass pipe, which reaches almost to the bottom of the receiver, and after passing through the lid is bent at an angle of about 130°. At its extremity is a fine opening.

j. The jet-thrower, through which a very fine stream passes to the metal button *b*.

s. Safety-valve.

C. Glass cylinder, for limiting the diffusion of the spray. It slants slightly, so that the farther extremity is on rather a lower level than that near the mouth.

o. Opening in cylinder, through which the jet of liquid passes to—

b. A metal button, on which the jet breaks into a fine spray. A portion of the liquid forms drops, which run into—

W. The waste-bottle.

The patient's mouth should be placed close to the end of the cylinder, and the tongue protruded.

ment in throat affections is more particularly indicated in cases where, from circumstances, the patient cannot visit his medical attendant sufficiently often, and is thus obliged to carry out the treatment himself. Weak solutions of carbolic acid, tannin, and perchloride of iron, have been advantageously employed by me in this way. I do not recommend the use of these *pulverisateurs* for the inhalation of caustic solutions.

SECTION II.—*Powders.*

Powdered substances may be introduced into the larynx in various ways; but either the apparatus of Dr. Fournié,* or my modification of Rauchfuss's injector (already described), will be found the most convenient instruments. In some cases of laryngorrhœa, the employment of alum in this way will be found useful.

SECTION III.—*Solid Nitrate of Silver.*

For applying the solid nitrate of silver to the larynx, the only instrument which is thoroughly safe, and at the same time easy to use, is the "laryngeal cauterizer." It consists of a piece of aluminium wire, bent at the same angle, and of the same length above and below the angle, as the laryngeal brush. The wire is roughened at its extremity, and then dipped into some nitrate of silver fused over the spirit-lamp. In this way a certain quantity of the nitrate adheres firmly to the wire. An ingenious

* Dr. Fournié's instrument may be obtained of Charière, of Paris.

porte-caustique has been invented by Fauvel, in which, while the stick of nitrate of silver is safely inclosed, the point, by a spiral spring behind it, is always kept protruding. Dr. Stoerk, of Vienna, also, when laryngoscopy was quite in its infancy, contrived a porte-caustique, in which the caustic remains concealed till brought to the part desired to be touched, when, by pressure on a spring in the handle, it is made to protrude.

My laryngeal lancet (see page 115) is provided with a small piece of aluminium wire, which can be fitted on in place of the cutting-blade: in this way it becomes a guarded porte-caustique. The nitrate of silver is attached to the wire by fusion in the way already described.

Besides these instruments, various others have been invented; but the simple aluminium wire, which I am in the habit of employing, answers the purpose perfectly well. The solid nitrate will be found useful for touching ulcers, condylomata, and the base of growths after evulsion has been practiced.

SECTION IV.—*Escharotics.*

If to the stock and tube of my laryngeal lancet, a piece of aluminium wire, roughened at its extremity, is fitted on, in place of the cutting-blade, escharotics can be applied without danger, and often with great benefit. Instead of the duck-billed tube which fits on at the joint below the angle, a large silver tube should be adjusted, so that there is some space between the aluminium wire and the inner surface of the tube. For applying escharotics, I have also used a simple glass brush, firmly fixed to the end of a piece of curved aluminium wire. The brushes, however, do not answer well, as the fine glass hairs, though they do not break, are apt to come out. Where the greater part of the mucous membrane of the larynx is covered with vegetations, as not unfrequently happens, it is useless to attempt to remove them by the mouth, and foolish to open the larynx (after the manner of Ehrmann). In these cases the greatest benefit may result from the use of escharotics; and I have, on different occasions, applied nitric and chromic acids, Vienna paste, and a mixture

of caustic soda and lime. The most satisfactory results have followed the use of the last preparation. This class of remedies should only be employed by those who have had much practice in introducing instruments into the larynx. The happy effect of escharotics is illustrated by Case 6, page 128.

SECTION V.—*Galvanism.*

By a very simple instrument of my contrivance, the electric current can be applied directly to the vocal cords. The important feature in the laryngeal galvanizer is, that the current does not pass beyond the handle, till the sponge is in contact with the vocal cords. The instrument is held in the hand, between the thumb and second finger, and when the sponge is in contact with the vocal cords, the operator with his index finger presses on the spring in the handle, and the electric current passes through the larynx to the skin externally. By placing the sponge of the galvanizer on the arytaenoid cartilages, both branches of the pneumogastric nerve are stim-

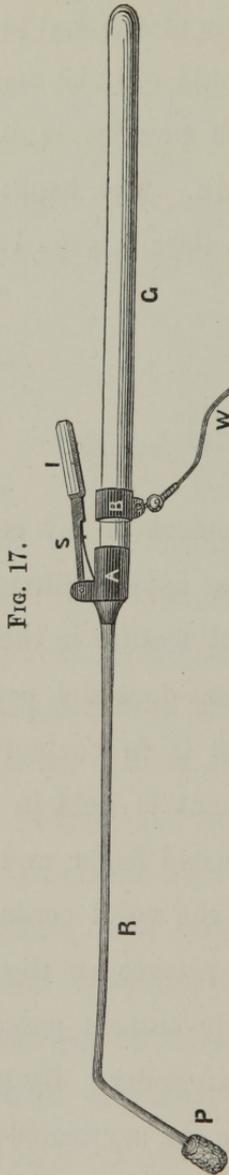


FIG. 17.

Fig. 17.—THE LARYNGEAL GALVANIZER.

The instrument is connected with an electric machine by the wire *W*, which is attached to the metal ring *B*. When the ivory handle *I* is pressed upon, the metal spring *S* connects the two rings *A* and *B*, and the current passes to the point *P*, which is covered with sponge. The wire between *P* and *A* is contained in caoutchouc tubing, and forms the rod *R*. The instrument is held by the glass handle *G*.

ulated. My instrument is now extensively employed in France, Germany, and this country; and Drs. Smyly, George Johnson, Fauvel, Tobold, and others, have borne testimony to its value. Its employment is indicated in functional aphonia, and in most cases of vocal weakness, where there is no structural disease.

The source of electricity is not a matter of any importance, but its application to the vocal cords will be facilitated by the patient wearing a kind of elastic necklet, in the center of which is a piece of metal covered with sponge. This plate of metal, which is inclosed in cotton, is about three inches long, and one and a half broad, and is bent back in the center, so that, when applied, it corresponds to the thyroid cartilage. Projecting forward from the center of this thyroid pad is a metal eye, by which it may be connected with the electric machine. The pad should be wetted before it is put on the patient's neck. The employment of this necklet enables the operator to dispense with assistants. When the point of the galvanizer is placed on the vocal cords, the electric current passes right through

them in all directions, to reach the pole over the thyroid cartilage.

The following two cases illustrate its use :

Complete Loss of Voice of two years' standing cured by one application of Galvanism.

Case 3.—Miss T., æt. 26 years, was sent to me March 7, 1864, by Dr. C. J. B. Williams. For the last two years her voice had been entirely suppressed, and she had only been able to speak in a feeble whisper. The aphonia originally came on with cough and cold, and when I saw her, she was rather delicate, had a bad appetite, and was easily fatigued. Her medical attendant in the country had tried local and constitutional treatment, and various tonics had also been prescribed for her by Dr. Williams, but all without effect. On examining this patient with the laryngoscope, and finding the vocal cords perfectly healthy, though relaxed, I passed the electric current through them. The voice was immediately restored. I saw the patient once or twice afterward, but there was no relapse.

Loss of Voice of three years' standing cured by two applications of Galvanism.

Case 4.—The Rev. Henry A., æt. 31, suffering from pulmonary phthisis, consulted me in September, 1863. He had suffered from weakness of voice for six years, and for the last three had not been able to speak above a whisper. He was much emaciated, and there was a small cavity at the apex of the left lung. It was supposed that he had laryngeal, as well as pulmonary, consumption; but with the laryngoscope the mucous membrane of the larynx was seen to be very pale, and covered with thin frothy

mucus. On attempted phonation, the vocal cords scarcely moved at all. The first application of galvanism produced no effect; but on its repetition, a shrill feeble sound was uttered. After this time, without any further application of galvanism, the voice gradually became stronger, and at the end of October it was more powerful than it had been for many years. After the restoration of the voice, the general health became greatly improved.

For further illustrations of the value of the direct application of galvanism, I must refer to my pamphlet on the *Treatment of Hoarseness and Loss of Voice by the Application of Galvanism to the Vocal Cords*. (London: T. Richards.)

CHAPTER VII.

OPERATIONS ON THE LARYNX.

SECTION I.—*Scarification and the Opening of Abscesses.*

FOR scarifying the mucous membrane of the larynx in acute or chronic œdema of the larynx, for opening abscesses, and, in some rare cases, for dividing laryngeal growths, I have contrived an instrument which, in many instances, has proved very serviceable. It consists of a small double-edged knife or lancet, which is contained in a hollow tube, suitably curved for introduction into the larynx. The point of the lancet is concealed in the duck-billed extremity of the tube, till forced out by pressure on a spring in the handle. The stock of the instrument is provided with tubes bent at different angles, and below the angle is a joint which enables the operator to lengthen, or shorten the tube. This arrangement allows for the varying inclination which the plane of the laryngeal aperture bears to

FIG. 18.

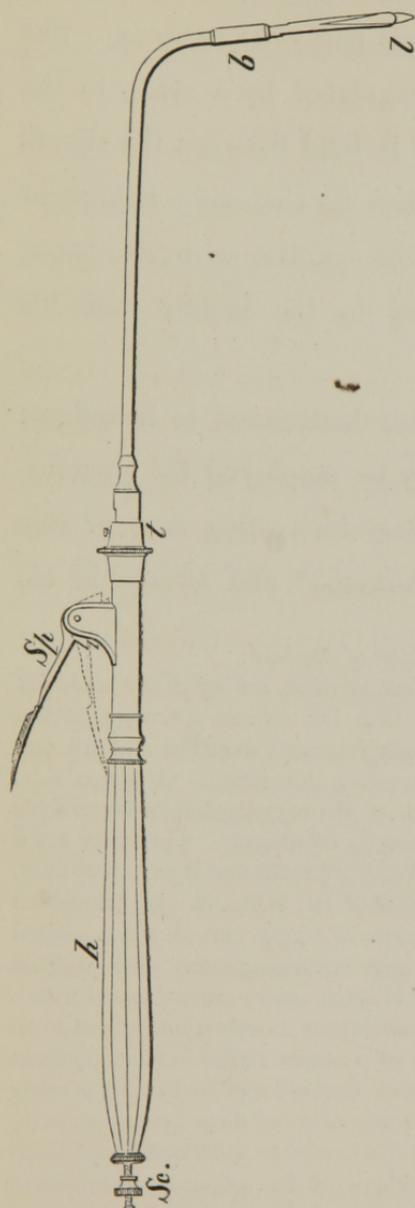


Fig. 18.—THE LARYNGEAL
LANCET.

- Sp.* The spring which forces out the lancet: when it is pressed down to the dotted line, the lancet *l* protrudes.
- h.* The handle—the same as that used for the forceps.
- sc.* The screw, by turning which, the length of the point of the lancet can be regulated.
- t.* Junction of the barrel and stock of the instrument. At this point, barrels curved at different angles, can be applied. This part of the instrument is thicker than it need be, when each instrument (forceps and lancet) has a separate stock. To the left side of *t*, a small disk has to be inserted, which fixes the tube, and allows the chain inside to move. In the forceps, on the other hand, the chain is fixed, and the tube moves.
- b.* The bayonet joint. A shorter or longer tube can be put on here, according to circumstances, and the blade can be taken out and cleaned.

the horizon, and renders the lancet fit for operating either at the upper or lower part of the larynx. The length of the blade is regulated by a screw in the handle. The instrument is held between the thumb and second finger, and when its extremity is brought opposite the part which the operator wishes to lance, he presses on the spring in the handle with his index finger.

The principal use of this instrument is in œdema of the glottis, but it may be employed for puncturing cystic tumors. A very interesting case of this sort occurred to Mr. Durham;* and Bruns, in his

* The following is the description of the case:

“On making a laryngoscopic examination, the epiglottis could not be distinguished in its normal form, but instead there appeared a large round tense tumor, projecting backward and downward, and completely covering in and concealing the glottis. On either side, and rather behind this, portions of the arytaeno-epiglottidean folds could be seen swollen and apparently œdematous. The tumor could be just reached by the finger. Feeling certain that it contained fluid, Mr. Durham, with the concurrence of Dr. Wilks, at once proceeded to make an incision into it, by means of a long, curved, sharp-pointed bistoury, partially surrounded with sticking-plaster. The incision was followed by a sudden gush of thick glairy mucus, mixed with a little pus and blood, which, on subsequent examination, proved to be precisely similar to the contents of a ranula beginning to suppurate. All the patient's symptoms were at once relieved, and in the evening he was singing in bed. In the course of a few days he was perfectly well. Examinations were made from time to time, and it was interesting to watch the gradual subsidence of the œdema, and the return of the parts to their normal condition. The patient was examined

second case of laryngeal growth, used a curved bistoury for dividing its base.

Chronic Œdema of the Right Ventricular Band (causing great difficulty of breathing, hoarseness, and pain), cured by scarification.

Case 5.—Charles C., æt. 22, applied at the Dispensary for Diseases of the Throat, May 4, 1863, on account of great difficulty of breathing, hoarseness, and pain in the throat. He had suffered since March, 1861, and for more than a year he had never been able to lie down at night. When he did get to sleep (in an arm-chair) he often woke with the most distressing dyspnœa, and said he felt as if he should be strangled. He had attended at the Middlesex, Brompton, and other hospitals. On making a laryngoscopic examination, the right ventricular band and aryepiglottidean fold formed together a large tumor which projected across the glottis, and concealed from view the anterior two-thirds of the left vocal cord. The swelling was of a deep purple-red color. The mucous membrane over the arytaenoid cartilage was also inflamed and swollen. The case was diagnosed to be one of chronic œdema of the larynx, and was freely touched with a strong solution of nitrate of silver. This treatment was continued every

nearly four months after the operation; he was in every respect perfectly well. There was no appearance of the cyst (for such evidently was the nature of the tumor), but the cicatrix of the incision could be just distinguished on the lower part of the laryngeal aspect of the epiglottis." (*Med. Times and Gazette*, Nov. 21, 1863.)

I have particular pleasure in calling attention to this very interesting case, as, when it was brought before the Medico-Chirurgical Society (Nov. 10, 1863), some observations which I made at the time were misunderstood.

other day for a month, with little benefit to the patient; indeed, though the œdema did not increase, the patient became weaker, and the voice was completely extinguished.

FIG. 19.

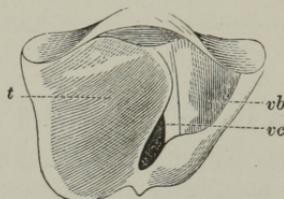


Fig. 19.—CHRONIC ŒDEMA OF THE LARYNX.

t. A large semi-transparent tumor formed by the right ary-epiglottic fold and ventricular band. It projects across the glottis and eclipses part of the left vocal cord.

vb. The left ventricular band.

vc. The left vocal cord.

June 8th.—I scarified the œdematous swelling, and after the operation, the patient expectorated a considerable quantity of blood and frothy fluid.

June 10th.—On examining the larynx, the swelling did not appear much diminished. I again lanced the part freely. The next day the patient was greatly relieved; he had slept well for some hours, and woke refreshed and comfortable—a pleasure that he had not known for more than two years. The laryngoscope showed that the swelling had gone down very much, and the right vocal cord was now seen to be rather congested. I again scarified the part.

June 15th.—The patient said that he felt quite well, and asked if he could return to his work. Scarcely a trace of the œdema remained; but there was still a slight abnormal projection situated posteriorly over the right ary-tænoid cartilage, and the mucous membrane of the larynx gener-

ally was also rather redder than in the normal condition. The voice was at first a little hoarse, but soon became natural, and the respiration was free from any embarrassment. This patient occasionally calls at the Dispensary just to show himself, but he is perfectly well, and has been so ever since his larynx was lanced.

SECTION II.—*The Extirpation of Growths and the Removal of Foreign Bodies from the Larynx.*

The extirpation of growths from the larynx, which was at one time* scarcely heard of, is now by no

* The only cases which I have been able to find in pre-laryngoscopic times are the following:

1st. It appears that a certain Koderik once successfully operated on a case of laryngeal growth, with a curved flexible instrument (rosenkranzartig). Nothing further is known of this case. (Semleeder, p. 59.)

2dly. Pratt performed sub-hyoid laryngotomy, for the removal of a tumor, which grew on the left half of the under surface of the epiglottis, and which, though it projected into the fauces, could not be got at from above. A firm, fibrous, grayish-white growth was extirpated. The case did very well. (Semleeder, p. 60.)

3dly. Sir Astley Cooper, with his finger, removed a large cancerous tumor, about the size of a hen's egg, from the under surface of the epiglottis. It grew again, and was again removed, and the patient finally died from hæmorrhage. The specimen is preserved in the Museum of Guy's Hospital (No. 1685).

4thly. Ehrmann removed a growth from the left vocal cord in the following way: Tracheotomy was first performed by dividing the cricoid cartilage and several of the upper rings of the trachea; after the patient had had a respite of forty-eight hours, the larynx was

means an uncommon operation. Evulsion, with forceps of suitable construction, is the best mode of

divided in the median line, up to the base of the hyoid bone. When the two halves of the thyroid cartilage were drawn apart, the growth was seen on the left vocal cord, and removed with the knife. The patient recovered from the operation at the end of three weeks, *but the aphonia remained*; he unfortunately died five months later from typhus. (*Histoire des Polypes des Larynx*. Strasbourg, 1850.)

5thly. Dr. Horace Green removed a pedunculated tumor (about the size of a cherry) which was (thought to be) attached to the left vocal cord. When the mouth was widely opened, and the patient coughed, a round white fibrous-looking tumor could be seen projecting upward between the ary-epiglottidean folds. Green succeeded in seizing the growth with the ordinary tonsil forceps, and then in dividing it with a long slender knife. (*Polypi of the Larynx*, p. 56. New York, 1852.)

6thly. Professor Middeldorpf, of Breslau, succeeded in removing a tumor from the upper opening of the larynx, by means of the galvanocaustic wire. "The sarcomatous growth showed a high degree of cell-development," and as a portion remained behind, a very doubtful prognosis was given: solutions of nitrate of silver were afterward used. Rühle, who saw the case six years after the operation, states "that there was no symptom at that time of any return of the growth." (*Galvanokaustik*, p. 212, and Rühle, p. 229.)

From an analysis of the five latter operations (and the first one is so vague that it must necessarily be excluded), it appears, that in those cases where the growths were removed by instruments introduced through the mouth, they could all be seen, and in two instances (the cases of Sir Astley Cooper and Professor Middeldorpf) could be felt with the finger. In Dr. Green's case the tumor could be seen, and though it was thought to be attached to the vocal cord, it more probably grew from the ventricular band or ary-epiglottidean fold. If the polypus had been attached to the vocal cord, it could not have been seen projecting through the opening of the larynx, unless it had been unusually large, or its pedicle had been much longer than is usually the case. Neither of these conditions appears to have existed. In the cases of Ehrmann and Pratt, the operations were indirect, and preceded by tracheotomy. Since "the eye learned to direct the hand"

removing laryngeal growths. The forceps which I use is contained in a tube, and its teeth are made to approximate by the passage of the tube over the shoulder of the blades. In seizing growths, the extremity of the instrument, therefore, scarcely moves at all. The tube which contains the forceps is made of steel, and has a diameter of one-tenth of an inch; it is bent at an angle of 110° , but to the same stock, barrels of different angles can be applied. Just below the angle is a joint, which enables the practitioner to clean the forceps, and apply shorter or longer blades, as the case may require. The spring which forces the tube over the forceps is at the anterior and upper part of the handle; and the

to the interior of the larynx, an immense number of cases of laryngeal growth have been successfully removed. Professor Bruns, of Tübingen, was the first to operate in this way; and since then Lewin, Fauvel, Semeleder, Tobold, and others on the Continent, with forceps of various construction, have extirpated a great many laryngeal tumors. In England, Dr. Walker, of Peterborough, was the first who succeeded in removing a laryngeal growth. He used a modification of Gooch's double canula, which he called an *écraseur*. (*Lancet*, November, 1861.) At a later period Dr. Gibb, who still further modified this instrument, reported several cases of laryngeal growth treated in the same way. Dr. Russell, of Birmingham, has also recorded a very interesting case under his care, in which a laryngeal growth was removed by Messrs. Bracey and Bolton, with an ordinary pair of curved forceps. (Dr. Russell *on Laryngeal Disease*, p. 16. London: 1864.)

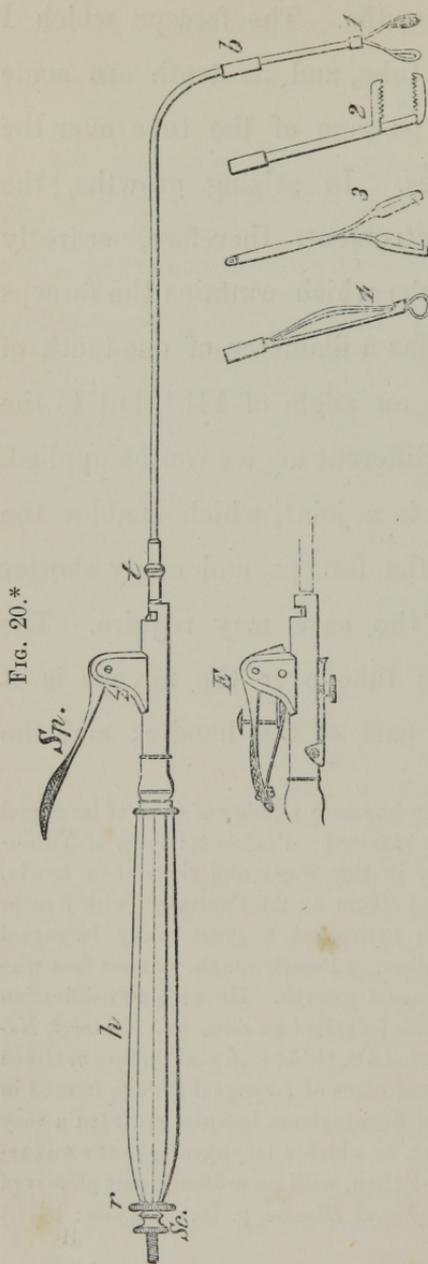


FIG. 20.*

Fig. 20.—THE LARYNGEAL FORCEPS, SCISSORS, AND ÉCRASEUR.

Sp. The spring, by pressing on which, the tube is forced over the base of the forceps.
t. The junction of stock and barrel. At this point, tubes bent at different angles can be applied.
b. The joint at which longer or shorter tubes may be applied, and the blades taken out and cleaned.

h. The handle.

r. The ring, by turning which the forceps revolve, so that the blades open in any direction.

Sc. Screw for taking the instrument to pieces, cleaning it, &c.

1. The perpendicular blades.

2. The horizontal blades.

3. The scissors with hooks attached to them.

4. The *écraseur*. The loop can, if desired, be about four times the size that it appears in the drawing. *E.* The modification of the stock, which is required when the *écraseur* is combined in the instrument.

* Both the forceps and lancet were originally made for me by Mr. Krohne.

operator, holding the instrument between his thumb and second finger, presses on the spring with his index finger. At the posterior part of the handle is a ring, by which the forceps can be made to revolve, and in this way the blades can be made to open backward and forward, or from side to side. This arrangement enables the operator to seize excrescences, whether they grow from near the anterior insertion of the vocal cords, the arytaenoid cartilages, or either side of the larynx. The blades of the forceps have sharp cutting teeth all round their edges. For most cases, the blades which pass down perpendicularly from within the tube which contains them, are convenient; but sometimes, where the growths are thin, membranous, and have an extensive origin from the side of the larynx, a forceps, the blades of which open horizontally, will be found more convenient. In this case the forceps has in fact only one blade, which is at right angle to its shank, the other blade of the forceps being let into the tube: the two blades of the forceps close when the tube containing the upper blade is forced down, by the pressure of the index finger on the spring in the

handle. When the growth has an extensive lateral origin, it is apt to be pushed on one side by the blades of the perpendicular forceps. Under these circumstances, the lower blade of the horizontal forceps can be passed beneath the growth, and the upper one is then forced down on the top of it.

To recapitulate: the advantages of this instrument are, first, that it can be made of any length; secondly, that it can be inclined at any angle; and, thirdly, that the blades can be opened in any direction. The use of this instrument is illustrated a little further on (pp. 128 to 138).

At the joint below the angle of the instrument just described, instead of the forceps, scissors can be fitted. In order that the blades should cut well and easily, the shanks of the scissors should cross one another above the blades; the scissors which I use for cutting through growths have hooks on each blade, which seize the divided particles, and prevent their falling into the trachea. I have sometimes employed scissors also for cutting through cicatrixes: in this case the hooks are not required. (See Case 13, p. 139.)

It is to be noticed that in my forceps the tube passes over the blades, while in the lancet the tube does not move, but the blade advances. By a most ingenious arrangement* the same stock has been made to answer for both forceps and lancet.

At the joint below the angle, an *écraseur* can also be applied in place of the forceps, though this addition requires the insertion of an additional mechanism below the spring (see Fig. 18, *E*). By each pressure of the index finger on the spring in the handle, the wire is drawn through the ring, at the extremity of the instrument, and two or three movements of the finger are sufficient for the purpose. The *écraseur*, however, though it may be used for removing growths from the epiglottis,—but even for that purpose it is obviously inferior to the forceps,—is not at all adapted for operating on tumors in the interior of the larynx. Professor Bruns, of Tübingen, in his first case, tried the principle of the wire loop, but soon perceived that it was not applicable to the larynx.†

In order that a growth could be removed from

* This was effected at my request by Mr. Mayer, of Great Portland Street, who has also combined the *écraseur* in the same instrument.

† Brit. and For. Med.-Chi. Rev., No. LXVII, p. 133. July, 1864.

the larynx with the *éraseur*, it would be necessary, not only that it should be distinctly pedunculated, but also that the peduncle should be firm and short (otherwise the tumor would hang down, and the wire could not be slipped over it). These conditions scarcely ever exist, and my own experience, as well as that of Türk, Lewin, and most Continental laryngoscopists, clearly proves that growths in the larynx occur much more frequently as warty excrescences than as true polypi. Indeed, out of thirty-one cases of laryngeal growth that I have inspected with the mirror, in only one (Case 10) was the tumor really pedunculated; even in that instance, the presence of the peduncle was inferred, not seen. In by-gone times, before the larynx was an organ of especial interest, these small vegetations were generally overlooked by pathological anatomists, and only the larger tumors attracted notice. In spite of this circumstance, however, there are not more than three or four distinctly pedunculated growths in the museums of the London hospitals.* Again, in

* In one or two of the cases described as "pedunculated," the foot-stalk is as broad as any other part of the tumor. Thus, in specimen No. 54 of the W series in St. Thomas's Hospital Museum, the growth which is described as pedunculated is about the size of a small walnut,

those few cases which are pedunculated, the stalk does not remain firm when the growth attains to any size; but, on the other hand, the tumor falls down from its own weight, and drags the peduncle with it. It thus becomes impossible to get the wire round the stalk. It would be easy to bring forward numerous other objections to the use of the wire loop, but the probability of pieces falling into the trachea is alone sufficient to condemn the instrument. Occasionally a particle may get entangled in the wire, or may be jerked out of the larynx by it; but, as a rule, portions, divided by the thin wire of the *écraseur*, cannot do otherwise than obey the laws of gravity, and fall into the trachea. The danger of thus allowing particles to fall down the windpipe has been pointed out by Lewin, and it can be readily appreciated by any one. If large, they would be likely to cause fatal dyspnoea; if small, they would be almost sure to give rise to the formation of abscesses, and

and the pedicle is attached to the entire length of the ary-epiglottidean fold. The only two pathological specimens in our museums, in which an *écraseur* could possibly have been used, are those referred to by Ryland, in King's College Hospital Museum. Had they been divided by a wire loop, they would almost inevitably have caused death, by falling into the trachea.

thus very likely to phthisis. The *écraseur*, therefore, if used at all, should only be employed in cases where the growth is situated on the lip or upper surface of the epiglottis,—in other words, only in cases where the tumor can be reached with the finger.

Five large spongy Excrescences in the Larynx; one on the under surface of the epiglottis; another on the right ventricular band; a third on the left ventricular band; a fourth on the left vocal cord; and a fifth on the right vocal cord, and the mucous membrane below the cord. The four upper excrescences were removed with the forceps.

Case 6.—William W., æt. 44, applied to me April 10, 1863, on account of loss of voice. He stated that his general health was very good, but that three years ago he had caught a cold and bad sore throat, and since then he had not been able to speak a word out loud. At Christmas his breathing was much affected, and he thought he should have been suffocated; but the attack passed off, and he said that, with the exception of not being able to speak out loud, he was now quite well. He had never had syphilis. On making a laryngoscopic examination, the laryngeal mucous membrane, above and below the vocal cords, was seen to be covered with dark reddish spongy excrescences. One was situated on the right side of the under surface of the epiglottis, another involved the whole right ventricular band, a third covered the whole of the right vocal cord, a fourth occupied half of the left ventricular band, and a fifth the anterior half of the left vocal cord.

Below the right vocal cord a number of smaller excrescences were also seen extending down into the trachea.

The appearance is shown in Fig. 21. This case was seen by Drs. Czermak, Frodsham, George Johnson, Wahltuch, and others. With my laryngeal forceps, I succeeded, in a number of sittings, in removing, in small fragments, the whole of the four upper excrescences. This included the one seated on the left vocal cord. These fragments were kindly examined for me by Dr. Andrew Clark. He "found them to consist of numerous yellowish, hard, nodular, or warty-looking particles. Under the microscope some of

FIG. 21.



Fig. 21.—EXCRESCENCES IN THE LARYNX.

1, 2, 3, 4, 5. Separate growths on the epiglottis, right ventricular band, right vocal cord, left ventricular band, and left vocal cord.

ae. Ary-epiglottidean fold.

lvb. Left ventricular band.

lvc. Left vocal cord.

these masses consisted entirely of enlarged racemose glands, the terminal vesicles of which were filled with minute nucleated cells and granular matter. Others were true papillary growths, consisting of more or less perfect connective tissue, clothed with many layers of epithelium, the outermost layer of which was in a state of partial desquamation. A few of the papillæ were either quite hollow, or had contained fluid." He regarded the case as one of "Granular Wart." The small particles which were torn away with the forceps produced so little effect on the bulk of the large growth on the right vocal cord, that I was induced to try

the effect of escharotics. Nitric acid and chromic acid were both applied several times with decided advantage, but the greatest benefit resulted from the employment of a mixture of caustic soda and lime. The growth was reduced to a quarter its former size, and the patient has recovered a loud and tolerably clear voice. This patient is still under observation.

Warty Excrescences on and beneath both the vocal cords (causing loss of voice of four years' standing) removed with the forceps.

Case 7.—Mrs. A., aged 35, applied at the Dispensary in April, 1863, though in consequence of my absence from town she did not come under my care till the following month. I had previously (in December, 1862) seen the patient, at Mr. Maunder's request, in conjunction with Dr. Gibb, and the latter author has referred to the case at page 156 of his work, and has also given a rough sketch of the laryngoscopic appearance. The patient stated that she caught cold in 1859, was very hoarse for two years, and that in 1861 her voice had become quite suppressed. For the last two years, she had always spoken in a whisper. There was no history nor symptom of syphilis or phthisis. With the laryngoscope, both vocal cords were seen to be of a dirty grayish color, and in an irregular papillomatous condition: the appearance is shown in Fig. 22. Subsequently I discovered two growths,—one below each vocal cord. As the diseased condition of the cords was so general, and the growths on the cords were so imperfectly developed, I thought that the case would be most easily treated by caustics. Strong solutions of nitrate of silver were accordingly applied, but they produced so much dyspnoea, that the treatment was obliged to be discontinued.

Under these circumstances, I tried to use the forceps; but the patient being unable to open her mouth widely, the laryngeal aperture being exceedingly small, and the growths on the vocal cords most minute, great difficulty was expe-

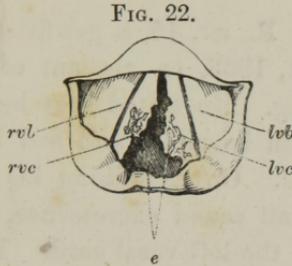


Fig. 22.—PAPILLOMATOUS EXCRESCENCES ON, AND BENEATH, THE VOCAL CORDS.

rvb. Right ventricular band.

rvc. Right vocal cord.

lvb. Left ventricular band.

lvc. Left vocal cord.

e. Irregular papillomatous excrescences covering the vocal cords.

rienced, and it was only after repeated failures that I ultimately succeeded in clearing the vocal cords of the warty growths which covered them. The growths below the cords, which afterward became distinctly visible, being of larger size, were removed with much less difficulty. A month after the removal of the last growth, the patient's voice was completely restored. I have not seen her now for some time, but I lately received a note (dated October 31, 1864) from Mr. Brown, of Finsbury Circus, who sent the patient to me, in which he says, "I called on Mrs. A. this evening, and am pleased to find her voice is entirely restored by your treatment."

Loss of Voice of nine years' standing, caused by a small excrescence on the left vocal cord; the warty growth was removed with the forceps, and the voice completely restored at the end of a month.

Case 8.—Henry R., æt. 45, a gas-fitter, applied at the Dispensary, May 1, 1863, on account of loss of voice of nine years' standing. He stated that he had attended at various metropolitan hospitals, and had lately been at the Brompton Hospital. On examining his throat with the laryngoscope, a small round excrescence, about the size of a pea, was seen on the left vocal cord. The warty growth was situated on the free edge, and exactly in the middle of the cord, and on attempted phonation it was seen that, owing to the projection of the growth, the cords could not become approximated. On the right cord, exactly opposite

FIG. 23.

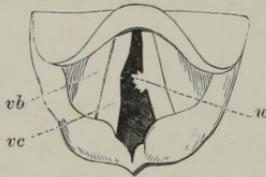


Fig. 23.—A SMALL WART ON THE RIGHT VOCAL CORD.

- vb.* Right ventricular band.
- vc.* Right vocal cord.
- w.* Wart on left vocal cord.

to the wart on the left cord, there was a distinct round indentation. The laryngoscopic appearance is seen in Fig. 23. I had the opportunity of exhibiting this patient to Drs. Czermak, Wahltuch, and others. There was some difficulty in removing this growth, owing to its small size, and the more than usual awkwardness of the patient, and

it was not till the fourth sitting that it was successfully seized and removed. Dr. Andrew Clark examined microscopically the portions removed with the forceps, and the following was his report: "The growth was found to consist of two sets of particles, one membranous, the other warty or obscurely papilliform. The membranous portions consisted of from twenty to thirty layers of scaly epithelium, surrounded and penetrated by a confervoid growth. The epithelial cells composing the layers were polygonal, flattened, nucleated, and easily affected by weak alkalis and acids. The nucleus of each cell was oval, abruptly defined, rather large in proportion to the containing cell, in most cases surrounded by a clear halo, and in some showing signs of division. The papillary portions consisted of simple outgrowths of nucleated connective tissue and rudely-formed blood-vessels, clothed with numerous layers of scaly epithelium, similar to those already described. Some of the papillæ exhibited large vacuoles or spaces filled with colloid matter, which, in one or two instances, had burst through the covering epithelium." Dr. Clark considered the tumor to be a true wart. Immediately after the operation the patient spat up a few teaspoonfuls of blood, and the same day he was able to sound his voice. The next day he complained of a feeling of great soreness, and there was so much involuntary objection to a laryngoscopic examination, that I was unable to see exactly how the wound looked. Nine days later, however, the mucous membrane over the left vocal cord, where the growth had been, looked rather puckered, and the depression on the right cord was still visible. At the end of a month, the voice was perfect, and all morbid appearance in the larynx, including the little pit on the edge of the right cord, had completely disappeared.

Warty Growths on the vocal cords removed with the forceps.

Case 9.—William J., æt. 40, a waiter, applied to me in May, 1863, on account of hoarseness of five years' standing. His general health was good, but fifteen years before, he had a primary venereal sore. He had never suffered from any secondary symptoms. The voice was harsh, but not suppressed, and with the laryngoscope, a large thin, flat, membranous growth was seen to project horizontally from each vocal cord, and to meet in the center. On account of the pendulous condition of the epiglottis, it was difficult to get an extensive view of the larynx, and consequently the growths could not be seen in their entirety. The appearance is shown in Fig. 24. The smallness of the laryngeal

FIG. 24.

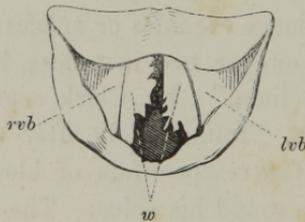


Fig. 24.—WARTS ON THE VOCAL CORDS.

(This View of the Larynx was obtained by raising the Epiglottis with the Pincette.)

- rvb.* Right ventricular band.
lcb. Left ventricular band.
w. Warts on the vocal cords.

aperture was still more inconvenient in operating, and it was only after several unsuccessful attempts that I managed to remove a small portion of the growth on the right vocal cord. Under these circumstances, I endeavored to divide

the left growth through its base, with my laryngeal lancet. After the operation, the patient left me, but soon returned, spitting up considerable quantities of blood. On examination with the laryngoscope, the mucous membrane was seen to be covered with blood, but the exact source of the hemorrhage could not be ascertained. I applied a strong solution of perchloride of iron to the interior of the larynx, and directed the patient to suck ice. The hemorrhage, however, which continued for some time—to an extent that was really alarming,—was ultimately arrested by the patient gargling with, and swallowing, a saturated solution of tannin. The first mouthful of the tannin that was swallowed stopped the bleeding entirely. A day or two after the operation, a careful examination of the larynx was made both by Dr. George Johnson and myself, but we were neither of us able to ascertain the source of the hemorrhage. I have since removed several fragments by using the horizontal blades of my forceps, and the patient's voice is now clear; he still complains, however, of a slight tickling in the throat.

Hoarseness of seven years' standing caused by a polypus attached just above the anterior insertion of the vocal cords. The polypus was removed with the forceps and the voice restored.

Case 10.—Morris B., æt. 41, shoemaker, and formerly singer, applied at the Dispensary for Diseases of the Throat, Aug. 20, 1863. He stated that he had been extremely hoarse for several years, but had never suffered from complete loss of voice. He had had primary syphilis when he was sixteen. A physician had recommended him to have his uvula removed, but the operation had not improved his voice. A laryngoscopic examination showed

that there was a yellowish-pink growth, about the size of a small bean, just above the anterior insertion of the vocal cords. It was movable (and therefore probably pedunculated), but the base was hidden by the tumor, and therefore its exact origin could not be ascertained. When the glottis was closed, the growth rested on the extremities of both the cords; sometimes, however, lying more on the

FIG. 25.

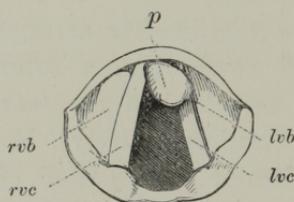


Fig. 25.—A SMALL POLYPUS, ATTACHED JUST ABOVE THE ANTERIOR INSERTION OF THE VOCAL CORDS.

rvb. Right ventricular band.

rvc. Right vocal cord.

lvb. Left ventricular band.

lvc. Left vocal cord.

p. Polypus.

right, and sometimes on the left cord. The appearance is shown in Fig. 25.

Aug. 21.—I had the advantage of a consultation with Dr. George Johnson and Mr. Mason, who entirely concurred in my diagnosis.

Aug. 24.—In the presence of these two gentlemen, I removed the excrescence with my laryngeal forceps. The growth was successfully seized at the first trial, and all of it, except a small portion of its base, was brought away. After the operation, we examined the patient with a mirror, and the base of the growth covered with blood was indistinctly seen. I was disposed to remove this small remain-

ing fragment, but after a consultation, it was thought better to leave it alone, under the idea that it would probably wither away.

Immediately after the operation, Dr. Johnson thought he noticed an improvement in the voice.

Aug. 26.—There being still a small portion of the base of the growth remaining, I removed it with the forceps. This case was completely cured, and at the end of a fortnight the man spoke perfectly well.

“The morbid growths,” according to Dr. Andrew Clark, “consisted of three or four minute, shapeless pieces of yellowish color, streaked with red, and of a horny consistence. On account of their hardness, their structure could not be very easily determined. On the free surface, however, were several layers of thin, scaly epithelium, few of the elements of which exhibited any nuclei. In fact, but for the absence of cholesterinè, the cell elements might have been most readily mistaken for those of cholesteatoma. Beneath the epithelial coverings, were minute extravasations of blood, and amorphous masses of a coagulated proteine compound.” Though in this case the proteine compound had not developed fibers, the case was regarded by Dr. Clark as one of commencing “Fibro-Epithelial Growth.”

Growths on both Vocal Cords (causing aphonia of nine months' standing), removed with the forceps.

Case 11.—Miss Mary B., æt. 30, was sent to me by Mr. Parsons, of Bridgewater, April 7, 1864. This patient lived in London, and after she had been suffering from loss of voice for some months, a distinguished physician recommended “change of air to her native place.” On arriving there (Bridgewater) she was recommended to return back

to London to see me, and the laryngoscope at once revealed the cause of the hoarseness.

A small growth was seen on the right vocal cord, and afterward, when the patient had been examined once or twice, another growth was perceived on the left cord, near to its anterior insertion. The appearance is shown in Fig. 26. The history of the case seemed to show that these

FIG. 26.

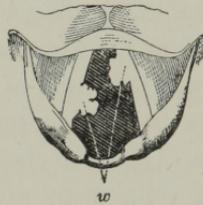


Fig. 26.—WARTS ON THE VOCAL CORDS.

The letter *w* points to the two growths.

growths originated in chronic laryngitis. After twenty attempts, only four of which were successful, the growths were entirely removed with the forceps. After the removal of the warts from the vocal cords, a small growth was seen lower down; but as the voice was restored, no further treatment was adopted.

A small fish-bone removed with the forceps from the larynx of a child.

Case 12.—Caroline C., æt. 12, was brought to the Dispensary, February 8, 1864, by an elder sister. She was crying, and her sister stated that, on the previous evening, she had swallowed a herring-bone. She said that she felt the bone, whenever she swallowed. She had put her fingers down her throat to try and get it up, and had been

sick several times. I examined her with the laryngoscope, but could only see that the mucous membrane of the larynx was much congested. Not being able to perceive the bone, I thought she had probably swallowed it, and recommended an inhalation of hot steam to relieve the irritation. I should mention that I passed a bougie into the stomach without difficulty. The next day the child was again brought to me. Her breathing was slightly stridulous, and a medical man, who had seen her in the mean time, had told her mother that "croup was coming on." On examining the patient with the laryngoscope, the ary-epiglottidean fold and ventricular band on the right side were seen to be much swollen, and of a bright red color, and a portion of the bone was distinctly seen lying across the right ary-epiglottidean fold, near the epiglottis. Apparent as it was, and easy as it seemed to seize, the greatest difficulty was experienced in getting it between the blades of the forceps. In the first attempt the mucous membrane was slightly wounded, and the bone became obscured by the blood. After an interval of half an hour, the bone again became visible, and it was fortunately grasped between the blades of the forceps. The bone was three-quarters of an inch long, and very thin. The patient complained of a little pricking in the throat for a day or two, but on the following Friday (the accident happened on Sunday) was quite well.

Contraction of the left Glosso-epiglottidean Fold from the healing of an ulcer; extreme dysphagia; relief from division of the structure.

Case 13.—Charlotte D., a married woman, æt. 24, was sent to me by Mr. Shillitoe, June 18, 1864. She stated that since November, 1863, she had not been able to swal-

low a particle of solid food; that she had lived entirely on liquids; and that bread soaked in milk was the nearest approach to a solid which she was able to get down. Even in swallowing liquids, a portion "went the wrong way," and she never attempted to drink, or rather sip, anything, without a violent and prolonged fit of coughing. Her symptoms all dated from an attack of ulcerated sore throat which she had had in October. Five years previously she had suffered from primary syphilis, and since then had had secondary symptoms.

On looking into the throat, numerous white cicatrixes were seen on the posterior wall of the pharynx, and on using the laryngoscope, the left side of the epiglottis was seen to be drawn upward, forward (toward the tongue), and slightly inward toward the median line. I at first thought that the left ary-epiglottidean fold was adherent to the fauces, but on subsequent examination, I found that such was not the case. The left glosso-epiglottidean fold was seen to be greatly thickened, white, prominent, and shortened, and it was obvious that this was the principal cause of the dysphagia. The dense band—raised not less than a quarter of an inch—could be felt with the finger. A bougie was passed down into the stomach without any difficulty, so that there was no doubt that the difficulty of swallowing depended mainly on the non-closure of the epiglottis over the larynx. I had the advantage of the opinion of Dr. Smyly, of Dublin, in this rare and difficult case. I at once determined on dividing the cicatrix, but its position in the antero-posterior diameter of the larynx made it difficult to use the lancet. With the laryngeal scissors, however, in two operations I succeeded in dividing it. There was very little hæmorrhage, and the patient, after a few weeks, was apparently able to swallow as well as most people; she still, however, complained of slight difficulty.

I have not seen this patient now for some months, but should not be surprised at her return any day, with her old symptoms. I should mention, that the epiglottis did not recover an entirely normal position; but instead of hanging very obliquely across the laryngeal aperture, the free edge of the valve became nearly horizontal. The appearance of the epiglottis, when the case first came under treatment, is shown in the annexed cut.

FIG. 27.

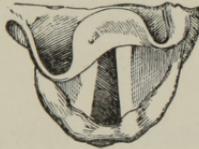


Fig. 27.—CONTRACTION OF THE LEFT GLOSSO-EPIGLOTTIDEAN FOLD, causing obliquity of the epiglottis, non-closure of the valve over the larynx, and (consequently) extreme dysphagia.

Since this case occurred, I have had the lancet modified, so that the cutting edge of the blade can be made to move in the antero-posterior or lateral diameter, according to the wish of the operator. Still, for dividing growths or strictures in the former direction, more power is obtained with the scissors.

CHAPTER VIII.

THE MANIPULATION OF LARYNGEAL INSTRUMENTS,
AND SOME CONCLUDING REMARKS ON LARYNGO-
SCOPY.SECTION I.—*Method of employing Laryngeal Instru-
ments.*

IN applying remedies to, or operating on the larynx, the practitioner should introduce the laryngeal mirror with his left hand, so that he may have his right hand free for using the necessary instrument. In employing the laryngeal brush, the operator should hold it like a pen, and introduce it quickly but steadily to the desired spot. In using any other instrument, the operator should hold it between the thumb and second finger, so that the index finger remains free, to press on the spring in the anterior and upper part of the handle.

Most of the laryngeal instruments invented by foreign physicians have the spring on which their action depends, situated at the posterior extremity

of the handle. The instruments are directed to be held between the first and second fingers, while the thumb pushes in the spring at the end of the handle. In this method, the back of the operator's hand is directed toward the patient's face, and half the mouth is covered by the operator's third, fourth, and fifth fingers; or the instrument may be held between the first two fingers, and the spring at the posterior part of the handle, may be made to act by the pressure of the palm of the hand. A cross-bar near the anterior extremity of the handle, on which the two fingers can rest, facilitates the employment of instruments of this construction, but the great objection to them is, that the pressure forward on the spring at the end of the handle greatly alters the position of the point of the instrument. In using instruments made after my model,—that is to say, with the spring on the upper and anterior part of the handle—the position of the extremity introduced into the larynx is not altered by the slight pressure of the index finger on the spring. This is a matter of the greatest importance in using the lancet or forceps.

Before dismissing this subject, I would call atten-

tion to the unity of action of all my laryngeal instruments. He who learns to use one, can use all; and the constant repetition of a particular act gives it a delicate precision, which is not otherwise attainable.

SECTION II.—*Concluding Remarks on Laryngoscopy.*

In this little work, many instruments and various kinds of apparatus have been described and recommended; but before concluding I would remark, that, with very few, and very simple appliances, the most satisfactory results may be accomplished,—not only in the diagnosis, but in the treatment of laryngeal disease. I have already observed that many of the most valuable laryngoscopic investigations have been made with a common moderator lamp, and I would call attention to the fact, that laryngeal growths have been removed with forceps of the most simple description. The forceps which Dr. Fauvel has several times used with success, has no complicated mechanism, and the instrument used in Dr. Russell's case was "an ordinary pair of curved forceps." Those

who do not intend to take up the subject from a special point of view, but merely wish to use the laryngoscope in general practice, will do well to provide themselves with a reflector, a couple of laryngeal mirrors, a light-concentrator (which can be used with different kinds of lamps), a few laryngeal brushes, and my laryngeal galvanizer. A very large proportion of laryngeal diseases can be treated with the brush alone, and obstinate cases of functional aphonia cannot resist the internal application of galvanism. An additional recommendation to these instruments is, that even when employed injudiciously or ineffectively, they are not likely to do any harm. It is only after the eye and the hand have had much practice in applying remedies to the larynx, that the lancet can be used with safety, or the forceps with effect. In conclusion, "I feel it a duty to remark," with Dr. Johnson, "upon the possibility that the larynx may get too much of local treatment. The laryngoscope has brought this organ so completely within our reach, that we are all exposed to the temptation of being too meddlesome. If we can avoid the error to which I have here alluded, the

introduction of the laryngoscope will be an unmixed good both to ourselves and to our patients, and it will soon be acknowledged to be one of the most valuable additions that have ever been made to our means of diagnosis and treatment."

The following works bearing on the use of the Laryngoscope may be consulted :

Czermak, "Der Kehlkopfspiegel und seine Verwerthung für Physiologie und Medizin." Zweite Auflage. The first edition has been translated from a French version, and published by the New Sydenham Society, Vol. XI.—Türck, "Praktische Anleitung zur Laryngoskopie"—Wien, 1860; and "Recherches Cliniques sur diverses Maladies du Larynx"—Paris, 1862.—Semeleder, "Die Laryngoskopie und ihre Verwerthung für die Aertzliche Praxis." Wien, 1863.—Tobold, "Lehrbuch der Laryngoskopie." Berlin, 1863.—Bruns, "Die erste Ausrottung eines Polypen in der Kehlkopfhöhle." Tübingen, 1863.—Sieveking, "Practical Remarks on Laryngeal Disease." Lond. 1862.—"Russell on Laryngeal Disease, &c." Lond. 1864.—Gibb, "Diseases of the Throat, &c." Lond. 1864.—"Walker on the Laryngoscope." Lond., T. Richards, 1864 (a most valuable pamphlet).—Dr. Johnson's "Lectures on the Laryngoscope," delivered at the College of Physicians. (These highly interesting lectures are shortly to be published.)—Reports of cases, and suggestions on the employment of the instrument, by Tonge, Mason, Ballard, and many others in the *Med. Times and Gaz.*; *British Med. Journ.*; and *Med. Circ.* Also some interesting reviews on the subject in the *Brit. and For. Med.-Chi. Rev.*, Oct., 1862, and July, 1864, and an original article in the same journal, Jan., 1863, by Mr. Winslow. To the latter I am indebted for several references bearing on the history of the invention of the Laryngoscope.

CHAPTER IX.

ADDITIONS ON THE USE OF THE LARYNGOSCOPE.

THE principal additions in the second edition are as follows:

An item is added to the history of the invention, namely, that "in the year 1825, M. Cagniard de Latour, the successor of Savart, at the French Academy of Sciences, and like him an earnest investigator of the physiology of the voice, made an unsuccessful endeavor to examine the larynx during life."* His attempt is thus described in the *Institut*, No. 225: "M. Cagniard de Latour then introduced a little mirror to the back of the throat, hoping with the aid of the solar rays and a second mirror to be able to see the epiglottis, and even the glottis; but by employing these means he was only able to see the epiglottis, and that imperfectly."

In using the reflector attached to spectacle-frames (see Fig. 4, p. 46), Dr. Mackenzie finds it more convenient to have the upper halves of the rims removed. He has also made a great improvement to his illuminating apparatus by devising his rack-movement laryngoscopic lamp, which is adapted for illuminating gas, and readily admits of perpendicular and horizontal movement, thus greatly facilitating the management of the light. Its action is shown in Fig. 28.

At *a* and *b* the horizontal movement can be effected; at *c* and *d* the vertical movement takes place. The gas passes

* *Physiologie de la Voix*. Par Edward Fournié, Paris, 1865, p. 352.

only along the upper horizontal tube from *c*; in the lower tube is a rack, which regulates the height of the lamp through the little handle *e*. The chimney of the lamp is made of metal, a round hole being left where the lens fits in.

FIG. 28.

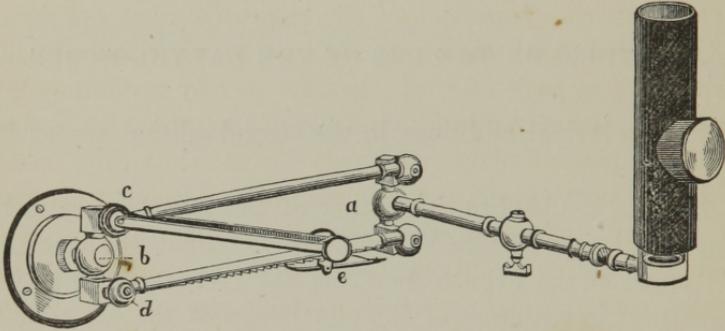


Fig. 28.—THE RACK-MOVEMENT LAMP.

The miniature light-concentrator, described at page 52, “has been greatly improved by Dr. Offley Shore, of Stamford, who recommends the use of the petroleum oil, with ten grains of camphor to the ounce, as employed by Dr. Cruise, of Dublin, for endoscopy. This lamp can be conveniently used for direct illumination, but is not suitable where a reflector is employed. It should be held in the left hand, close to the patient’s mouth.”

With reference to direct illumination, he tells us, that the most convenient plan is the one adopted by several of the French physicians, and which is thus described: “A lamp, provided with a lens, is placed on a table so narrow that the laryngeal mirror can be used by the practitioner on a patient sitting on the opposite side of the table. A shade screens the light from the observer’s eyes, whose face, in this mode of examination, is close to the lamp. In applying remedies, the lamp is between the arms of the practitioner, who, as it

were, embraces it. Dr. Fauvel, of Paris, uses a table about three feet long and one foot broad, in three leaves; the centre leaf, on which a moderator lamp rests, can be screwed up and down to different heights for different patients. Dr. Krishaber, of the same city, employs a simple round table of small dimensions."

Our author's comparison of the respective merits of direct and reflected light shows, in addition to what has already been stated at page 55, "(1) that, for merely making an examination, either method may be used; (2) that, for demonstrating a patient's larynx to a class of students, the French method is most convenient, as the operator does not obstruct the view of others to the same extent as when a reflector is used; (3) that, for applying remedies to, or operating on the larynx, reflected light is most suitable, on account of the operator being nearer the patient, and being able to sit in a less constrained posture."

In speaking of some new instruments which have been placed before the profession since the first edition, Dr. Mackenzie expresses himself strongly averse to complicated instruments for holding the mouth open. Hence he does "not recommend the gigantic '*spéculum laryngien*' recently presented by Dr. de Labordette to the Academy of Sciences of Paris.* This instrument is like the ordinary specula used for examining other canals; and it keeps the mouth open, whilst, by a powerful spring, it presses the tongue forwards and downwards. It is, in fact, an instrument of a retrograde character, combining the defective features both of Babington's and Avery's mirrors."

The following additional case is given illustrative of the value of the laryngeal lancet.

* Sur le spéculum laryngien. Par Dr. de Labordette. Delahaye: Paris, 1866.

*Œdematous Inflammation of the Epiglottis; Scarification;
Recovery.*

(Med. Times and Gazette, March 31, 1866.)

Case 14.—“John R., æt. 30, applied at the hospital on October 14, 1865, on account of difficulty of swallowing and pain in the throat, which had been gradually coming on for a fortnight. For a week he had not been able to swallow solids, and for the last thirty-six hours liquids could not be taken. Attempted deglutition now invariably resulted either in a violent paroxysm of coughing, or in the forced ejection of the liquids through the nares. A laryngoscopic examination showed the epiglottis to be of a bright red color and enormously swollen. The normal contour of the epiglottis was completely lost, and the valve presented the appearance of three red, slightly projecting, semi-transparent tumors, the largest one being on the right side. The œdematous epiglottis covered the right half and the greater part of the left side of the larynx. The parts which could be observed were seen to be much congested. The appearance is shown in Fig. 29. The patient was ordered to inhale hot steam con-

FIG. 29.



Fig. 29.—ŒDEMA OF THE EPI-
GLOTTIS.

FIG. 30.

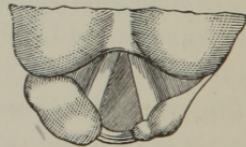


Fig. 30.—The same case a day
after scarification. Œdema of the
right ary-epiglottidean fold can
now be seen.

tinuously, and blistering fluid was applied externally beneath the angle of the jaw.

“October 15th.—Patient much worse. Completely unable

to swallow, and so weak that enemata of beef-tea and brandy were thought necessary. Dr. Mackenzie scarified the epiglottis freely with his laryngeal lancet, and afterwards the patient bled a great deal. Half an hour after the scarification the patient was able to swallow, though it caused him some pain. In the evening a laryngoscopic examination was made, and the swelling of the epiglottis was seen to have greatly diminished.

“October 16th.—The patient was able to swallow without difficulty. The epiglottis was seen to be no longer swollen, though the marks of the punctures were visible as minute hemorrhagic spots. The return of the epiglottis, however, to a healthy condition, permitted a more general inspection of the larynx, and the right ary-epiglottidean fold was seen to be œdematous. The laryngoscopic appearance is shown in Fig. 30. The œdematous fold of mucous membrane was freely scarified.

“October 17th.—The œdema had completely disappeared, though some congestion remained.

“October 20th.—The patient was discharged cured.”

INSTRUMENTS.

In the extirpation of foreign growths, Dr. Mackenzie has found that “ordinary forceps of slender construction, and curved so that they can be introduced into the larynx, are often useful. They should be made of different lengths and curved at different angles, and some should open like ordinary forceps laterally (Fig. 31, A), whilst others open backwards and forwards (Fig. 31, B).” He has removed several growths with these forceps.

For the extirpation of growths in certain cases, where the instruments already described cannot be introduced, Dr. Mackenzie has invented loops or rings of rigid wire. “They should be curved at different angles and of different lengths,

FIG. 31.

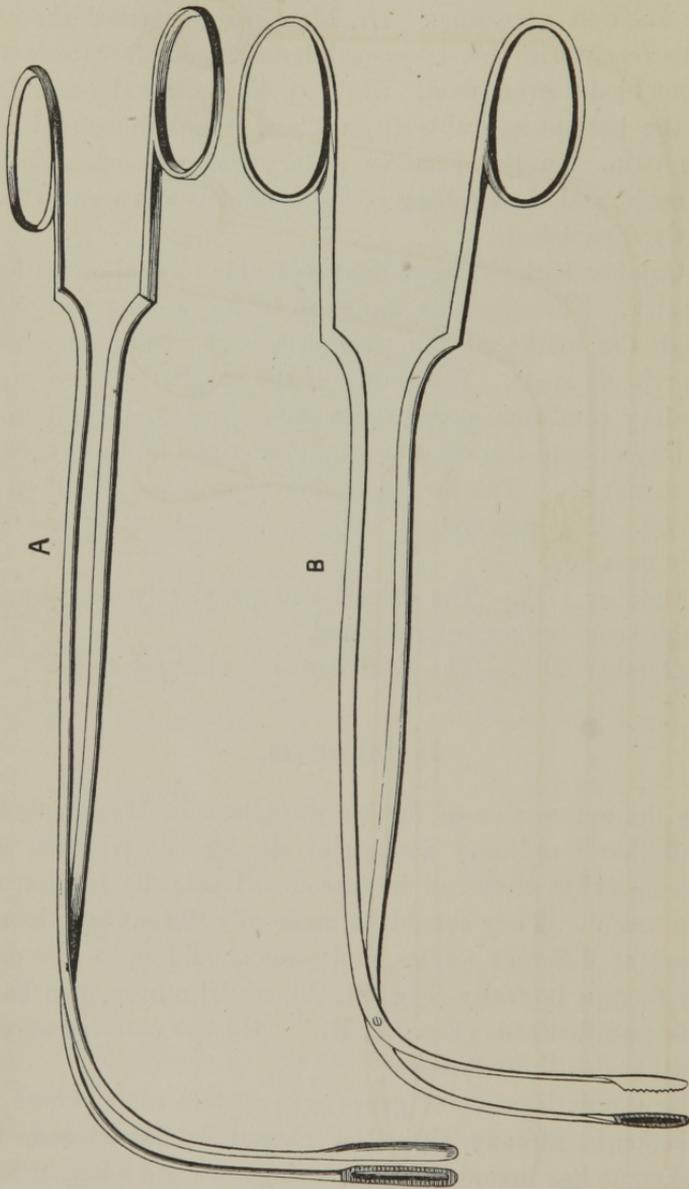


Fig. 31.—ORDINARY LARYNGEAL FORCEPS.

A. The laterally opening forceps.

B. The antero-posteriorly opening forceps.

FIG. 32.

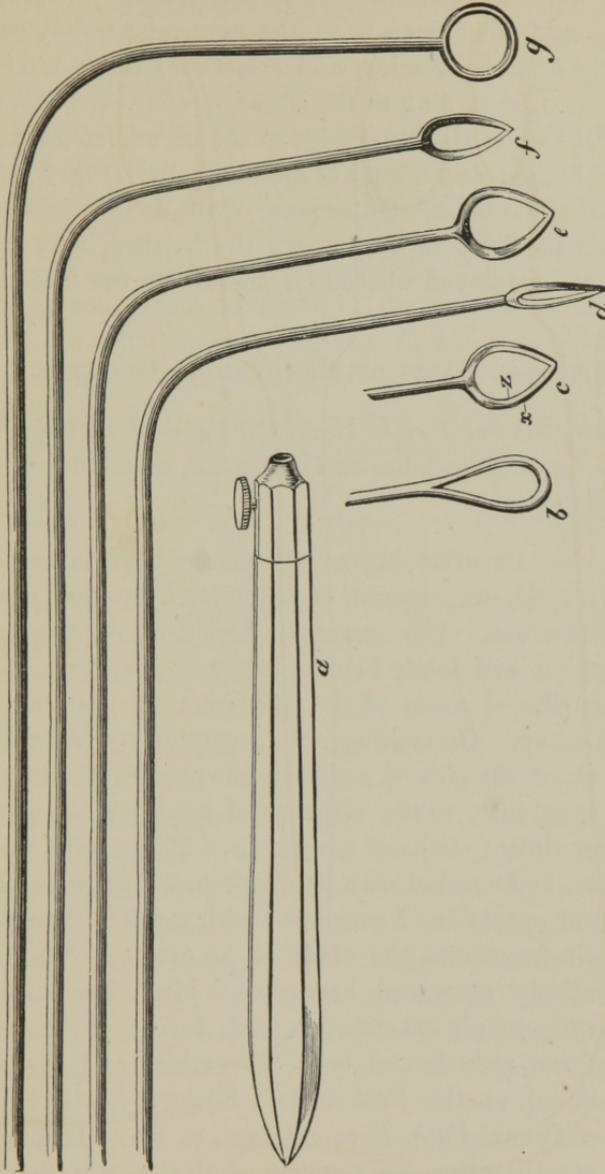


FIG. 32.—LARYNGEAL RIGID WIRE LOOPS.

a. Handle, with screw for holding wire. b, c, d, e, f, g. Different wires showing different kinds of loops.
 x. Outer smooth edge of a loop. z. Inner cutting edge of a loop.

and when the instrument is held in position the opening of the loop should sometimes be in the antero-posterior, sometimes in the lateral direction, and sometimes in an intermediate direction, according to the situation of the growth. It is convenient to let the inner edge of the wire have a cutting edge (Fig. 32, *z*); and a kind of angular collar (Fig. 32, *b*) is not without advantages. On account of the danger, however, of allowing particles to drop down the trachea, wire loops should not be employed where it is possible to use forceps."

ADDITIONAL CASES OF REMOVAL OF GROWTHS.

Growth attached to the right Vocal Cord of a child, aged four years (causing aphonia and dyspnoea), removed with the tube-forceps.

Case 15.—"Caroline M., æt. 4, was brought to me November 7, 1864, on account of aphonia, dyspnoea, cough, and expectoration. The symptoms had come on two years previously, but had lately become much aggravated. Cold was the attributed cause of the affection; the patient had never had croup. On making a laryngoscopic examination, a growth about the size of a cherry was seen in the larynx, attached apparently to the right vocal cord, but occupying the anterior three-fourths of the glottis. The growth was of a pale color, and covered with papillary prominences. By a succession of operations I succeeded with my tube-forceps in removing, in fragments, the whole of the growth. The little patient entirely recovered her voice. Mr. Mason kindly made a laryngoscopic examination both before and after the removal of the growth, and both the patient and specimen were exhibited at the Pathological Society in December, 1864. (See *Trans. Path. Soc.*, vol. xxi, p. 38.) It was not till some months after the removal of the growth that the voice was fully restored."

Warty Growths on both the Vocal Cords of a child, aged six years, removed with the tube-forceps.

Case 16.—“Ellen B., æt. 6, was brought to the Hospital for Diseases of the Throat, November 20th, 1864, on account of loss of voice of two years' standing. The laryngoscope showed warty growths on both the vocal cords. By a series of operations I ultimately succeeded with the tube-forceps in removing the whole of the growths. There remained only a slightly roughened condition of the vocal cords. The voice was 'loud and distinctly phonetic, though still a little hoarse,' when I brought the patient before the Pathological Society (see *Transactions*, vol. xvi, p. 39). Here, again, I enjoyed the advantage of Mr. Mason's co-operation.”

Epithelial Cancer of the Larynx; a large portion removed with the wire-loop.

Case 17.—“Eliza W., æt. 45, applied to the Hospital for Diseases of the Throat, January 18th, 1866, on account of complete loss of voice and shortness of breath. She stated that for the last twenty-five years she had been hoarse, and that for the last eight her voice had gone altogether; latterly she had occasionally suffered from distressing attacks of suffocation. She stated that two months previously she had been an out-patient at one of the general hospitals, where electric shocks were applied to the neck, but without advantage; and that since then she had been under private medical treatment, and twenty-seven blisters had been applied consecutively to the neck, with no other effect than causing great swelling of the submaxillary glands. On examination with the laryngoscope, a large excrescence was seen occupying the space between the vocal cords. Its exact origin could not be ascertained, but it appeared to grow from the anterior third of the left vocal cord, and on inspiration closed the anterior three-fourths of the laryngeal canal.

“The upper opening of the larynx was small, and in other respects the case was a difficult one for operative manipulation. Under these circumstances I was unable to use forceps, but with my wire-loop I succeeded in jerking off into the mouth a large piece of the growth. A portion still remains, but the patient now speaks in a hoarse voice, instead of, as formerly, in a whisper, and the respiration is now perfectly easy. The piece of growth removed was pronounced by my colleague, Dr. Andrew Clark, after a careful microscopical examination, to be ‘highly developed typical epithelial cancer—pathologically speaking, the most malignant variety that he had ever seen of any small growth in that locality.’ The specimen was exhibited at the Pathological Society, February 20th, 1866.”

Growth removed with the tube-forceps from the right Vocal Cord of a child aged twelve years.

Case 18.—“Conway C., æt. 12, from Gosport, was brought to me in January, 1865, on account of loss of voice and dyspnoea. When five years old the boy had had measles, followed by croup, and since then had not been able to speak out loud. For the last eighteen months he had suffered from shortness of breath, being quite unable to play at any games, and sev-

FIG. 33.

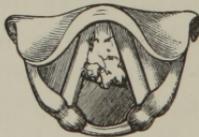


Fig. 33.—WARTY GROWTH ATTACHED TO THE ANTERIOR HALF OF THE RIGHT VOCAL CORD.

eral times during the last year he had ‘seemed as if he would be strangled.’ On making a laryngoscopic examination, a growth was seen attached to the right vocal cord and beneath

the anterior commissure. The appearance is shown in the annexed wood-cut. On February 3d, Mr. Mason kindly made a very careful laryngoscopic examination and drawing of the case. After a great many attempts, I ultimately succeeded with my tube-forceps in removing the whole of the growth, and in the following June, to use Mr. Mason's expression, there was nothing to see but 'a slightly uneven condition of the cords.' This afterwards passed away. Dr. Andrew Clark described the specimens which were brought before the Pathological Society, December 19th, 1865, as being 'examples of simple papillary, warty, or cauliflower growths.' The voice was completely restored."

Large Growth attached to the left Vocal Cord; aphonia of six and a half years' standing; evulsion of growth; recovery of voice.

Case 19.—"Eliza P., æt. 31, a stout, healthy-looking woman, from Gravesend, was sent to Dr. Morell Mackenzie, in June, 1865, by Mr. John A. Kingdom. She stated that in the winter of 1858-59 she had a bad cough and cold, and that the hoarseness which came on at that time passed, in a few months, into complete loss of voice; since then she had not been able to speak a word out loud. In 1860 she was an in-patient in a provincial hospital, and there shower-baths were used, but in vain, to restore the voice. In the following year she was admitted into one of the metropolitan hospitals, and here the treatment consisted in blistering the neck,—twenty-seven blisters having been applied consecutively; afterwards iodine, mustard poultices, and turpentine stupes were used, and general remedies (quinine, iron, etc.), but all without effect. She further stated that she always suffered now from shortness of breath, and that lately she had had two attacks of great difficulty of breathing, which had lasted for several days. On making a laryngoscopic examination,

an irregular lobulated growth, about the size of a sparrow's egg, was seen to be attached to the entire length of the left vocal cord; it projected up into the laryngeal cavity and across the glottis. At the patient's second visit, Dr. Mackenzie first attempted to seize the growth with his tube-forceps, and on the first trial a large piece was seized and brought away. On several other occasions fragments were removed, but at several visits the attempts to seize the tumor were quite unsuccessful. On account of the distance at which the patient lived, she was not able to attend at all regularly, and long intervals often intervened between her visits. Accordingly, it was not till March 7th, 1866, that Dr. Mackenzie succeeded with a pair of ordinary forceps (opening in the antero-posterior direction), in completely clearing the larynx. Dr. Pratt was present on this occasion, and made a laryngoscopic examination both before and after the removal of the last piece. The patient attended twice at the hospital afterwards, and the larynx was seen to be perfectly healthy. The voice was clear and natural. A portion of the growth examined by Dr. Andrew Clark, was pronounced to be 'an ordinary cauliflower or warty growth.' (*Med. Times and Gaz.*)"

CHAPTER X.

ADDITIONS BY DR. J. SOLIS COHEN, OF PHILADELPHIA.

I HAVE thus far copied at length the new matter introduced into the second edition of Mackenzie. I entertain very high opinion of the work, as is evinced by my consent to the proposal of the American publishers, as mentioned in the preface to the present edition. The author, however, has very little to say in regard to the instruments devised by others, and recommends those of his own invention almost exclusively. There is no reason to doubt that these instruments are all that is claimed for them, but unfortunately they cannot as yet be procured in this country, except through the tedious and expensive process of special importation. On the other hand, the instruments of the German laryngoscopists have become thoroughly introduced into the United States through the example, first, of Dr. Elsberg, of New York, and subsequently of myself and others, so that they can be promptly obtained from the principal dealers in surgical instruments. These instruments being so readily procurable, and at the same time efficient for the purposes designed, I propose to describe such as my own experience has proved to be most reliable, with such comments as the subject may suggest.

Reflectors and Condensers.

I very rarely employ a reflector attached to a head-band; but prefer to have it firmly attached to a stand, or to a clamp which can be screwed upon the edge of a table, when working

by sunlight; and when working by artificial light, to have it attached in some way to the illuminating apparatus. Almost the only occasions upon which I use the head-band, are those in which the patient is confined to bed, and cannot be raised so as to admit of a table being brought sufficiently near to support the reflector. Under these circumstances, the head-band is a valuable aid, but it can never, in my opinion, replace a steady support.

For artificial light, I use the illuminating apparatus of Tobold, as depicted in Fig. 34. The condenser contains two

FIG. 34.

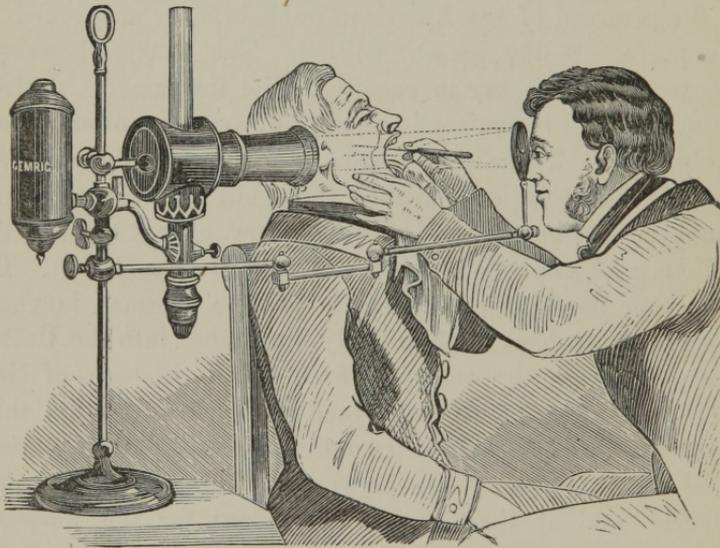


Fig. 34.—TOBOLD'S ILLUMINATING APPARATUS (*after Tobold*).

bi-convex lenses, in actual contact, or very close together, where the tube is attached to the jacket, and a third lens of the same character, but larger, is placed at the free extremity of the tube. The manner of employing it is sufficiently evident. The concave reflector is perforated. In the figure, the apparatus is represented as attached to a movable student

lamp, and in this form is the most convenient apparatus for country use; and were it not for the trouble of trimming the lamp, and the odor of the coal oil, both of which inconveniences are avoided in the use of gas, it would be the best instrument for town use also; for a coal oil lamp furnishes a much whiter, brighter, and steadier flame than gas.

A gas-burner can be readily adapted to the illuminating apparatus, which thus forms a very serviceable instrument. I have used the illuminating apparatuses of Stoerck, Von Bruns, Lewin, Krishaber, Fauvel, Siegle, and many others, and find Tobold's apparatus superior to them all. The manner in which the reflector is attached is more convenient than that employed in any other apparatus; and if an auto-laryngoscopic mirror is desired, it can very readily be supplied. It is now kept in stock at most of the surgical instrument shops, and in two sizes. The larger one (Fig. 34), gives a greater area of light, and admits of rather more freedom in operation, but for the ordinary purposes of the general practitioner, the small one is just as good, and much less expensive. I have performed some of the most delicate manipulations of intra-laryngeal surgery by its aid, although using the larger instrument in preference as a rule.

Throat Mirrors.

It will be noticed that in the body of this work, the author advises mirrors with shanks adjusted to a movable handle. I prefer a mirror firmly attached to its handle, as less liable to get out of order, and presenting a more workmanlike appearance.

Application of Solutions.

Dr. Mackenzie recommends hair-brushes for applying solutions to the larynx, etc. My own experience leads me to consider that the most suitable substance for the application of solutions, in the great majority of instances, is a small bit

of soft surgical sponge of the very finest quality. It must be strong enough to resist a good deal of tension without tearing, in order to avoid liability of its being caught and torn off, and thus producing mischief by its retention in the larynx. When large surfaces are to be washed over, a long-haired brush, the hair of which may extend an inch or an inch and a half beyond the quill, and cut square at the free end, will be more suitable than the sponge, especially when the parts are extremely sensitive, and the friction of the sponge might produce some irritation. Where a very small circumscribed spot is to be touched, a delicate fine hair-pencil answers the purpose. For a general application, if a hair-pencil be employed, it should be large enough to imbibe from five to ten minims of fluid. Care must be taken, in all cases, to prevent dripping from the point of the pencil; for, if a drop of liquid enters the larynx, it will produce spasm, and thus perhaps prevent the performance of the desired application. If a decided contact with a diseased surface is desired, such as is produced by moderate pressure, a sponge will be more advantageous, as it will better allow of pressure; and if it is intended that the application should force a portion of the fluid out upon the diseased surface, the object will be better accomplished with the sponge, inasmuch as it can be made to absorb a greater quantity of fluid than can be taken up by the brush. In certain cases, a swab made by unravelling a portion of a strip of linen, will be the most convenient medium of application.

Whatever be the material employed, care must be taken that it is firmly secured to a staff, so that there will be no chance of its becoming separated; and this is especially to be guarded against when the interior of the larynx is to be operated upon. A stout rod of whalebone, about the thickness of a writing-quill, forms the most ordinary stem, and is very convenient. A stout wire of silver, or other metal,

firmly secured to a handle, is often used, and is perhaps preferable to whalebone, on account of its greater rigidity.

Sometimes we employ a steel staff terminating in two short blades, serrated and pronged, so as to firmly seize the sponge, the grasp upon which is tightened by a ring or screw, forced down over the blades (Fig. 35). For the purpose of carry-

FIG. 35.

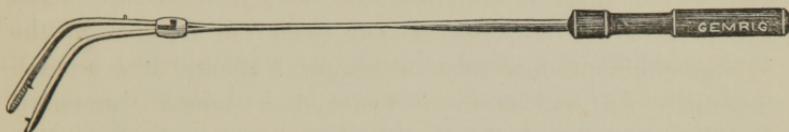


Fig. 35.—SPONGE-HOLDER WITH BAYONET CATCH.

ing the sponge, various kinds of forceps have been devised, the best of all of which is, the forceps of Von Bruns, of mechanism similar to that of his epiglottis pincette, depicted in Fig. 43. The laryngeal curve of this instrument terminates in small serrated blades, or still better, as modified by Elsberg, in two very small sharp hooks crossing each other, so that they pierce the bit of sponge from either side, and thus secure in a firm grasp, as small a bit of sponge as may be desired, as well as larger pieces. By the mechanism of this instrument, a bit of sponge can be firmly grasped, or released with great promptness. It is not worth while to describe the other sponge-holders, they are so vastly inferior to this one.

Occasionally, it may be desirable to use a sponge attached to the extremity of the forefinger, by means of a suitable thimble or nipple, permitting a more delicate appreciation of touch in some instances.

When these instruments are made of steel, as in the case of the forceps, it is well that the laryngeal portions should be gilt, as they are thus kept much more cleanly, and more readily preserved from oxidation.

Sponge-holders, especially those of the forceps variety, are

preferable to any sort of probang, because they admit of ready removal and renewal of bits of sponge, so that the same piece need not be used twice, even upon the same patient.

The size of the sponge will vary according to the use to which it is to be put. For very circumscribed applications, as in touching individual inflamed follicles, or minute ulcers, it should be no larger than is absolutely necessary to cover the diseased point; and here, the sharp-pointed prongs terminating the modification of Von Bruns' forceps, cannot be superseded by any other contrivance with which I am acquainted. For a general application, and where it is intended to press some liquid out of the sponge, the piece should be much larger. If it is to be passed between the lips of the glottis, it should not be larger, when saturated, than a good-sized pistol-bullet, and should form an elongated oval, so as to facilitate its penetration. Every time a sponge is to be used, it should be pulled upon, to see that it remains firmly attached to its stem or holder. Before use, it should be dipped into clean water until saturated, and then be squeezed dry, so that it will absorb sufficient of the medicated solution into which it is dipped. To prevent dripping, which will produce cough, the redundant fluid should be shaken off by a strong movement of the arm, such as we use when a pen is too full of ink. Before making an application, it is well to press against the parts a soft bit of sponge from which plain water has just been squeezed, or a soft piece of punk, so as to remove from the surface any overlying secretion or deposit, and thus secure more thorough contact of the remedy to the diseased structures. A neglect of this precaution has led to the discouragement of local applications to affections of the throat, by those who do not know how to use them. In cases of ulceration in chronic laryngitis, especially as attendant upon phthisis and syphilis, and when there is considerable dysphagia, the difference in result from attention to this particular, and neglect of it, will be found very marked.

Another method of applying liquids is by means of a syringe or douche. The most convenient syringe is that of Tobold (Fig. 36), the nozzle of which is of hard rubber, with a silver tip pierced with several holes, to permit of the better distribution of the fluid. The barrel is of glass, and the piston-rod

FIG. 36.

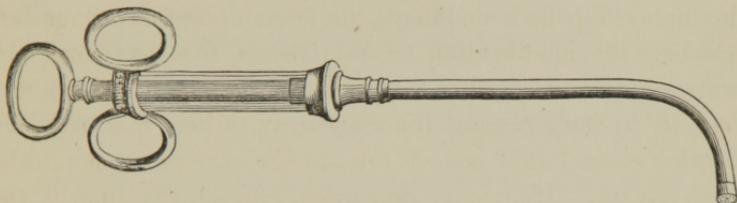


Fig. 36.—TOBOLD'S LARYNGEAL SYRINGE.

can, if desired, be graduated, so as to permit of great accuracy in the amount of solution employed, if this point be deemed important of determination with exactness. The rings on the barrel are for the first and second fingers; the ring on the piston-rod for the thumb. Its manner of employment is obvious. This instrument is sometimes made with a laryngeal mirror in its curve, and the contents are ejected from several apertures, which surmount the rim of the mirror. A somewhat similar combination of laryngoscope with syringe has been devised by Binz. Türck's syringe is similar to Tobold's, only the nozzle has but a single aperture, and a piece of sponge is tied over it.

For passing a finely divided douche into the larynx in the form of a spray, which shall irritate the parts less than an injection from a syringe, the best instrument which has been devised is the laryngeal douche of Dr. Gibb, of London. This consists of a silver tube of proper laryngeal curve, to the free extremity of which there is screwed a platinum bulb, perforated with a number of openings so fine that they cannot be seen without the aid of a lens. The straight end

of the tube is fastened by silver wire within the neck of a little rubber ball. The instrument is charged by dipping the bulb into the solution while the ball is compressed, and then releasing the ball until a sufficient quantity has been drawn into the tube. A modification of this instrument, the bulb and tube being in one piece, and the bulb being much smaller than in the original instrument, is depicted in Fig. 37. In employing this instrument, the neck of the rubber ball is held between the first and second fingers, the thumb applied to the base of the ball. When placed in position it is discharged by compressing the extremity of the ball with the thumb.

FIG. 37.

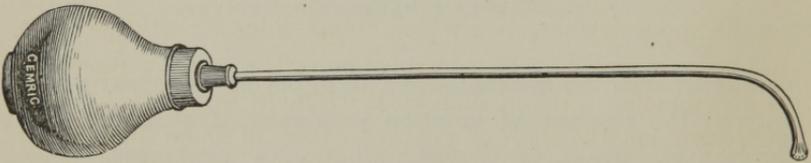


Fig. 37.—A MODIFIED FORM OF GIBB'S LARYNGEAL DOUCHE.

The spray produced by this instrument is as finely divided as that made by the various nebulizers in use for the inhalation of liquids; and the contact of the spray produces less spasm than any other method of applying solutions.

Application of Powders.

Substances are often advantageously employed in powdered form. Occasionally we desire to arrest hemorrhage after an operation upon the larynx; or control the hemorrhage from ulcerated malignant growths, etc. Under these circumstances the insufflation of astringent or hæmostatic powders forms an effective and satisfactory procedure. Various methods have been devised to accomplish this purpose, the best of which is that of Rauehuss.

It consists in the employment of a properly curved canula

of metal or vulcanized rubber, screwing on to a flange attached to a rubber ball; the powder is inserted by detaching the tube. A more convenient form of this instrument is shown in Fig. 38, in which the powder is inserted into an aperture

FIG. 38.

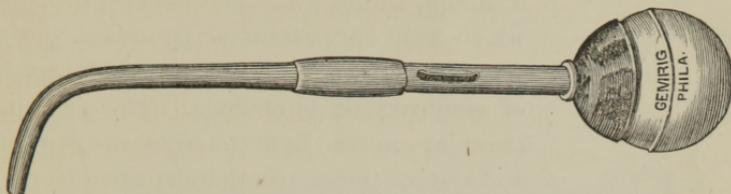


Fig. 38.—RAUCHFUSS'S LARYNGEAL POWDER INSUFFLATOR.

on the upper surface, over which a cap slides after the powder has been inserted. It is employed in the same manner as Gibb's douche. When such an instrument is not at hand, a substitute may be made of a catheter tube, in which the powder is to be placed, and the powder can be blown in by the mouth; or the flexible tube of a Davidson's enema syringe may be attached to it. The application of powders is usually followed by less suffering and reflex action than that of liquids, whether by the sponge or by the douche. We employ in this manner alum, tannin, cinchona, nitrate of silver, sulphate of copper, sulphate of zinc, calomel, or anything else that may be required. Where the material to be employed is powerful or of small bulk, it may be mixed with sugar, liquorice powder, pulverized marsh-mallow root, or some similar substance.

The application of powders in this way will often prove serviceable in all the various forms of laryngitis, acute and chronic; and in chronic inflammations and ulcerations of the trachea. The powder becomes entangled in the mucus, and as it is gradually dissolved exercises a continuous influence on the parts. Often after solutions have failed, or when the parts have become accustomed to them, we will find resort to the same substance in powder, of great benefit.

Scarification, Incision, Puncture, etc.

For puncturing an abscess, or making a simple incision into a growth within the larynx, I have employed the abscess lancet of Tobold, Fig. 39. It consists of a canula, within which is concealed a blade, which can be protruded by pressing the terminal ring of the instrument. Its mode of employment is obvious. The rings on the sides are for the first and second fingers, and the other for the thumb; after having made the puncture, by withholding the pressure, the knife springs back within the tube. The terminal extremity of the tube can be altered so as to expose a bistoury with a single or double cutting edge for purposes of scarification, or the detachment of growths. For mere scarifications, I employ unguarded lancets, with blades like the ordinary gum lancet, with a steel stem of proper size and curvature, to meet the case. Where one is unaccustomed to these procedures, or where the timidity of the patient seems to require it, the lancets can be employed concealed within a canula, as in the abscess lancet of Tobold.

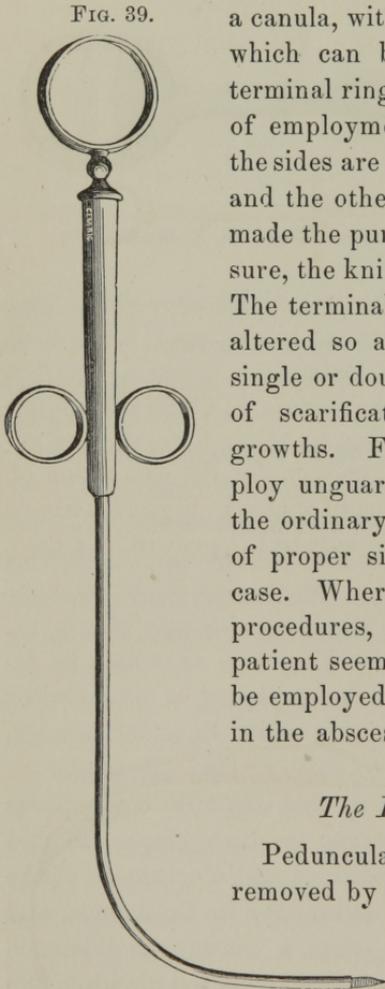


Fig. 39.—TOBOLD'S ABSCESS LANCET.
BLADE EXPOSED.

The Extirpation of Growths.

Pedunculated growths can sometimes be removed by compressing the pedicle within a loop of wire until the growth is detached. For this purpose I have used a snare, made exactly like

Wilde's snare for polypi of the ear, only made of proper length and shape. A similar instrument, acting with the same mechanism as Tobold's lancet, sponge-holder, cautery, etc., may also be employed. Many instruments have been devised for this purpose by different surgeons, but the best of all is Gibb's improved laryngeal ecraseur, depicted in Fig. 40. Its mechanism and mode of employment is sufficiently apparent.

FIG. 40.

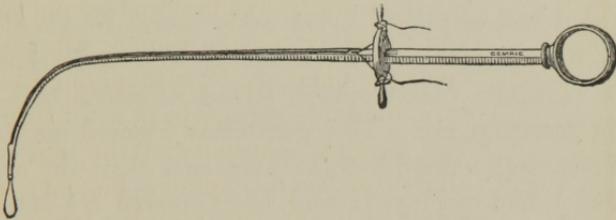


Fig. 40.—GIBB'S IMPROVED LARYNGEAL ECRASEUR.

The best pair of forceps I have seen for the extraction of growths is the laryngeal forceps of Fauvel (Fig. 41), which is furnished with steel pins to penetrate the growth and hold

FIG. 41.

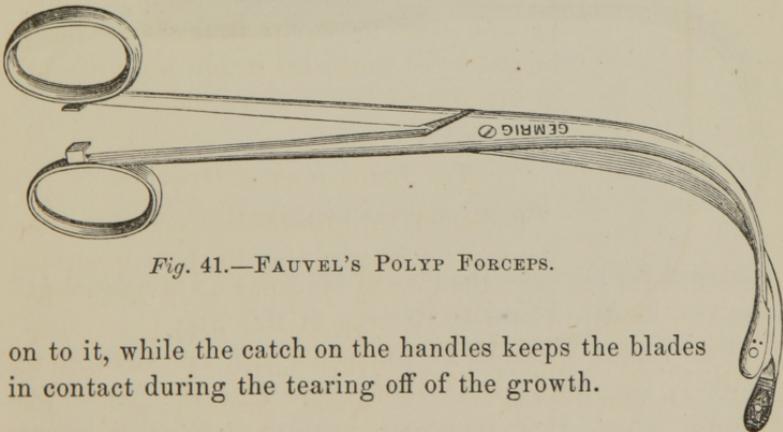


Fig. 41.—FAUVEL'S POLYP FORCEPS.

on to it, while the catch on the handles keeps the blades in contact during the tearing off of the growth.

The Galvano-Cautery.

The best cautery is produced by the passage of a galvanic current through a fine platinum wire, as first devised and employed by Middeldorpf, of Breslau.

It is necessary to be able to control the current, so that the wire shall not be heated until in contact with the part to be burnt. Large growths may be removed in this way with little fear of hemorrhage, and with less pain than when the knife is used. I have used the galvano-cautery upon one patient, on whom I had employed every other means for the destruction of a laryngeal growth, including knives, forceps, solid nitrate of silver, chromic acid, strong solutions of acid nitrate of mercury, etc. This gentleman assured me that the galvano-cautery caused less inconvenience than any other instrument I had employed; and he expressed his determination, in case of any necessity for future surgical operations within his larynx, to allow of no other interference than by the galvano-cautery, if it were sufficient for the purpose.

The instrument I employed is depicted in Fig. 42, and was

FIG. 42.

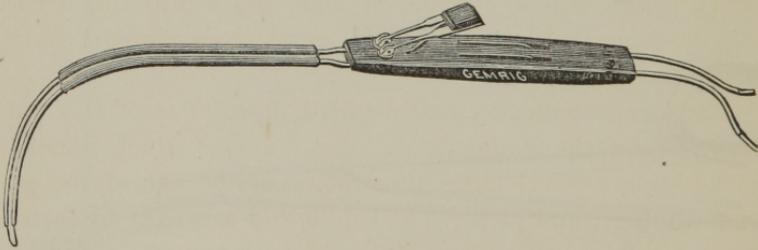


Fig. 42.—GALVANO-CAUTERY.

modelled for me upon the plan of Mackenzie's laryngeal galvanizer, by Mr. Theodore Gemrig, of this city.

Two copper wires, to be connected with the wires of the battery, pass through an ebony handle to the top of that handle, where they terminate beneath a metallic spring,

which, when pressed down, forms a connection with two other copper wires passing out of the anterior portion of the handle, and which at their terminal extremity are connected by a short piece of thin platinum wire. The copper tubes are isolated by India-rubber jackets, and by twisting these wires the terminal extremity may be turned so that the cauterizing surface shall present in any desired direction. The spot to be burned having been reached, pressure upon the spring completes the circuit, and in less than two seconds the platinum wire is at a white heat.

A battery of great intensity is required for galvano-cautery. I employed six cells of the Maynooth battery, which answered the purpose admirably. A large battery of this kind requires the services of an assistant to hold up the connecting wires, so that their weight, as they drag upon the instrument, shall not impede the free motion of the wrist.

The best battery to employ for this purpose is undoubtedly the battery devised by Prof. Middeldorpf himself, especially adapted to purposes of galvano-cauterization. This battery, which I have seen, but not used, consists of two cells, each composed of an outer glass cup containing diluted sulphuric acid; within this a cylinder of zinc, and within this a clay cup containing dilute nitric acid, in which is plunged a carbon element.

For a representation and detailed description of this battery, I refer the reader to Voltolini's work,* which narrates in addition several cases illustrative of the use of the galvano-cautery, and pictures and describes a variety of instruments employed for this purpose. I have recently seen these instruments, but have had no experience with them. They are clumsier, much heavier, and of more complicated mechanism than my own.

I have no doubt that the galvano-cautery presents an ad-

* Die anwendung der Galvano-kaustik im innern des Kehlkopfes und Schlundkopfes, etc., von Dr. Rudolph Voltolini. Wien, 1867.

mirable mode of operating within the larynx in the removal of morbid growths, inasmuch as it is less painful than cutting and twisting, while it is more prompt and certain in action, and not followed by as much hemorrhage. This last consideration I deem a very important one, inasmuch as the bleeding not only renders the patient fearful of suffocation, and perhaps might prove fatal occasionally, but always obscures the view of the parts, so that after drawing blood by knife, scissors, or forceps, it is often impossible to follow the action of the instrument with the eye; and the sensation of touch conveyed through the instrument is then our only reliance in continuing the incision or evulsion.

Want of a proper galvanic apparatus has deterred me from attempting the use of the galvano-cautery in more than the single instance referred to.

THE MANIPULATION OF INSTRUMENTS WITHIN THE LARYNGEAL CAVITY.

The instructions given in the body of this book not being sufficiently explicit to enable the practitioner to take the readiest mode of learning how to manœuvre with instruments within the cavity of the larynx, I deem it useful to introduce the directions which have already appeared in my articles on Intra-Laryngeal Surgery, published in the *Medical Record** of New York.

Certain general manœuvres are necessary for the proper introduction of every instrument, from a blunt probe to an exposed bistoury. The plan which the writer has found most useful in instructing his pupils, is to let them begin by holding the laryngeal mirror over a plane surface, as for instance the page before us; the paper representing the plane of the upper surface of the larynx, and the mirror being held an inch or more above it, at an inclination of about 45°. Then the

* See No. 37, September 1st, 1867.

student is directed to take an ordinary probe in his other hand, and still keeping his attention upon the image of the spot he designs touching, to carry the probe towards the *mirror* until it is nearly in contact, and then to move the probe gently until a distinct view is obtained of the image of its point; when, without losing sight of the end of the probe, it is to be directed towards the image of the spot selected, and to be slowly carried to it. A little practice will soon render him familiar with the inclination necessary to be given to the probe to secure the desired movement. After this procedure has been repeated sufficiently to familiarize the student with the proper method of following the reflex of his movements, so as to carry his instrument at will to the right or the left, in front or behind, the straight probe is exchanged for a curved one, such as would be suitable for introduction into the larynx; and then the same exercises are repeated; a second person, after a while, designating the points which the student is to endeavor to touch. A triangular paste-board tube of the size of the larynx, with certain marks upon its inner surface, is then substituted for the sheet of paper or printed page, and the mirror is then held above this so as to reflect the image of its interior, and the exercises are repeated. The difficulty of touching a desired spot is now rather greater than before; and thus the student is compelled to learn to raise the handle of his instrument if he wishes to touch the anterior surface of the tube, and to depress it in order to carry the point of his instrument towards the posterior portion of the tube, as also the proper movement to the one side or the other.

After this, a papier-maché model of a larynx is employed as a means of exercise; and finally, the method introduced by Tobold, which is, to mount a recently excised larynx, with the tongue, soft palate, etc., upon the rod supporting a mounted skull, with the jaws separated, the œsophagus being

fastened round the rod. If a recent larynx cannot be obtained, a wet preparation, or an artificial one, is substituted.

After a certain amount of facility has been acquired in this way, it is necessary to learn how to manage the mirror and operating instrument at the same time, with artificial light. This is best done by suspending the model, or the mounted skull, within a box, having a small opening, to represent the open mouth, just in front and above the larynx or model; then the light is to be thrown into the interior, through the opening, and the manipulation proceeded with as before.

When the student has acquired considerable facility in placing the point of his instrument upon any desired spot, recognized solely by reflection in the mirror, it will require a great deal of patience and of practice to enable him to accomplish the same result upon a patient, in whom nervousness and the natural irritability of the structures will cause more or less movement of the parts, whose reflex must be followed promptly and with accuracy, in order to insure precision of movement. The results that reward perseverance seem all but incredible to those who are not familiar with the subject, or impressed in its favor.

The principal rule to be observed in these manipulations, be they what they may, is to *carry the instrument well towards the mirror, until its point is visible in the image, and not to lose sight of the point during the operation.* Very often the instrument will have to be withdrawn again and again before a favorable opportunity is presented for carrying it home; but with increased practice, the expert soon becomes able to succeed at almost every attempt.

We can, in this way, not only make local applications of a general nature, such as swabbing, syringing, etc.; but circumscribed ulcers can be cauterized, abscesses opened, tumors ligated, excised, or twisted off, granulations scarified, individual muscles galvanized, everything, except dissection; and

this without compromising the integrity of the healthy structures any more than occurs under ordinary circumstances.

The instrument which it is proposed to carry into the larynx, must be formed with a suitable curve or angle. The angle most generally serviceable is one of 112° , but if it be a little greater or a little less, it will make no material difference. An angular instrument may be employed, if desired, but it will occupy more space in the throat than a curved one, and thus, at times, may be less serviceable. The laryngeal portion may vary from an inch and a half to three inches in length, and the handle or stem from six to eight inches. Under certain circumstances, the ordinary form of the instrument may be conveniently departed from, in consequence of peculiar conformation of the larynx, or where it is intended to operate upon the anterior or posterior portion of the tube: in the former instance, the angle may be more acute, and in the latter more obtuse; otherwise the necessary depression or elevation of the hand, in order to reach the desired spot, will require the possession of a greater amount of skill.

The best method of managing the tongue is for the patient to extrude it as far as possible, and then to hold the extremity himself between his thumb and forefinger, so as to arrest the involuntary backward movement when an instrument is passed within the mouth, a cloth being interposed between the tip of the tongue and the fingers to prevent its slipping. Patients soon learn to hold the tongue properly and quietly without grasping it. If it is absolutely necessary to employ a tongue-depressor, an instrument should be selected which will reach well back to the base of the tongue, which is then to be forcibly depressed and drawn forwards; and its management should be intrusted to the patient. The less paraphernalia employed, however, the better. Tongue-depressors, mouth-distenders, head-rests, and laryngeal "*fixateurs*," all produce more or less restraint on the part of the patient or operator; and their use is therefore to be avoided unless imperatively

needed, an emergency which is happily of rare occurrence. When a patient is unable to maintain his head in a proper position without extraneous support, the best rest for it is the breast of a friend, or that of an assistant, who should place one hand upon the forehead of the patient. The writer sometimes employs Tobold's head-rest when an assistant is not within call. If the tongue is very fleshy, or very unruly, a depressor may become indispensable. It is difficult to conceive of any case in which an instrument for holding the laryngeal mirror in position can be judiciously employed, for it would become spattered by cough, etc., necessitating frequent readjustment, which would prove exceedingly irksome and vexatious. If the operator require the use of both hands for instrumental purposes, the mirror can be managed by an assistant, or in many cases, and what would be far preferable, by the patient himself, who can often be taught to keep the mirror in position after it has been properly placed by the operator; and indeed, some patients have learned by practice during protracted treatment, to introduce the mirror themselves, and place it at once in the desired position.

Light, patient, tongue, etc., being in proper adjustment, the mirror is introduced with the left hand, if the operation is to be performed with the right, or *vice versa*, and with the other hand the instrument is to be passed well back into the pharynx, and close to the mirror, until its point can be clearly discerned in the mirror, and avoiding contact with any of the structures; then, with the image in the laryngeal mirror, as "the guide to the operating hand," the point of the instrument is to be directed towards the desired spot, and, following the reflex, to be carried there promptly and quietly. The instrument should be taken in hand as if it were a pen,—not as if it were a cart-whip, a position in which too many are apt to hold it,—and the fingers being extended on the wrist, the laryngeal portion is to be carried over the tongue, until its approach is seen in the mirror. It is not always, even

after long practice, that the actual contact of the diseased spot can be recognized in the mirror, for usually, and perhaps always at a first application, spasmodic action ensues at the moment of contact; and very often the instrument, if not promptly withdrawn, will be caught by the epiglottis or by the base of the tongue; an occurrence which it is desirable to be able to avoid, although under certain circumstances, as when a general application is being made by means of a moistened sponge, the action may be advantageous, inasmuch as it compresses the sponge, and thereby secures the discharge of its fluid. Under these circumstances the character of the contact is to be determined by the impression conveyed to the finger by the end of the instrument. As soon as practicable, which is as soon as the spasmodic action induced by the operation ceases, the parts are to be re-examined in the usual manner, in order to judge of the success of the application, as well as to determine the necessity for its repetition in case of failure.

Patients soon become accustomed to the momentary contact of a foreign body against the laryngeal mucous membrane, but at the earlier applications the distress is often extreme; there is a great deal of spasm, with choking sensation and expectoration; while the sense of constriction and dread of suffocation sometimes endures for several minutes. It is the same as when a foreign body has been removed from the conjunctival mucous membrane, the sensation of its presence remains for some time; and, from a similar cause, patients will "feel the sponge in the throat" after its withdrawal, and this will keep up the feeling of impending suffocation, so that they will sometimes throw the body from one side to the other, walk about the room, approach the window to get a breath of air, etc., and occasionally exhibit an amount of distress really piteous to witness. With each repetition of the application, however, the sensibility of the parts decreases, until after a while, the operation will be followed by

a mere hawking, or clearing of the throat. In the earlier applications, too, the effect will be to induce active congestion of the parts with increased secretion, which will be followed by a sense of rawness, dryness, or burning, in greater or less degree, and continuing from fifteen minutes to several hours. As the applications are repeated, these effects, too, gradually diminish in intensity. The swallowing of cold water will often materially alleviate this distress, when it is severe; and if it continues for some time, the inhalation of an anodyne solution or vapor will overcome the irritation.

Very often a skilful operator can succeed in making a successful application at the first interview with his patient; but with those who are less practised, and in all cases of extreme irritability of structures, a certain amount of preparatory manipulation is rendered requisite. The best method is the contact of some extraneous body. We may show a patient how to pass an instrument into his own larynx, a probang armed with a small sponge, for instance, and direct him to insert it into his own larynx two or three times a day, until the contact of the instrument can be borne without flinching. This practice is necessary at times, preparatory to the employment of cutting instruments; less so, when cauterization or general applications are to be instituted.

Very often the epiglottis is more irritable than the interior of the larynx, and to overcome this, the best plan is for the operator to pass his finger behind the patient's epiglottis, and pull it forward several times, and then to teach the patient how to perform the manœuvre himself; with directions to repeat it occasionally at intervals during the day. Then he may be provided with an extension thimble (such as is used by dentists for holding foil while plugging back teeth), with a good, broad, blunt end, and insert that several times a day. When the epiglottis is very much depressed, the patient must pull it forward frequently, so as to induce it to assume a more erect position. A patient can be taught to raise the epiglottis

with the forefinger of one hand, and then with the other hand to pass a sponge probang along the back of the finger down into the larynx. By this, or some similar method, the sensibility of the part will be gradually subdued.

Where obstinate depression of the epiglottis precludes the convenient introduction of an instrument, it will have to be forcibly raised by means of properly curved forceps, hooks, or pincettes, of which that of Von Bruns (see Fig. 43), is one of the best.

FIG. 43.

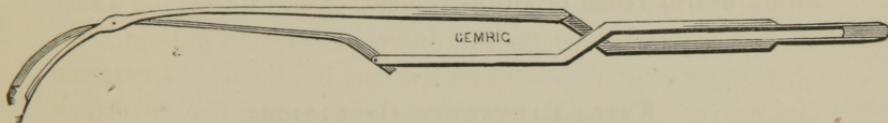


Fig. 43.—VON BRUNS' EPIGLOTTIS PINCETTE.

These instruments always cause more or less irritation, and the patient must be gradually inured to their use. For mere purposes of examination, the simple rod, curved so that its point shall not press upon the epiglottis, is employed by Voltolini and others, and is often of great advantage.

Certain precautions are necessary to insure success in limiting a local application to certain portions of the larynx, and in order to gain access to others; and for this purpose we avail ourselves of the physiological effect of voluntary movement. Thus, if we want to medicate the floor of the glottis, or prevent any of the material used from entering the trachea and lower laryngeal cavity, we direct the patient to emit a vocal sound, which of course closes the glottis; if, on the contrary, we desire the instrument to enter the lower laryngeal cavity, or penetrate into the trachea, we direct the patient to take a deep inspiration, which opens the glottis, and permits the passage of the instrument between its lips. If we wish to make an application to the laryngeal surface of the epiglottis, or to the anterior portion of the vocal cords, ventricular

bands, etc., we direct the forcible extension of the tongue, and the utterance of a high note or an ironical laugh, in order to expose these structures more fully; if we wish to touch a spot upon the lingual face of the epiglottis, or in the glosso-epiglottic sinuses, or upon the base of the tongue, we allow the base of the tongue to remain in a more natural position, or cause it to be protruded in such a way as will not raise the epiglottis to its erect position; and so on. Then, again, the preliminary movements of retching, swallowing, coughing, etc., will raise the entire larynx, and bring the structures within nearer reach of an instrument.

EXTRA-LARYNGEAL OPERATIONS.

We have thus far considered the various modes of intra-laryngeal interference for the treatment of laryngeal disease. Occasionally, however, despite all our endeavors to avoid it, we occasionally find it necessary to open the larynx from the outside for the removal of morbid growths, which cannot be destroyed from within, either on account of their position below the glottis, or from their extensive attachments above, and within the ventricle, precluding the possibility of thorough extirpation, so necessary in the case of malignant growths. Under these circumstances the laryngoscope has still a great value. It enables us to judge of the seat and extent of the formation. It enables us, by means of forceps or knife, to remove portions of the growth for microscopic examinations; and it enables us finally to watch the reparative process after the performance of an operation.

I have been compelled in two instances to resort to an external division of the larynx for the removal of laryngeal growths. These operations were performed in June of last year, for the removal of a fibroid tumor, and in February of the present year, for the removal of an epithelioma. They

were both successful as regards the removal of the growth, the prompt recovery of the patient, and the consequent prolongation of life. They have not yet been published.

The mere opening of the larynx is a matter of little difficulty, but the extirpation of a tumor with extensive attachments is a matter of a good deal of labor and responsibility, on the one hand, on account of the spasmodic action of the parts at every touch of the knife and forceps, thus impeding manipulation; and on the other hand, on account of the passage of blood into the trachea.

In the slighter of these cases, the larynx was divided without the previous performance of tracheotomy. In the more serious and later case, tracheotomy was performed in advance, on account of the size of the growth, which threatened to impede respiration; and more particularly to facilitate future access to the parts in case of a return of the tumor; a circumstance still apprehended, though there had been no evidence of it up to the 3d of September of this year, at which date the patient was examined by Prof. Tobold, of Berlin, who reported still an inflammatory condition of the whole larynx, but no evidence of any growth, old or new. In case the operation, after splitting the larynx, would be a simple one, as strangulating or cutting a tumor without ramifying adhesions, so that comparatively a slight amount of injury would be inflicted upon the intra-laryngeal structures, I would be inclined to open the larynx at once without the previous performance of tracheotomy. Where, on the other hand, a great amount of injury of this kind is anticipated, which would lead to a good deal of inflammation, I would be inclined to perform tracheotomy in advance, to facilitate respiration and keep the injured parts at rest. Having adopted these views, I acted upon them in the instances referred to, and, as far as the result of but two cases go, with satisfaction to myself. I was led to adopt the plan of open-

ing the larynx at once, from a perusal of Cutter's case (*Am. Jour. Med. Sci.*, January, 1867), but still have a preference for the other mode of operating in severe and malignant cases; both as a matter of precaution, and as conducive to greater comfort of the patient in the after-treatment.

CHAPTER XI.

HOARSENESS, LOSS OF VOICE, AND STRIDULOUS BREATHING, IN RELATION TO NERVO-MUSCULAR AFFECTIONS OF THE LARYNX.

BY DR. MORELL MACKENZIE, OF LONDON.

NERVOUS AFFECTIONS OF THE LARYNX may be conveniently divided into (1) Diseases of the Motor System; and (2) Diseases of the Sensory System.

DISEASES OF THE MOTOR SYSTEM.

Under this head we have (*a*) paralysis of the muscles acting on the vocal cords; and (*b*) spasm of the muscles acting on the vocal cords. The paralytic affections of the muscles acting on the vocal cords may be again subdivided as follows:

1. Bilateral paralysis of the adductors.
2. Unilateral paralysis of the adductors.
3. Bilateral paralysis of the abductors.
4. Unilateral paralysis of an abductor.
5. Paralysis of the tensors.
6. Paralysis of the laxors. (These last two—5 and 6—may also be either bilateral or unilateral.) Some of these paralysees may coexist together, and indeed are often found associated. Thus paralysis of the tensors of the vocal cords is often met with in combination with bilateral paralysis of the adductors, and it not unfrequently happens that both the adductor and abductor of a vocal cord are paralyzed—the

vocal cord being permanently fixed in an intermediate position, and neither approaching the median line on phonation, nor being thrown outwards on inspiration.

Before proceeding to consider the paralyses of the larynx in detail, it may perhaps be thought desirable to make a few brief remarks on the anatomical and physiological relations of the part.

It should be remembered that the vocal cords have a fixed insertion anteriorly in the receding angle of the thyroid cartilage, and that whilst in vocalization the two cords are approximated, or *adducted* to the median line, in inspiration they are widely separated, or *abducted* from the median line. The crico-arytenoidei laterales, and the arytenoideus proprius are the *adductors*;* the crico-arytenoidei postici are the *abductors*. The adductors and abductors have been respectively called the closers and openers of the glottis, but the fact that each muscle may act separately on its respective vocal cord, and that the closing and opening of the glottis are only effected by the consentaneous action of the muscles of both sides, are reasons for preferring a name which at once explains the action of the muscles, and brings their nomenclature into harmony with that employed for the description of other parts of the body.

We now pass on to the consideration of—

Bilateral paralysis of the adductors of the Vocal Cords [crico-arytenoidei laterales, and arytenoideus proprius].

Definition.—Inaction of the adductors on both sides pre-

* Should this change in name meet with approval, it would be well to call the right and left lateral crico-arytenoid respectively the right and left adductor, and the arytenoideus proprius, from its situation, the central adductor. With regard to the last-named muscle, however, there is no doubt that the oblique fibres may act independently of each other, and probably it sometimes occurs that one set of fibres is paralyzed without the action of the other being impaired.

venting approximation of the vocal cords on attempted phonation, and consequently giving rise to loss of voice.

Synonyms.—*Latin*, paralysis glottidis, aponia paralytica, aponia; *French*, aphonie; *German*, Kehlkopflähmung, Stimmbandlähmung; *English*, functional aponia, hysterical aponia, aponia, nervous aponia, nervous loss of voice.

Causes.—Debility and hysteria are undoubtedly the most frequent causes of this disorder. It is common in the second and third stage of phthisis; and this is an important fact,* as the aponia of phthisis is almost invariably attributed to the structural changes which are too frequently encountered in that disease. It is occasionally met with in chlorosis, but it far less commonly occurs in connection with amenorrhœa than might be supposed from the writings of some authors. More often it is the simply anæmic who suffer from it. Most commonly, however, this form of aponia originates in catarrhal congestion. The hoarseness and cough disappear, and the voice is entirely lost. Women are far more subject to this form of aponia than men, and young women more so than old. Still, I have treated several cases in which men were the patients. I well recollect a very obstinate case of an engineer, aged about fifty, sent to me some years ago at the Throat Hospital by Dr. Drysdale, and I recently treated an old gentleman, recommended to me by Dr. Smyly, of Dublin, for the same affection. I have also had women of

* In 1865, in conjunction with, and through the courtesy of, one of the assistant physicians, Dr. W. H. Stone, I examined a number of cases at the Brompton Hospital. Thirty-seven cases of phthisis, in the second and third stage of which the voice was affected, were selected for laryngoscopic examination. In eleven of these the affection was purely functional; in twelve there was thickening of the mucous membrane, and in fourteen there was congestion. I need scarcely say that the treatment of the laryngeal affection differs widely, according as it is of a functional or organic character; and it may not perhaps be out of place to observe that in a case of phthisis the character of the laryngeal disease has a most important influence in prognosis.

advanced years, with this form of aphonia, under my care. On the other hand, I have successfully treated two children—both girls, under ten years of age. Silent people, whether their silence is voluntary or forced, are more subject to functional aphonia than those who are accustomed to use their tongues freely. At a nunnery at the West End, held by one of the strictest of the contemplative orders, I lately saw, in consultation with Mr. Tegart, two cases, in which prolonged silence, together with the other depressing circumstances of conventual life, had given rise to obstinate paralysis of the adductors. Emotional influences, especially that of sudden terror, very frequently give rise to it. The popular expression, “struck dumb with fright,” probably refers more to vocalization than articulation; and the embarrassment of those “unaccustomed to public speaking” seems to be occasioned by loss of power of both these functions. Very frequently it occurs as one of the protean forms of hysteria, and these cases are not unfrequently associated with loss of power of articulation, the lips and tongue remaining perfectly immobile when the patient is directed to make an effort to speak. Pressure on the recurrent nerves* sometimes gives rise to it, but more often the nerve on one side only is affected. I have met with one case, however,—a patient under the care of my colleague, Mr. Hutchinson, about three years ago,—in which paralysis of the adductors of the vocal cords was caused by extensive disorganization of the brain. Such cases are, I believe, exceedingly rare.

Sometimes it has appeared to be due to malarious influences, and then has assumed an intermittent character. Professor Gerhardt, who calls attention† to these intermittent cases, also considers rheumatism as a cause of paralysis of the vocal cords, and notices three kinds, viz.:

* “Deutsches Archiv für klin. Mediz.” Feb. 22d, 1867. Ueber Stimmbandlähmungen, von Dr. Bäumlcr.

† “Virchow’s Archiv,” vol. xxi.

1. Meta-rheumatic paralysis of the vocal cords. In these cases acute inflammation of the joints is followed by paralysis of the vocal cords.

2. Catarrhal rheumatic paralysis. In these cases aphonia comes on with catarrh of the mucous membrane of the nose, larynx, and perhaps bronchi, and remains after the catarrh is cured.

3. Direct rheumatic paralysis. This is the result of exposure to draughts of air or taking cold drinks. This kind of aphonia is analogous to facial paralysis.

In the last two varieties, cold rather than rheumatism would, according to English notions, appear to be the exciting cause of the paralysis. I have not met with any cases of the so-called "meta-rheumatic paralysis."

Symptoms.—The most characteristic symptom of this condition is loss of voice; but though the voluntary power of phonation is lost, the reflex function is not generally affected.

The cough and the sneeze are usually accompanied with a distinctly laryngeal sound; the laugh, however, being a much feebler expiratory sound, is not always phonetic. The condition is at once seen with the laryngoscope. On directing the patient to attempt to say "a," "e," or "o," it is seen that the vocal cords do not approximate. They may approach one another slightly, or they may remain perfectly immobile, leaving a large triangular space between them. It not unfrequently happens that though both vocal cords are paralyzed, one is affected more than the other. Sometimes the paralysis principally affects the cartilaginous portion of the glottis. In this case, whilst the cords are nearly approximated in their anterior three-fourths, a considerable opening remains at the posterior fourth of the glottis. The laryngeal mucous membrane is almost invariably pale, but it may be congested.

Diagnosis.—The only cases which are likely to be confounded with functional aphonia are those in which the loss

of voice is due to feeble respiratory action—expiration not being powerful enough to set the cords in proper vibration. Vocalization being a highly compound process—an action in which a large number of muscles must be consentaneously concerned, the failure of one set of muscles often affects the others. Thus, the expiratory action of the chest being very feeble, the vocal cords are less perfectly adducted. In this way a secondary phenomenon is apt to be mistaken for a primary one. This source of fallacy, has, however, only to be indicated to be avoided. It must be borne in mind also that the approximative action of the cords may be interfered with by certain mechanical impediments, such as swelling of the inter-arytenoid fold, the presence of growths, or cicatrices, and disease of the crico-arytenoid joints. The laryngoscope, however, at once detects these conditions.

Pathology.—The pathology of the disease has, to a great extent, been encroached upon in considering its etiology, and it remains only to be said that, as a rule, there is no appreciable impairment of structure either in the larynx, nerves, or nerve-centres. It seems, rather, that the nerve-force is feebly or imperfectly evolved, or that it is not directed in the proper channel. The sudden restoration of the voice, which so frequently takes place, either spontaneously or as the result of treatment, can only be explained by some such theory as this. The muscles which are paralyzed are the adductors—the crico-arytenoidei laterales on each side, and the arytenoideus proprius. The latter muscle is probably alone affected when the cartilaginous portion of the glottis only remains open. As already remarked, I have only met with one case in which the affection was due to structural disease, the brain being in that instance affected with a cancerous tumor.

Prognosis.—The prognosis, as regards cure, is almost as favorable as it is in respect to mortality. For although these cases are often very obstinate, and resist a great deal

and a great variety of treatment, they are almost always cured in the end. During the last five years, I have treated more than two hundred such cases, and, as far as I am aware, in only four instances has the aphonia resisted treatment. In several of these cases the aphonia was of six, seven, and eight years' standing; and in one, the voice was restored after having been lost for ten years. It is exceedingly rare that atrophy of the muscles takes place, a fact which is explicable when it is remembered that in respiration they are constantly, though slightly, called into action. One case, however, of atrophy, or at least of complete and irremediable paralysis of these muscles, has come under my observation. Disease of the brain so rarely gives rise to bilateral paralysis of the adductors, that it is scarcely necessary to say that its presence would most seriously affect the question of prognosis.

Treatment.—Remedies which stimulate the mucous membrane of the larynx—which tend to create a mild spasm of the glottis, are those most rational in principle, and most successful in practice. Emotional influences not only cause, but often cure, this form of aphonia. We have an instance of the power of the mind in restoring the voice nearly two thousand five hundred years ago,* and it would be easy to

* Herodotus remarks (Book i, Clio, chap. 85), “ We have now to speak of the fate of Cræsus. He had a son, as I have before related, who, though accomplished in other respects, was unfortunately dumb. Cræsus, in his former days of good fortune, had made every attempt to obtain a cure for this infirmity. Amongst other things, he sent to inquire of the Delphic Oracle. The Pythian returned this answer :

‘ Wide ruling Lydian, in thy wishes wild,
Ask not to hear the accents of thy child ;
Far better were his silence for thy peace,
And sad will be the day when that shall cease.’

“ During the storming of the city, a Persian, meeting Cræsus, was, through ignorance of his person, about to kill him. The king, overwhelmed by his calamity, took no care to avoid the blow or escape death ;

bring forward many "modern instances" of the extraordinary curative power of emotion. As, however, this is an agency which can scarcely be employed either conveniently or safely by the physician, it is better to employ remedies of more manageable and more local character. There are three kinds of topical remedies which may be employed, all of which act on the same principle. 1st. Stimulant inhalations may be used. I have several times known a vapor impregnated with ammonia restore the voice. The inhalation of chlorine has been successfully used by Dr. Pancoast,* of Philadelphia, and in several cases I have employed the more safe remedy, creasote vapor, with complete success. In consultation with Mr. Pye-Smith, of Hackney, I recently treated a lady who had suffered from functional aphonia for many months (and whose throat had been most perseveringly swabbed with nitrate of silver for several weeks), with inhalation of creasote, and the voice was restored in a few days. 2dly. Stimulant, or strongly astringent solutions, such as nitrate of silver (3j ad 3j), or perchloride of iron (3ij ad 3j), or a saturated solution of tannin, can be applied with a brush to the interior of the larynx; or the silver or iron solutions can be introduced into the larynx in the atomized form. But whilst both the inhalations and local applications often fail, there is one remedy which is almost always successful. *This is (3dly) the direct application of electricity to the vocal cords.* Electricity externally applied seldom restores the voice when it has been lost for any length of time, but it may often be advantageously employed in keeping up the effect produced by the more

but his dumb son" (ὁ δὲ παῖς οὗτος ὁ ἄφωνος, is the expression), "overcome with astonishment and terror, exclaimed aloud" (literally, broke his voice, ἐρρήξε φωνήν), "Oh, man, do not kill Cræsus!" This was the first time he had ever spoken (ἐφθέγηστο), but he retained the faculty of speech (ἐφώνεε) from this event as long as he lived."

* Wood's "Practice of Medicine," vol. i, p. 834.

direct application. The internal current is, on the other hand, almost invariably successful. In other words, when the voice has been restored by the introduction of a pole into the larynx, the effect can often be kept up by the occasional application of the current externally.

In using the direct current, one pole is introduced within the glottis, and the other pole applied externally. In this way the voice is often immediately restored.

So many cases showing the value of this kind of treatment have already been published, that I do not think it necessary to give more than three or four illustrations. I shall therefore select four of the most recent cases, and relate them very briefly; before doing so, however, I may observe that the electricity possibly, and perhaps probably, does not act *directly* on the muscles paralyzed, but *indirectly*, through reflex action, by causing a kind of spasm of the glottis. When one pole is placed on the vocal cords, and the other on the neck externally, between the thyroid and cricoid cartilages, the electric current must doubtless pass through the adductors; but it is more probable that the contraction of these muscles is of a reflex character, brought about by the electric shock to the sensitive nerves. The sudden restoration of the voice in some cases, after one application of electricity, indicates that the curative influence in these instances is in all probability of an emotional character.

I generally keep the pole in the larynx for three or four seconds each time it is introduced, and pass a succession of short rapid shocks through the larynx; and at each sitting I apply the pole to the interior of the larynx three or four times. The source of the electricity is not a matter of any importance. I find equally good effects follow whether a battery or a magneto-electric machine is employed.

Out of more than two hundred cases that I have treated in this way, I have only met with four cases in which the treat-

ment was not successful. In three* of these no effect was produced, and in the fourth such violent hysterical attacks came on whenever the treatment was attempted, that it was obliged to be discontinued.

As a general rule, it is important not to allow too long an interval to elapse between each application of electricity. Sometimes one or two applications of electricity are sufficient; but in most cases the current should be applied every day for the first week, every other day in the second week, twice in the third week, and once in the fourth week. I have often known practitioners fail for want of pursuing some such plan as this. In those rare cases in which the paralysis of the adductors is due to actual pressure on the nerves, it is needless to observe that electricity is almost, if not entirely, useless. A case was lately brought to me at the London Hospital, by Mr. James Adams, which exemplifies this statement. The patient, residing at Walthamstow, was unable to attend very frequently as an out-patient; and the voice, though generally lasting for a few days after the application of the electric current, was usually lost before she was again able to visit the hospital. When, however, on my recommendation, she remained in the hospital for a week or two, under Mr. Adams's care, the voice was permanently restored.

In addition to the modes of treatment already referred to, I should mention that where the aphonia is associated with or dependent on hysteria, the ordinary anti-hysterical treatment, especially the use of the cold shower-bath, is sometimes successful. In cases of hysteria, the inhalation of chloroform

* In one of the unsuccessful cases, the patient, a lady, aged about 40, was under the care of Sir Henry Thompson for severe disease of the knee-joint. As an evidence of the extreme difficulty in making any impression in this case, I may remark that the thigh has since been amputated *without chloroform*, and that the patient bore the operation without uttering the faintest sound.

also frequently effects a cure. The patient should be rendered quite unconscious, and then, as consciousness is returning, should be engaged in conversation. In this way the voice which was lost is recovered under the effects of the chloroform, and often remains when the influence of the chloroform has passed away. The mode of treatment with chloroform is very uncertain, however, when compared with the direct application of electricity to the vocal cords. To those who can use the laryngoscope, the application of electricity in the way described will undoubtedly appear the most safe and satisfactory procedure. In most cases, when the voice has once been restored, it is important to adopt measures to keep up the effect. The external application employed daily, or every other day, is often very useful for this purpose. I also always direct the patient to exercise the voice regularly, by counting aloud, reading aloud—gradually increasing the exercises, both as regards their duration and the loudness of voice. These matters may appear trivial, but they are really of great importance in effecting a permanent cure.

Loss of voice of four and a half years' duration, from bilateral paralysis of the adductors, cured by the direct application of electricity to the vocal cords.

Case 20.—Miss D., aged 43, was sent to me, June 28th, 1867, by Mr. Le Gros Clerk, on account of aphonia of nearly five years' standing. Before that time she had occasionally lost her voice for a few days, but had always regained it. This time, however, she had been completely voiceless for four years and a half. She told me that she had had the best medical advice; that she had taken quantities of tonics, cod-liver oil, etc.; that her throat had been painted inside and outside; that she had tried many kinds of gargles, etc., but all without effect. She stated that she felt very well, could stand a fair amount

of fatigue; and though she had been repeatedly told that "as she got stronger, the voice would return," she had not found this to be the case. She showed no signs of hysteria, had never had an attack of hysterics, and both she and her sister informed me that she was not inclined that way. I mention this circumstance, as many practitioners are apt to call every case of this sort "hysteria." On making a laryngoscopic examination, it was seen that though on attempted phonation the vocal cords moved slightly towards the median line, they did not nearly approximate. The mucous membrane of the larynx was pale, but there was no organic disease. The case was therefore clearly one of paralysis of the adductors of the vocal cords.

I applied the electric current directly to the vocal cords daily, and after the fourth application the patient was able to sound her voice. After this the application was gradually left off—longer intervals being allowed to elapse between each visit, until the end of three weeks, when the patient was discharged cured. The perfect restoration of the voice was very gradual in this case; thus at the end of the first week it was very feeble, jerky, and spasmodic; at the end of a fortnight it had lost its jerky character, and was merely feeble; whilst at the end of three weeks it was quite natural.

Aphonia of six months' standing, from a symmetrical paralysis of the adductors, cured by the direct application of electricity to the vocal cords.

Case 21.—Mrs. S., of Warwick, aged about 50, was sent to me, June 29th, 1867, by Mr. Ruttledge, on account of loss of voice of six months' standing. A laryngoscopic examination showed that the aphonia was due to paralysis of the adductors of the vocal cords, for on attempted phonation they remained widely separated. A slight difference, however, could be noticed in the action of the two cords—the right advancing

rather nearer to the median line than the left. For some years her voice had been weak, but she had never lost it for so long before. The third or fourth application of electricity restored the voice, and though the lady took cold and was thrown back a few days, at the end of three weeks she was able to return home perfectly cured.

Loss of voice of eighteen months' duration, from paralysis of the adductors, cured by one application of electricity to the vocal cords.

Case 22.—Louisa C., a servant, aged 23, from Newbury, was admitted into the Hospital for Diseases of the Throat, July 4th, 1867. Though stout, she was rather weak, and fainted on her first visit to the Hospital. For this reason she was received as an in-patient. She stated that her loss of voice was a serious drawback to her, and that it prevented her getting a situation.

It was seen that the vocal cords scarcely moved at all towards the median line on attempted phonation. One application of electricity restored the voice, and after remaining in the Hospital two or three weeks to get her strength up, she was discharged "cured."

Aphonia of three years' duration, from paralysis of the adductors, cured by the direct application of electricity to the vocal cords.

Case 23.—Fanny S., aged 20, was admitted into the Hospital for Diseases of the Throat, July 14th, 1867, on account of loss of voice of three years' duration. Eight months previously she had applied at the Hospital, and her voice had been restored on several occasions by the direct application of electricity; but the effect had always been very transient, the voice having generally been lost again after a few days.

At that time she lived at some distance from the Hospital, and could not visit it very often, and for the same reason it was necessary now to make her an in-patient. The laryngoscope showed that the case was one of paralysis of the adductors of the vocal cords. After three applications of electricity to the vocal cords, the voice was fully restored, and since July 20th the voice has remained strong.

*Aphonia from paralysis of the adductors of the vocal cords
in the course of pericarditis.*

Case 24.—C. R., æt. 22, shoemaker, a pale-looking and badly-nourished young man, who had from his childhood suffered a good deal from rheumatic pains, and more recently from palpitation of the heart, was admitted into the German Hospital, Dalston, on January 8th, 1866, with pericarditis, and with various symptoms of syphilis, which he had contracted about six months before. Besides a very loud systolic murmur at the apex of the heart, which pointed to old-standing mitral disease, there was well-marked pericardial friction-sound, and the cardiac dulness extended upwards to the incisura jugularis, and even a little beyond the right sterno-clavicular articulation. His voice, which on admission was rather husky, became after a few days a mere whisper. As there was slight ulceration of both tonsils, it was thought the loss of voice might be due to some morbid change in the larynx of a syphilitic origin. The laryngoscope, however, at once refuted this idea, for although it revealed two small mucous tubercles on the inner surface of the epiglottis, it showed that the larynx itself was perfectly sound, and that the aphonia was due to paralysis of the adductors of the vocal cords, which on attempted phonation remained widely separated: the arytenoid cartilages showed only a slight trembling movement. The pericardial effusion gradually diminished, and about a fortnight after the aphonia had be-

come complete the voice began to return; for some time, however, the lower notes only could be produced, although the laryngoscope showed that the mobility of the vocal cords was perfectly restored. The impairment which remained for some time longer was due to catarrhal congestion of the mucous membrane of the larynx, which had come on after the paralysis had disappeared. In the beginning of March he left the hospital, much improved in his general health, and with his voice nearly in a normal state, but had to return on the 26th, as the heart's power began more and more to fail. Although he suffered a great deal from dyspnœa, and was at times exceedingly weak, his voice remained unaffected until his death, on the 19th of May.*

Unilateral Paralysis of the Adductors (of a Vocal Cord).

Definition.—Inaction of the adductors on one side, preventing the approach of the corresponding vocal cord to the median line, and consequently giving rise to hoarseness or loss of voice.

Causes.—The condition may be due to chronic toxæmia (lead, arsenic, † diphtheria, etc.), may result from cerebral disease, or may be caused by cold, or muscular strain. I have met with it after small-pox, in constitutional syphilis, and in phthisis. As regards the aphonia, so commonly met in phthisis, Dr. Mandl‡ thinks that it is frequently due to paralysis of the right vocal cord, from pressure on the recurrent nerve of the same side. In support of this view, he states

* This unique case was originally contributed to the "Deutsches Archiv für klin. Medizin" (Ueber Stimmbandlähmungen, February 22d, 1867) by Dr. Bäumlér, Assistant Physician to the German and Victoria Park, Hospitals. I am indebted to that gentleman for making an abstract of it for this article.

† See a case in the London Hospital, recorded in "Medical Times and Gazette," January 11th, 1862.

‡ "Gazette des Hôpitaux," No. 135.—1862.

that whilst in fifty-two cases where the apex of the right lung alone was affected, fifty of the patients were hoarse; in thirty-two cases where the left apex was affected, only one of the patients was hoarse. Dr. Mandl accounts for this difference by reminding us that whilst the left recurrent nerve winds round the aorta, the right recurrent passes in close contact with the apex of the lung, and is therefore likely to be pressed upon by the morbid deposit, or the pleuritic inflammation at the apex, to which it so often gives rise. Dr. Ogle,* also, in an interesting paper, observes as follows: "My impression has long been (and, indeed, according to my experience, post-mortem research has demonstrated it to be so), that the affection of the voice in this disease (phthisis) is by no means unfrequently quite unconnected with any altered condition of the mucous membrane of the parts forming the upper outlet of the larynx, such as we do very frequently meet with in this class of cases, and which, either alone or with an attendant affection of the vocal cords, completely accounts for the hoarseness or other altered conditions of the voice, cough, etc. I see no improbability in conjecturing that the nervous structures abounding at the upper part of the chest (and among them the recurrent laryngeal or the main trunk of the pneumogastric nerve) may in some cases become involved." My own experience points rather to functional aphonia and enfeebled expiration than any special implication of the nerves. Still I have at different times met with cases of phthisis in which the adductors were paralyzed. My observations, moreover, do not accord with those of Mandl as regards the side affected, for out of seven cases of phthisis in which a vocal cord was motionless, in six the left vocal cord was at fault. In the two cases (Cases 30 and 31) now recorded, the lung and vocal cord were affected on opposite sides, though of course there might have

* "Transactions of the Pathological Society," vol. x, p. 343.

been undetected disease of the lung on the same side. Sometimes the paralysis is due to the pressure of an aneurism, or other tumor, on one of the recurrent nerves. The left nerve* is affected through the arch of the aorta, and the right† recurrent through the subclavian or right carotid artery. The really important muscular affection in these cases, however, is the paralysis of the *abductor* of the vocal cord. In many cases of unilateral paralysis of the adductors, the cause is involved in obscurity. The etiology of the affection will be illustrated by some of the cases presently to be related.

Symptoms.—The condition is at once seen with the laryngoscope. On attempted phonation, the affected vocal cord remains at the side of the larynx, whilst the healthy one is well adducted to the median line. The mucous membrane covering the affected vocal cord may be healthy, but is often congested. There is aphonia or dysphonia, and usually an absence of constitutional symptoms. When the affection is due to cerebral disease, there is usually paralysis of other parts (the tongue, palate, or perhaps one side of the body). When the paralysis of the adductors on one side is complete, or even much marked, the acts of coughing, sneezing, and laughing are always altered in character, and often unaccompanied by sound; indeed, a modification of the natural cough or sneeze is often one of the earliest symptoms of the condition. The affection is not unfrequently associated with slight dysphagia—probably dependent on imperfect action of the epiglottis in deglutition, or on some loss of power of the superior and middle constrictors.

* See my case in "Med. Times and Gaz.," 1864, vol. i, pp. 34 and 643.

† The only recorded case of paralysis of the right vocal cord (adductors and abductor—but especially the latter) from an aneurismal tumor, is, I believe, that of mine, in the "Medical Times and Gazette," 1866, vol. ii, p. 637. The lower part of the right common carotid was the seat of the disease, and though there was no post-mortem confirmation, the symptoms left no doubt as to its existence.

Diagnosis.—The most likely source of error in examining a case of this sort, is to be found in swelling of the ventricular band (false vocal cord). When the ventricular band is much swollen, it more or less eclipses the true cord on the same side. It thus happens that when the larynx is examined, one vocal cord is seen to be adducted well to the median line, whilst the other is not visible at all. A little practice with the laryngoscope will enable the observer to recognize the true nature of the case. Symptoms of a paralytic character are sometimes produced by destruction or impairment of one of the crico-arytenoid joints from ossification or other morbid changes. In these cases there is generally some abnormal appearance, such as enlargement or swelling about the base of the arytenoid cartilage. Simple impairment of the articulation is sometimes met with in old age.

Pathology.—As regards the pathological anatomy, I may observe that in the only case of this disease—a case of seven years' standing which I have examined after death—there was considerable atrophy of the left adductor (crico-arytenoideus lateralis) on the affected side. The arytenoideus proprius did not appear to have suffered. The disease is probably often due to inflammatory exudation, either of a simple or dyscrasic character, into the substance of the muscle. I have met it two or three times in tertiary syphilis, in cases where there did not appear to have been any ulceration of the larynx. In these cases there was, probably, deposit in the substance of the muscle. When the affection is accompanied with loss of power on the same side of the tongue and palate, it indicates serious cerebral disease near the nucleus of the spinal accessory nerve. Pressure on the pneumogastric, or its recurrent branches, does not often give rise to this form of paralysis.

Prognosis.—The condition not being in itself dangerous, and being generally due to local causes, need not, as a rule, give rise to serious apprehensions. If, however, there is evi-

dence, such as the paralysis of other parts, to show that the disease is due to cerebral causes, the prognosis is, of course, serious. Only those cases which are due to chronic toxæmia, or cold, are amenable to treatment.

Treatment.—When the condition of the larynx is due to cerebral disease, it is of little importance in comparison with the state of the brain itself. In these cases, treatment directed to the larynx would be perfectly useless. Where the affection is due to chronic toxæmia, the direct application of electricity to the muscles of the affected cord often does good; but in those cases the nature of which is involved in obscurity, and which appear to me to be due to an affection of the muscles themselves, no treatment seems of any avail. Perhaps it would be more correct to say that, in recent cases, the voice can generally be restored without much difficulty; but where the aphonia has been of many years' standing before a laryngoscopic examination has been made, treatment is of little use. For here it is not as in bilateral paralysis, where the reflex action of the muscles is not interfered with. On the contrary, in these cases there does not appear to be the slightest movement, either in simple expiration, or in the various expiratory acts. I have latterly, in some cases, employed my laryngeal electrode in a modified form. I call the original instrument (Fig. 17, p. 110) No. 1. Then I have an instrument No. 2* (Fig. 44, A), which contains two electrodes together, carefully insulated and separated at their extremity by about one-eighth of an inch. This is very useful, for the electrization of the thyro-arytenoid, arytenoideus proprius, or posterior crico-arytenoid muscle. In laryngeal electrode, No. 3 (Fig. 44, B), the extremities of the two poles are separated about five-eighths of an inch, or rather more. This instrument is introduced so that the extremity of one

* This modification of my instrument was first proposed and employed by Dr. Fauvel, of Paris.

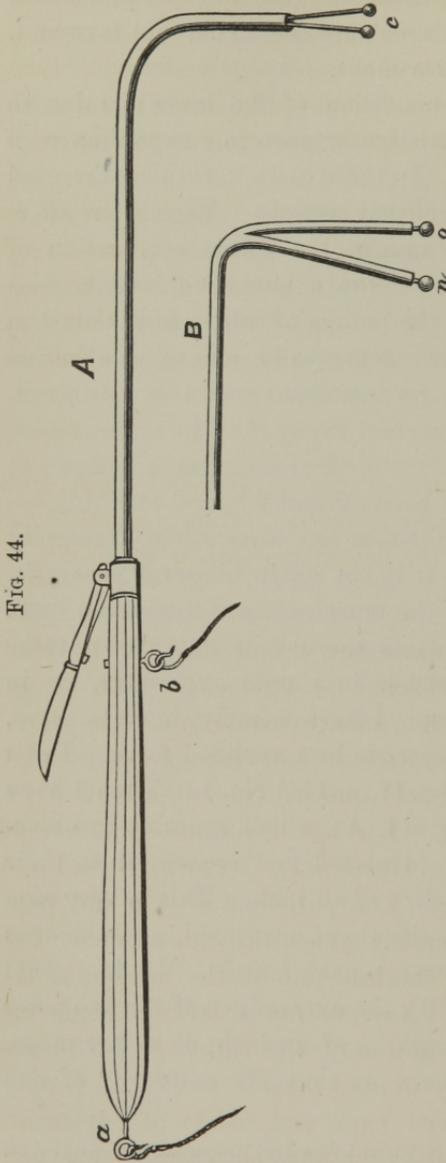


Fig. 44.

Fig. 2 represents my laryngeal electrodes, Nos. 2 and 3. The two poles are united in the same instrument—one wire going to the ring *a*, the other to the ring *b*. The two rods are carefully isolated, so that when the little handle on the upper part of the instrument is touched, the current passes between the two brass knobs.

A represents No. 2 electrode. This is useful for electrifying the surface of the vocal cord, and indirectly the thyro-arytenoid muscles, the arytenoideus proprius, and the posterior crico-arytenoid muscles. The current passes between the two knobs at *c*.

B represents No. 3 electrode. It is introduced into the larynx in such a way that the pole, *o*, is in contact with the vocal cord, and *n* passes into the hyoid fossa. In this way the lateral crico-arytenoid is embraced between the two poles. The extremity of the hyoid electrode should be about five-eighths of an inch distant from, and slightly posterior to, the pole which is applied to the vocal cord.

pole is in the larynx, the other in the hyoid fossa. In this way the current passes right through the lateral adductor of the vocal cord, to which it is applied. This instrument is particularly useful in the class of cases now under consideration. The instrument is constructed so that when introduced, the outer or hyoid pole is slightly posterior to the inner or laryngeal pole.

The following cases are put on record—though I am aware that many of them are “wanting in point”—because very few of the kind have been already published, and because the difficulties surrounding the subject are so great, that very many cases must be related before any general conclusions can be drawn.

Paralysis of the adductors of the right vocal cord, with aphonia of five months' duration (from chronic lead-poisoning), cured by the direct application of electricity to the affected muscle.

Case 25.—W. H., a painter, æt. 35, applied at the Hospital for Diseases of the Throat, in December, 1865, on account of loss of voice of five months' standing. He stated that for the last four years he had been very subject to colic, and that in July, 1865, he had suffered from an attack of paralysis of the right hand. For the latter affection he had attended at the Middlesex Hospital, and the wrist had now quite recovered its power. The patient was thin and pale, but he had not the miserably unhealthy appearance often present in these cases. The lead-line at the margin of the gums was distinctly seen. On making a laryngoscopic examination, the adductive action of the right vocal cord was perceived to be completely in abeyance.

The patient was ordered bark and iodide of potassium, and electricity was applied to the affected muscles—one pole being introduced into the larynx, the other placed over the

larynx externally. At the end of three weeks the patient was able to speak, though in a shrill falsetto kind of voice. Subsequently the treatment was continued, though less frequently, at first on alternate days, and afterwards every third day for two months, when the action of the vocal cord was perfect, and the voice completely restored.

Aphonia of ten months' duration (after diphtheria)—partial paralysis of right adductor—cured by the direct application of electricity to the affected muscle.

Case 26.—Mr. Charles E., æt. 19, of Brighton, came under my care June 15th, 1865. He stated that at the end of July, 1864, he had suffered from a severe attack of diphtheria, and that on recovering from the acute stage, he had experienced great difficulty in swallowing, and loss of voice. The power of swallowing was now, to a great extent, recovered, though he still had occasional attacks of coughing from "things going the wrong way" whilst he was taking his meals. This accident was especially apt to occur in drinking. From prescriptions which he showed me, I saw that he had been taking iron, quinine, and, latterly, strychnia, and he told me that for six weeks electricity had been daily applied to his throat externally. The voice, however, had not at all improved. A laryngoscopic examination showed slight paralysis of the adductors of the right vocal cord.

This patient did not come regularly under my care till the middle of August. On the 16th of that month I commenced applying the current through the affected muscle—one pole being introduced into the larynx, and repeated the operation every day till the 10th of September. By this time the patient was able to sound his voice, though he usually spoke in a whisper. Ten days later the *sound* of the voice was the rule rather than the exception, and by the middle of October the patient was able to speak in a strong, clear voice, which

to me appeared perfectly natural, although he thought that "it sounded differently to what it had done before his illness." The action of the right cord appeared perfectly normal.

Dysphonia of fourteen months' standing, from paralysis of the adductors of the left vocal cord, after diphtheria, cured by electrization of the vocal cords.

Case 27.—Patrick O., æt. 19, was sent to me in April, 1863, but I first commenced treatment in the middle of May. The patient stated that in March, 1861, he had an attack of diphtheria; that since that time he had always found great difficulty in speaking aloud, and that when he did succeed, his voice was always "very squeaky." On looking into the throat, the pillars of the fauces presented a peculiarly atrophied appearance, and on the posterior wall of the pharynx there were several lumps of inspissated mucus. On using the laryngoscope, and directing the patient to say "Eh," it was seen that, whilst the right vocal cord advanced well to the centre, the left vibrated slowly, without moving at all towards its fellow. The sound produced was in the falsetto register, and he was unable by the most violent efforts to produce a chest-note. He stated that before he suffered from diphtheria he had a remarkably loud and strong voice.

On the application of electricity to the cords, he at once spoke in the chest-register. The high-pitched squeaking voice soon returned, however—according to the patient's account, "directly he got into the open air." Electric shocks were continued, first every day, and afterwards every two or three days, for two months, when the voice having been restored for more than a fortnight, and the left vocal cord acting perfectly, it was not thought necessary to continue the treatment. [No general remedies were employed in this case.]

Loss of voice of four months' duration—paralysis of the left adductors—cured by the direct application of electricity to the affected muscles.

Case 28.—Christopher B., æt. 37, a police sergeant, consulted me in March, 1867, on account of aphonia, which had come on suddenly in the previous December, after a night of great exposure. He stated that he had gone to bed very wet and cold at about three o'clock in the morning with his voice in its usual state, but that when he woke up the next morning he could only whisper. Thinking that it was only a cold, he had done nothing for it for ten days, when, there being no improvement, he consulted a surgeon. He had taken a good deal of medicine, and had tried inhalations of vinegar in hot water, but without restoring the voice. On examination with the laryngoscope, the aphonia was seen to be due to paralysis of the adductors of the left vocal cord. As there was some difficulty as regards the patient seeing me often, I advised him to try the effect of external electricity. This he did for a month, having had a current applied through the larynx three or four times during that period. No improvement taking place, on April 10th I began to apply the direct current daily; and after the fifth application a feeble sound was heard. I then applied it every day till the 25th, when the voice, though weak, was generally sounded. The patient was obliged to go away on the 30th; but by continuing the external current he fully recovered his voice at the end of May.

Aphonia of six weeks' duration, caused by paralysis of the adductors of the right vocal cord (from exposure to cold), cured by the inhalation of creasote.

Case 29.—Mr. A. W., æt. 44, residing at Notting Hill, was seen by me on March 19th of the present year, in con-

sultation with Dr. Vinen. The history of the case was as follows. At the beginning of February, Mr. W. was in very good health, and his voice perfect, but on the 4th of that month, in the intensely cold weather which occurred at that time, Mr. W. spent a few hours one evening at a neighbor's house, and walked home afterwards. The next morning his voice was completely gone, and he had great difficulty in swallowing. Under Dr. Vinen's care he had taken diaphoretics and other suitable treatment, and as the pharynx was seen to be much congested, Dr. Vinen had several times applied solutions of nitrate of silver to the back of the throat. Notwithstanding, however, that the pharyngeal congestion had passed away, there was no improvement in the voice, and when I examined the gentleman on the 19th March he was completely aphonic. The difficulty of swallowing, complained of at the commencement, had passed away at the end of about three weeks.

A laryngoscopic examination showed complete paralysis of the adductors of the right vocal cord, and an otherwise healthy larynx. We prescribed a creasote inhalation (5j in a pint of hot water) to be used thrice daily. After employing it a few times, the voice began to return, and on the 11th of April the patient was speaking in a clear natural tone.

Dysphonia from paralysis of the adductor of the left vocal cord.—Consolidation of the upper third of the opposite lung.

Case 30.—Mr. F. C., æt. 61, was sent to me in October, 1866, by Mr. Clowes, of Windermere. The patient was a literary man, who had never been very strong, and whose health during the last two years had failed a good deal. Since January, 1865, his voice had been slightly affected—at first having been hoarse, and latterly almost completely suppressed. He had himself noticed the peculiarity of his

cough, which scarcely sounded at all; and on being questioned about his sneezing, he told me that he seemed scarcely able to sneeze, the act always appearing as if it were balked (no doubt from imperfect closure of the glottis).

FIG. 45.

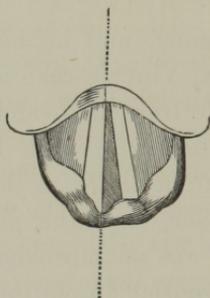


Fig. 45.—ATTEMPTED PHONATION.

The left vocal cord is not adducted to the median line; consequently a space remains between the vocal cords, and the voice cannot be sounded.

An examination with the laryngoscope showed that the adductive action of the left vocal cord was completely in abeyance. The appearance is shown in the cut above. On investigating the state of the chest, there was found to be extensive consolidation of the upper part of the right lung—the opposite side to that on which the vocal cord was affected.

Inhalations have been tried in this case, without any decided result; and the patient has not hitherto been able to give up the time to undergo a special course of local treatment.

The next case is remarkably like the preceding, and for this reason is, I think, worthy of record.

Dysphonia, caused by paralysis of the adductors of the left vocal cord, with tubercular deposit in the opposite lung.

Case 31.—Mr. S., æt. 45, was sent to me in August, 1866,

by Dr. Marriott, of Leicester. During the last three or four years he had shown symptoms of incipient phthisis, and latterly had become a good deal emaciated, and had had several attacks of hæmoptysis. The voice, which was weak and harsh, but not entirely lost, had been affected during the last six months. There was considerable consolidation at the apex of the right lung. Had I been called upon before the invention of the laryngoscope, to give an opinion as to the state of the larynx in a case of this sort, I should certainly have attributed the laryngeal symptoms to a tubercular affection of the tissues of the larynx. On inspecting the larynx, however, with the mirror, it was at once evident that the aphonia was due to paralysis of the adductors of the left vocal cord—the opposite side to that on which the lung was affected. I saw this patient on only one occasion, and do not know the subsequent history of the case.

Dysphonia of two years' standing, from paralysis of the adductors of the left vocal cord in a syphilitic person.

Case 32.—Sarah H., æt. 30, a shopman's wife, became, in January, 1867, an out-patient at the Hospital for Diseases of the Throat, where she is still attending. From the history of her case, it appeared that ten years previously, shortly after her marriage, she had suffered from syphilis. Her first two children had died soon after birth, but she has since borne three healthy children. Two years ago she had an ulcerated sore throat, and not long afterwards an ulcer of considerable size formed on the palate; at the same time her voice became hoarse, and has remained so. She used to have great difficulty in swallowing liquids, but has latterly got better in this respect. Every kind of treatment, including inhalation of hot vapors, atomized liquids, the local application of electricity, the administration of iodide of potassium, has been tried in vain.

Dysphonia of many years' duration, from paralysis of the adductors of the left vocal cord.

Case 33.—Sarah F., æt. 41, an engineer's wife, is now under my care at the London Hospital, and has been under treatment since April 2d, 1867. She stated that she had been hoarse from childhood, when she had an attack of measles, but that three months ago she caught cold, and since then her voice had been much worse. The dysphonia was evidently due to paralysis of the adductors of the left vocal cord; the larynx was otherwise healthy. The left ary-epiglottic fold, with its contained cartilages, was seen to be on a higher level than the right one, making the upper opening of the larynx unsymmetrical. On attempted phonation,

FIG. 46.

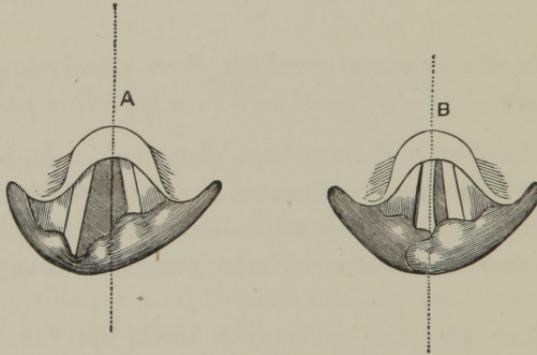


Fig. 46.—PARALYSIS OF THE ADDUCTORS OF THE LEFT VOCAL CORD.

A. Inspiration. *B.* Attempted phonation. The right vocal cord is seen to pass even beyond the median line, and the capitulum Santorini to pass across the left.

the right vocal cord advanced beyond the median line, so as to compensate for the insufficient action of the left vocal cord, and the capitulum Santorini passed behind and beyond its fellow. The appearance in inspiration and attempted phonation is shown in the above wood-cuts.

Dysphonia of two years' standing, from paralysis of the adductors of the left vocal cord.

Case 34.—Jessie C., a teacher, æt. 27, was sent to me at the Throat Hospital by Mr. Edwin Canton, on September 30th, 1867, on account of loss of voice, which had been coming on for two years. She was slightly hoarse for six months, but then suddenly lost her voice completely, and for the last eighteen months has not been able to speak above a whisper.

On a laryngoscopic examination it was seen that, when phonation was attempted, the left vocal cord did not move from the side of the larynx, while the right vocal cord approached well to the median line. The coloration of the larynx was perfectly normal. The patient was rather weak and anæmic, but there were no signs of chest disease.

The cause of the paralysis was involved in obscurity, but the patient was completely cured by the direct application of electricity.

Dysphonia of six weeks' duration, from paralysis of the adductors of the right vocal cord; restoration of voice by direct application of electricity to the affected muscles.

Case 35.—Rev. H. A., æt. 29, applied to me in May, 1867, on account of dysphonia of six weeks' duration. In the beginning of March he had not been feeling at all well for some time, and had been unusually hard worked as a London incumbent, when he found one evening, after preaching in a hot and crowded church, that he was unable to speak above a whisper. After resting for a few days in town, not feeling any better, he went down to the neighborhood of Torquay, and passed a fortnight there. The voice not having improved, he returned to London and consulted a surgeon, who attrib-

uted his hoarseness to an enlarged tonsil, and accordingly removed a portion of the left gland. A fortnight later, on the 6th of May, the patient consulted me, and on making a laryngoscopic examination, I found that the adductive action of the left vocal cord was entirely in abeyance, and that the cord itself was a good deal congested. A solution of perchloride of iron (5j ad ʒj), was applied every day to the larynx for eight days, and at the end of that time the congestion had quite disappeared; but neither the action of the vocal cord nor the voice had at all improved. The internal application of electricity was then adopted every day. No effect whatever was produced for a week, but on the 27th of May, about three weeks from the time I first saw him, he was able to sound his voice; after this the voice gradually became stronger, and when he left town in the middle of June, by my advice for a tour in Switzerland, the voice was perfectly restored.

Dysphonia from paralysis of the adductor and abductors of the right vocal cord, with other symptoms of diseased innervation—all confined to the right side.

Case 36.—This was the case of a laboring man (J. G.), æt. 50, under the care of my colleague, Dr. Hughlings Jackson. The voice was not completely lost, but was very weak and shrill, and the breathing was slightly stridulous. When I made a laryngoscopic examination in December, 1866, the right vocal cord seemed to be permanently fixed in an intermediate position, so that it was neither abducted in inspiration, nor adducted in vocalization. The affected cord was perfectly immobile. There was some tumefaction of the right ventricular band, and the right side of the epiglottis was slightly swollen, distorted, and pushed towards the left side. "The other defects were," as Dr. Hughlings Jackson described, "all on the right side. The right half

of the tongue was greatly wasted, the right half of the palate hung forwards a little, and was drawn up to the left when the patient cried *Oh!* and there was nearly complete deafness of the right ear." There was an exceedingly hard tumor, rather longer and narrower than a hen's egg, extending downwards, behind the angle of the lower jaw on the right side; on the opposite side there was a similar but much smaller tumor. He had a constant sensation of pain and stiffness at the back of the nose, though nothing could be seen with the rhinoscope; and he several times suffered from severe hemorrhage—to the extent of a pint or more on one or two occasions, the blood coming down the nose into the mouth. Dr. Jackson thought the tumors syphilitic,—and fourteen years previously the patient had undoubtedly suffered from syphilis; but I inclined to the idea of their being carcinomatous. In any case, however, there can be little doubt but that Dr. Jackson's opinion that there was disease of the brain near the origin of the spinal accessory, and of several other cranial nerves of the right side, was correct. The organic disease (distortion of epiglottis, etc.), though a complication, can scarcely, I think, be looked upon as throwing a doubt on the correctness of the diagnosis. I should mention that the tumors on the side of the neck were first noticed about a year, and the hoarseness about three months, before I saw him, and that for many months he had slept very little, owing to excruciating pains in the head. He complained of difficulty in swallowing, though he ate and drank a great deal.

In the first volume of the "London Hospital Reports" (p. 361 *et seq.*), Dr. Hughlings Jackson records two cases, in each of which I examined the larynx. Dr. Jackson tells me that the man, Thomas C. (Case 10, *Illustrations of Diseases of the Nervous System*), has had no further symptoms, beyond a little weakness of one leg, for a few days. The

man's voice is more natural than it was.* The subject of Case 11 died. Here, although there was no paralysis of the vocal cords, the negative results of the laryngoscopic examination were thought by Dr. Hughlings Jackson to be valuable. To this point he refers in the second volume of the "Reports" (p. 330), when speaking of the symptoms of disease of the medulla oblongata. Whilst recently discussing these cases with me, Dr. Jackson reminded me of the cases of two other patients whom he had sent to me for laryngoscopic examination, on account of aphonia, with paralysis of several cranial nerves, clearly dependent on syphilis. In each case I found paralysis of one of the vocal cords, and negated the existence of any organic change to account for the aphonia—an important matter in patients undoubtedly syphilitic. The autopsy in these cases revealed the existence of disease, involving amongst many other parts the rootlets of the spinal accessory nerves.

*Bilateral Paralysis of the Abductors of the Vocal Cords
(Crico-arytenoidei Postici).*

Definition.—Inaction of the abductors on both sides, preventing the outward movement of the vocal cords on inspiration, and consequently giving rise to dyspnœa and stridulous breathing.

Causes.—The causes of this condition are generally cerebral, but morbid influences, which affect both pneumogastric or both recurrent nerves, may give rise to it. In a case of ex-ophthalmic goitre, in which I once saw this condition, it appeared to me doubtful whether the paralysis was caused by the direct pressure on the nerves by the enlarged thyroid

* Still more lately I have seen this patient, and found that whilst some power has been recovered in the adductor, the right abductor has become paralyzed. Owing to this condition, the patient now suffers from slight though constant stridor.

gland, or whether it was due to the morbid state of the nervous system, usually present in ex-ophthalmic bronchocele. Scrofulous deposits in the bronchial and cervical glands, especially in children, are apt to give rise to it. In cancer of the œsophagus, when the deposit affects the anterior wall of that tube, both the recurrent nerves may be involved. It is, however, most commonly caused by central disease of the nervous system. The condition is fortunately very rare.

Symptoms.—With the laryngoscope the diseased condition is very apparent, for on inspiration, instead of the vocal cords being abducted from the median line, they remain nearly approximated, the opening of the glottis being in proportion to the degree of the paralysis. The aperture may vary from a line to two lines or more. In forced inspiration the opening generally becomes smaller, and in forced expiration larger; in the former act the cords are often completely approximated. The vocal cords are often slightly congested, but they may be perfectly healthy in appearance. The voice is not generally much affected, but it may be slightly hoarse. If the patient does not move at all, the respiration may be little affected, but the least exertion brings on dyspnoea and stridulous breathing; during sleep the respiration is almost invariable accompanied with stridor. The cough is croupy. The condition is in itself apt to produce constitutional symptoms, such as wasting and febrile excitement, and it is often accompanied by paralysis of other parts, or by the cachexia of the disease, which indirectly causes it. In children it produces symptoms not unlike laryngismus stridulus, and Dr. Ley* considered that laryngismus was always of a paralytic nature, and always due to the same cause, namely, pressure on the recurrent nerves. Had the last supposition been correct, the first would have been so also; but true laryngismus depends on

* "An Essay on Laryngismus Stridulus." London, 1836.

other causes, which operate in an opposite way.* The paralysis of the abductors of the vocal cords, which produces symptoms resembling those of laryngismus, is usually found in children of a more advanced age than those who are attacked by the ordinary form of laryngismus—that is, by spasmodic laryngismus; but it may also occur to the youngest infants. It differs also inasmuch as the symptoms do not completely pass away; exacerbations may occur, but on the least exertion there is at all times stridor and dyspnœa.

Diagnosis.—Spasm of the adductors of the vocal cords produces symptoms which closely resemble those of paralysis of the abductors; in the cases of spasm, however, the vocal cords are constantly varying in the degree of adduction, whilst in the cases of paralysis, the cords are perfectly immobile. This at once differentiates the two conditions.

Pathology and Morbid Anatomy.—The disease consists essentially in a loss of power of the crico-arytenoidei postici, the powerful abductors of the vocal cords, caused by the interception or non-generation of the nerve-current, which, through the medium of the pneumogastric and its branches, supplies these muscles in their normal state. In the case of a patient under the care of my colleague, Mr. Hughlings Jackson,† in the London Hospital, two years ago, where I had diagnosed bilateral paralysis of the abductors during life, these muscles, when examined after death, by Mr. Rivington, were found to be greatly atrophied. It is probable also, generally, atrophy of the nerve-centre.

Prognosis.—The prognosis is very serious, both on account of the immediate danger of suffocation, implied by the condition of the larynx, and on account of some serious disease either in the brain or along the trunks and branches of both pneumogastric nerves, of which the condition is an indica-

* See "Medical Times and Gazette," vol. ii, p. 638, 1866.

† See "Spasmodic Approximation of the Vocal Cords."

tion. The laryngeal state, indeed, is in itself highly dangerous, for though the simple action of the adductors (the abductors being paralyzed) is not sufficient to close the glottis completely, the addition of a little inflammatory swelling, or œdema, would soon bring about that state.

Treatment.—The operation of tracheotomy should be performed without delay to save the patient from dying from suffocation. The opening of the trachea would be likely to exercise a favorable effect on the cerebral disease, for the indirect influence of the exceedingly narrowed glottis (through the respiratory system) must be highly injurious. Except the surgical operation, I cannot recommend any remedial treatment, either local or general. The application of electricity to the abductors would, no doubt, be an easy and perfectly rational procedure, but scarcely a safe one. When the glottis is reduced to the size of an exceedingly narrow fissure, the introduction of a foreign body to its proximity has always appeared to me to be very hazardous; reflex action of the adductors, giving rise to dangerous dyspnœa, would be exceedingly likely to occur.

The following case illustrates this form of paralysis :

Paralysis of the abductors of the vocal cords, of many years' standing, reducing the size of the glottis to a mere chink, not more than one-sixteenth of an inch in width.

Case 37.—Judge S., æt. 61, came over from America, by the advice of Dr. Marion Sims, to consult me, in September, 1866, on account of shortness of breath and hoarseness. He stated that, as a young man, he had been thought to be consumptive, and, for this reason, he had for a few years abandoned his profession and taken to an agricultural life. His health improving, however, he had returned to the practice of his profession in the city. He told me that his voice had been weak for the last thirty years, but that fifteen years

ago, after delivering a charge of several hours' duration, he had experienced a sudden and extreme spasm in the throat, from which, however, he recovered in a few hours. Since that time he had occasionally suffered from similar, but milder, attacks of the same sort. During the last seven or eight years, his voice had become weak, and latterly, on the least exertion, especially in talking or going upstairs, he made a great noise in his breathing. During sleep, the noise (stridor) was so loud that it disturbed people in the adjoining rooms. At meals, it often happened that "things seemed to go the wrong way," and then he had violent attacks of coughing. His symptoms had increased very much in the last five or six months, and within the last eight or nine weeks he had been troubled with a frequent, and rather prolonged, croupy cough, and slight expectoration—the latter especially occurring in the morning. As regards his family history, it appeared that an uncle and a cousin had died of consumption, but no nearer relatives had suffered from that affection. The patient now appeared weak and feeble, but being a man of enormous natural energy, he could still stand a fair amount of fatigue. He was thin, and had a palish yellow complexion, very similar to that seen in cases of malignant disease. He complained of no pain in the head or chest, nor were there any other symptoms of paralysis than those found in the larynx. On making a laryngoscopic examination, I found, that on inspiration, the vocal cords were scarcely abducted at all from the median line, the space between them not being more than one-sixteenth of an inch. In forced expiration, the opening appeared about one-eighth of an inch. In phonation, the vocal cords, which were of a pearly-white color, seemed to approximate. The appearance is shown in the annexed cuts.

I examined the chest, but could find no disease. The case being one of great gravity, I had the advantage of a consultation with Dr. Greenhow, who, after a most prolonged and

searching investigation, could find nothing but some slight dulness in the posterior mediastinum. Both he and Dr. Pratt (now of Paris), a skilful laryngoscopist, verified my examination of the larynx. Wishing for still further and independent confirmation, I sent the patient to Dr. George Johnson, without making any communication to that gentleman as regards my own observations. Dr. Johnson gave a written opinion, in which he agreed with me as to the narrowing of the glottis, but differed slightly as to its cause. He expressed an opinion that the lungs were healthy.

FIG. 47.

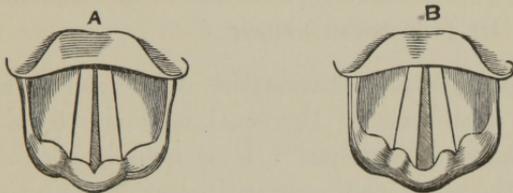


Fig. 47.—BILATERAL PARALYSIS OF THE ABDUCTORS OF THE VOCAL CORDS.

A. Inspiration. B. Forced expiration.

After explaining the condition of the larynx to the gentleman, I recommended tracheotomy. He requested to be allowed to see a patient wearing a canula, and after seeing one of my patients in that condition, was unwilling to submit to the operation, saying that "he would rather have the inconvenience and danger of his present state, than the annoyance incident to wearing a canula." The fact, too, which of course I explained to him, that, in all probability, he would have to continue wearing the tube as long as he lived, strengthened his determination against the operation. Had it only been for a time, he would have submitted to it, but I could see no prospect of the paralysis ultimately yielding to treatment. He asked me to order him the necessary tracheotomy instruments, so that he could carry them about with him, and have

the operation performed when he seemed in immediate danger of suffocation. Whilst in London he made use of stimulating inhalations (creasote, etc.) and took an iron tonic and cod-liver oil. He thought himself better, but I did not perceive any improvement in the condition of the larynx. We recommended him to pass the winter in the south of Europe. From London he went to Paris, and consulted Dr. Trousseau. This eminent physician gave an opinion which, with the exception of the part referring to the larynx, differed widely from the views entertained by Dr. Greenhow and myself, and the treatment he recommended was certainly very characteristic of the French school. The following translation is an abstract of Dr. Trousseau's report:

“The laryngoscopic examination allows me to state, that the mucous membrane of the vocal cords is red and rather swollen, without ulceration.* It is equally possible to perceive that the vocal cords are, as it were, paralyzed, that is to say, that they hardly move at all. I found on auscultating the chest, that in the upper part of the left lung, the respiration is weak, and I think that there exists tubercular deposit in an early condition in the upper lobe. I think that the incomplete paralysis of the vocal cords is to be accounted for by the spreading of the inflammation of the mucous membrane, and of the cellular textures, to the muscular fibres acting on the vocal cords. I prescribe as follows:

“1st. To pass the winter at Cannes.

“2dly. Every two months, take for a fortnight a cup of ‘les Eaux Bonnes,’ before eating.

* Dr. Pratt, who assisted at the laryngoscopic examination in Paris as well as in England, wrote to me that “when he inspected the larynx with Trousseau, both vocal cords were slightly tumefied, and the right one somewhat red.” This was evidently an accidental and probably only a temporary catarrhal condition. He further adds that “Trousseau pronounced both lungs more or less diseased, and called the laryngeal affection tuberculous.”

“3dly. The following fortnight, take in the morning and the evening, a tablespoonful of cod-liver oil.

“4thly. Keep usually in the bedroom an apparatus for the evaporation of tar.

“5thly. Every other day, inhale slowly into the trachea, eight or ten puffs of an arsenical paper cigarette.

“A. TROUSSEAU.

“PARIS, Oct. 20th, 1866.”

As the great physician, who differed so widely from us all, has now passed away, criticism would only recall the aphorism of the live dog and the dead lion—especially, as in this case, we had far better and more extended opportunities of arriving at a correct view. My own opinion is, that the paralysis of the abductors was due to simple atrophy of the muscles, uncomplicated by any nerve affection, but it may have been caused by peripheral disease of the recurrent nerves, or by some limited disease of the brain, involving the origin of the pneumogastric or spinal accessory nerves.

P. S. Since writing the above, I was requested (in October, 1867) to see this gentleman in Paris. He had spent the previous winter in Italy, and was returning to London to have tracheotomy performed, when he took a slight cold in crossing the Alps, and was obliged to have the operation done at Geneva. I found a great improvement in the general condition of the patient, and there seemed to be rather more separation between the vocal cords, on inspiration. Of course he was wearing the canula.

Unilateral Paralysis of the Abductor of a Vocal Cord.

Definition.—Inaction of an abductor on one side, preventing the outward movement of the corresponding vocal cord on inspiration, and consequently giving rise to more or less dyspnoea and stridulous breathing.

Causes.—The causes which lead to paralysis of one abduc-

tor are the same as those which produce the bilateral form of paralysis; but the condition now under consideration is more often due to peripheral influences, that is to say, to pressure on one pneumogastric or one recurrent nerve. As already remarked, aneurisms of the arch of the aorta* not unfrequently involve the left recurrent nerve, and pericarditis has been known to produce the same result.† I have also seen one case in which the abductor of the right vocal cord was paralyzed, apparently from the pressure of an aneurism of the right carotid artery on the right recurrent nerve.‡ Cancerous tumors occasionally involve the pneumogastric, or its branches, and strumous glands along the trachea may do so likewise. In malignant stricture of the œsophagus, when the disease affects the anterior wall of that tube, one of the recurrent nerves is occasionally affected. The paralysis may also be due to cerebral disease. In three out of twenty-three cases of very marked hemiplegia which I was enabled, through Dr. Hughlings Jackson's kindness, to examine at the Hospital for Paralysis and Epilepsy, in 1863, the abductive action of one cord was affected. In two cases the impairment of the action of the vocal cord was on the *opposite side to that on which the limbs were paralyzed*. In the other case, that of Charles R., the *right arm and leg and abductor of the right vocal cord* were paralyzed, and the *portio dura on the left side*.

Symptoms.—The condition can be observed with the aid of the laryngoscope, for on directing the patient to inspire, the affected cord is not drawn aside or abducted from the median line. The affected vocal cord is generally, but not always,

* See a case which occurred in the London Hospital ("Medical Times and Gazette," 1864), in the year 1863.

† In the interesting case (No. 24) of aphonia with pericarditis herein published, the adductors of both vocal cords seem to have been affected. There is no mention of the condition of the abductors.

‡ "Medical Times and Gazette" (*op. cit.*).

congested. Stridulous breathing and dyspnoea ensue on the slightest exertion; but, as might be expected, not quite so severely as when both cords are affected. The voice is generally shrill. This peculiarity of the voice is probably due to a want of correspondence between the vibrations of the two vocal cords. The constitutional symptoms vary with the different conditions which give rise to this form of paralysis, but, after a time, the glottic obstruction generally causes symptoms of slight irritative fever.

Pathological Anatomy.—The immediate nature of the disease, and the condition of the nerves and muscles, are the same as those which are found in bilateral paralysis of the abductors; but here the disease only affects one side. In the case narrated below, which I recently brought before the Pathological Society, the muscle of the affected side was seen to be completely wasted, only a few of its inner and lower fibres remaining, whilst its fellow on the opposite side was healthy and well nourished. (See accompanying Lithograph, Plate III.) In this case the left recurrent nerve was so completely incorporated in a cancerous tumor, that its course (after entering the tumor) could not be traced.

Prognosis.—The condition is generally indicative of very serious disease elsewhere, and as a rule, an unfavorable opinion should be given as to the prospects of the case.

Treatment.—There is generally little to be done towards the cure of the disease; but tracheotomy should be performed when the symptoms are at all urgent.

In illustration of this affection I append the following cases, and must refer to others published by myself and fellow-workers (Traube, Gerhardt, Türck, Voltolini, Johnson, etc.).

Paralysis and atrophy of the abductor of the left vocal cord, caused by pressure of a malignant tumor of the thyroid gland on the left recurrent nerve.

Case 38.—Samuel K., æt. 50, was sent by Mr. Richardson, of the Commercial Road, to see me at the Hospital for Diseases of the Throat, on the 10th of May, 1864. His breathing at that time was embarrassed and slightly stridulous; he had a croupy cough, and his voice was slightly hoarse. His expression was anxious, his countenance and extremities were of a somewhat purple hue; he was thin and weak. He stated that the symptoms had been coming on for six years, but had gradually become aggravated during the last few months. He had formerly suffered from constitutional syphilis. The smallest exertion now brought on a paroxysm of suffocation, and he occasionally experienced difficulty in swallowing. Twice he had spat blood, once bringing up half a pint, and the second time nearly a pint. There were slight bronchial râles at the apices of both lungs. The heart-sounds were normal. No aneurismal bruit could be detected, nor was the arterial circulation perceptibly affected on either side of the body.

On laryngoscopic examination, it was seen that there was paralysis of the left vocal cord with central fixture, that is to say, that on inspiration the left vocal cord was not drawn outwards, but remained with its inner edge near to the median line. An opinion was at once expressed that there was paralysis of the left crico-arytenoideus posticus—the abductor of the vocal cord on that side—and that the paralysis was caused by pressure on the left recurrent nerve.

In support of the latter opinion, a few weeks later, a very slight round projection could be detected in the median line just above the sternal notch. The symptoms became gradually worse, and I sent the patient to Dr. Davies (with a description of the paralysis of the left crico-arytenoideus

posticus) for a careful stethoscopic examination. Dr. Davies admitted the patient into the London Hospital, but the most careful auscultation gave negative results. He left the Hospital after a few weeks, was readmitted several times, and finally died on the 2d of November, 1865. During the eighteen months that the patient was under observation, all the symptoms had become greatly aggravated, and the dyspnoea had increased so much that the patient could only sleep in an arm-chair.

The tumor in the neck had become much larger, and was exceedingly hard. It appeared to be due—at least in part—to ossification of the rings of the trachea. In the last moments tracheotomy was performed by the House Surgeon; but “owing to venous hemorrhage, the narrow space between the cricoid cartilage and the tumor, the hardness of the trachea, and difficulty of introducing the tube,” the patient died almost as soon as the operation was completed.

The post-mortem examination showed a hard nodular cancerous tumor, two inches in breadth, reaching from the arch of the aorta to the cricoid cartilage. In its growth backwards it had first pushed the rings of the trachea before it, so that they were within a quarter of an inch of the posterior wall of the trachea, and then had burst forth beyond and formed an oblong tumor, about half an inch in width, which extended rather obliquely down the trachea for an inch and a quarter, from just below its second ring. The calibre of the trachea at this point was diminished to the eighth part of an inch. In its growth the tumor had pushed through the left wall of the trachea, and just penetrated into the canal of the œsophagus. The tumor had completely incorporated the left recurrent nerve, just where it passes up from beneath the upper border of the arch of the aorta. (See Plate I, Fig. 1.) The left crico-arytenoideus posticus was completely atrophied, only a few pale thin fibres could be seen at its lower and inner part (Plate I, Fig. 2 *b*), whilst its fellow was large and well nourished (Plate I, Fig. 2 *a*).

DESCRIPTION OF PLATE I.

(See Frontispiece.)

Illustrating a Case (No. 38) of Cancer of the Thyroid Gland involving the left recurrent nerve, and giving rise to paralysis and atrophy of the abductor (*crico-arytenoideus posticus*) of the left vocal cord.

Fig. 1 represents the tumor extending from the cricoid cartilage (*cr*) to the arch of the aorta (*a*). A vertical section has been made from the cricoid cartilage to the aorta. The tumor is seen to be of a nodular character; *x* and *z** are two prominences; two other projections are seen immediately beneath them, and a fifth behind and to the outer side of *x*. The right pneumogastric nerve (*b*) is seen giving off the right recurrent nerve (*r*), and the left recurrent nerve (*l*) is seen branching off from the left pneumogastric nerve (*c*), and passing upwards behind the aorta into the tumor.

Fig. 2. Posterior view of the cricoid and arytenoid cartilages, showing a healthy *crico-arytenoideus posticus* (*a*), and an atrophied condition of the left muscle—only a few of the fibres remaining at the inner and lower part (*b*); the posterior tubercle of the left arytenoid cartilage (*c*) is exposed.

Fig. 3. Microscopic appearance of tumor, from a drawing by Dr. Andrew Clark. (This specimen was brought before the Pathological Society in December, 1865, and the Report and Lithograph were published in the "Trans. Path. Soc.," vol. xvii, p. 80.)

* A slice has been taken from *z* to show the microscopic structure in Fig. 3.

The following report and the microscopic drawing (Plate I, Fig. 3) were kindly furnished by Dr. Andrew Clark: "The disease appears to have begun in the thyroid gland, and to have been at first nothing more than a sort of hypertrophy, with the production of colloid matter. Next there seems to have been lymph effused in the centre and back part of the gland, which has undergone cretaceous transformation. The disease seems to have broken through into the trachea, and finally to have reached the œsophagus. In the air-tube it seems to have assumed a new character. In the obscurely villous growth at this part, I find nests of free vesicular nuclei, and here and there areolæ filled with variously shaped tumid cells, containing multiple vesicular nuclei and vacuoles. I consider the growth to be a rudimentary cancer." Cancerous deposits were found in the liver and lungs.

Paralysis of the abductor of the left vocal cord, caused by aneurism of the arch of the aorta, pressing on the left recurrent nerve.

Case 39.—Thomas D., æt. 30, well nourished and of considerable muscular development, but having a large arcus senilis in both eyes, applied at the London Hospital, December 1st, 1863, on account of a burning pain in the chest. On inquiry it was found that he had several times lately spat up a few teaspoonfuls of blood, altogether about a cupful. His appetite was good, and there was nothing to indicate disease of the digestive system. A careful examination of the chest failed to detect any signs of venous obstruction (from pressure on the large trunks).

The pain had come on quite suddenly about a fortnight before he came under notice, and he compared it to a feeling "as though he had swallowed something too hot." At the time that he first felt the pain, his voice suddenly became very hoarse and weak, and it has since become shrill and

feeble. He continued his work for a day or two after he first felt the "burning," but his occupation (that of a dock-laborer), aggravated the pain so much, whilst it caused him at the same time to make "a crowing noise in his throat," that he was obliged to desist from all labor.

The following is a report of my laryngoscopic examination :

"The larynx is quite free from structural disease, and there is not the slightest congestion of the mucous membrane. On inspiration, there is a very slight difference in the position of the vocal cords,—the left being a little nearer to the median line than the right. On the left side also, the capitulum Santorini is a little nearer to the median line, and on a rather higher level than its fellow, and the same observation applies to the left aryteno-epiglottidean fold and its contained cartilage. This condition of the left side of the larynx is not so marked as in other cases of unilateral spasm* of a vocal cord that have come under my notice ; but it must be observed that in this instance, neither of the vocal cords is so much drawn aside in inspiration, as is commonly the case : this fact would account for relative differences between the two sides, being less marked than is usual. On gentle phonation, the left vocal cord is seen to remain fixed, whilst the right advances well to the median line : a small space remains between the vocal cords. On forced phonation, the right vocal cord crosses over the middle line, so that its inner edge touches the left cord. When the vocal cords are approximated in this way, the whole of the right cord, but only about one-third of the breadth of the left cord, can be seen. It

* Before I had given much attention to the pathology of the muscular apparatus of the larynx, I employed the term "spasm" to describe those cases in which the vocal cord was not abducted in inspiration. The sharp voice and stridulous breathing have misled many observers, and pressure on the pneumogastric or its branches is even now constantly described as giving rise, first to spasm, and then to paralysis.

was carefully noted that this appearance was not due to any difference in the size of the false cords,—that is to say, the left true cord was not eclipsed by the false cord on the same side." The patient could only speak in a high-pitched squeaking voice, of a somewhat *false* character.

The patient left the hospital at the beginning of 1864, and died after a painful paroxysm of angina pectoris on March 3d. A post-mortem was made twelve hours after death, by Dr. Powell, the resident medical officer, and Mr. Frederick Mackenzie. The following is an abstract of the report:

At the upper part of the arch of the aorta was an aneurismal sac, about the size of an unpeeled walnut, containing laminated fibrine. Its position and relations were as follows: It was situated partly on the anterior surface of the trachea, but its principal bulk lay to the left side of that tube. The anterior, upper, and posterior portions of the transverse part of the arch of the aorta were involved in the tumor. The innominate artery was pushed forwards, and compressed by the tumor, which extended half an inch to the right of that vessel, but did not involve it, though the margin of the sac was only distant a quarter of an inch from its origin. The left carotid and left subclavian were neither involved nor compressed, and bounded the sac in their usual position. The left recurrent nerve was traced from its origin from the vagus, round the arch of the aorta, as far as the sac of the aneurism, with which it became incorporated, and could not be followed further. The sac of the aneurism encroached upon the left side of the trachea and anterior surface of the œsophagus. On slitting up the trachea along its posterior part, a projection, an inch and a half long by three-quarters broad, was evident on the left side of that tube, just above its bifurcation, and extending to within a quarter of an inch of the opposite side. The mucous membrane covering it was dark and congested, and there were appearances of commencing ulcera-

tion. The cartilaginous ring in this situation had also undergone partial absorption.

On removing the mucous membrane from the posterior surface of the cricoid cartilage, it was found that the left posterior crico-arytenoid muscle was completely atrophied—only a very few thin pale fibres being apparent. The right muscle was large and healthy. The difference between the two sides is seen in the annexed lithograph (Plate 2), taken from the specimen, which is in my possession. The œsophagus was opened, but presented nothing remarkable. The aneurism was of the false variety. (For a more detailed report, see "Medical Times and Gazette," 1864, vol. i, pp. 34 and 643. At the time the post-mortem was originally published, the intrinsic laryngeal muscles had not been dissected.)

Paralysis of the Tensors of the Vocal Cords (Crico-thyroidei).

The paralysis of the tensors and laxors might be subdivided into bilateral and unilateral paralysis, as it not unfrequently happens that one side only is affected. As, however, the etiology, pathology and treatment are the same, whether one or both sides are affected, it simplifies the subject in this case to avoid subdivision.

Definition.—Feeble action of the tensors, the result of which is, that the vocal cords not being properly stretched, the voice is lost or muffled, or the higher notes more or less suppressed, and vocalization is attended with a sense of fatigue, or even pain.

Causes.—The most common cause is a too violent or a too prolonged use of the voice; and, of course, when these two causes operate together, they are exceedingly likely to bring about the condition now under consideration. I have met with it amongst military men (from giving the word of command), often amongst the clergy; twice have I treated auctioneers for it, and I have frequently met with it amongst

FIG 1

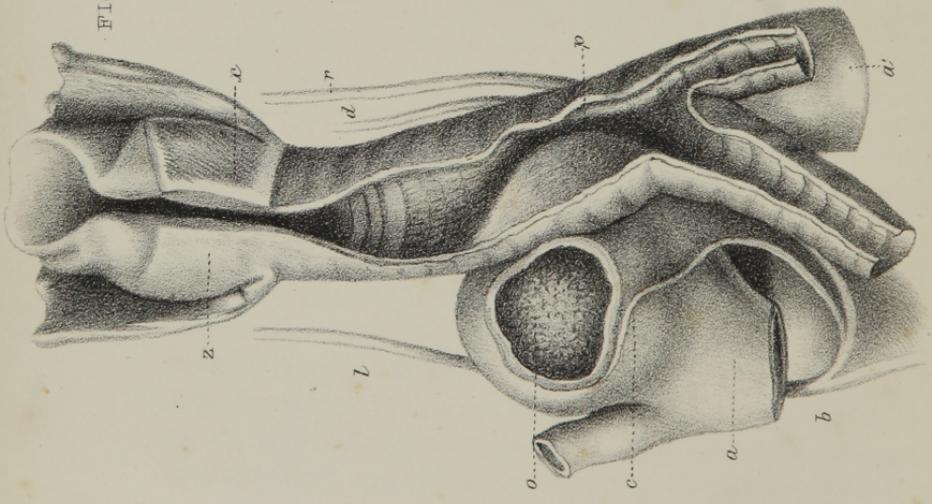
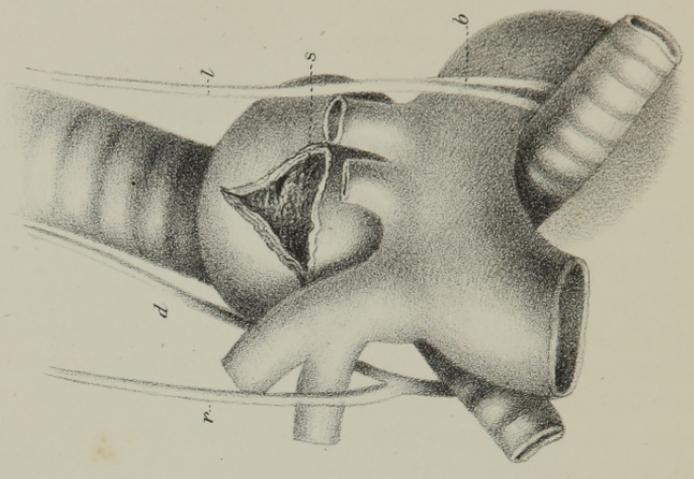


FIG 2



DESCRIPTION OF PLATE II.

Illustrating a Case (No. 38), of Aneurism of the Arch of the Aorta, involving the left recurrent nerve, and giving rise to paralysis of the abductor of the left vocal cord.

Fig. 1 represents the posterior view of the windpipe and aorta; *a* is the ascending aorta, *a'* the descending aorta; the left pneumogastric nerve (*b*) is seen passing down in front of the aorta, and (at *b*) giving off two branches, one of which goes to the left bronchus, whilst the other (the recurrent) passing upwards, gets incorporated in the aneurism, and is lost in it (at *c*). A post-mortem opening has been made at *o*. The right pneumogastric nerve (*r*) and the right recurrent (*d*) are also visible. The abductor of the right vocal cord [crico-arytenoideus posticus] (*x*) is normal and well nourished, whilst the left muscle (*z*) is pale and greatly atrophied. The aneurism is seen to push the trachea on one side, and to encroach greatly on the canal (at *p*).

Fig. 2. Anterior view of aorta, with a portion of trachea and bronchi; an accidental rent has been made at (*s*). The other letters are the same as in Fig. 1.

singers and actors; but I have never known a barrister to be thus affected. I have several times seen it in the case of young girls learning to sing, and two or three times, boys who had previously sung *alto* in choirs, have been brought to me on account of it. It very frequently arises from people singing when they have colds, or when the body is exhausted. On the other hand, it not unfrequently occurs to people who are not in the habit of using their voices, except in ordinary conversation. I have seen one case in which it was caused by a severe blow.

Symptoms.—The laryngoscopic signs are not so evident as in the paralysis already described. There are, however, three points by which it may be perceived; viz. (1), the surface of the vocal cords; (2), the edge of the vocal cords; and (3), the *processus vocalis*. (1.) It can generally be seen that the surface of the vocal cords is not perfectly horizontal—that in fact, in quiet respiration, there is a slight depression or elevation near the centre of the vocal cord, according as the breath is inspired or expired. In whispering the letter “e,” the elevation of the central portion of the vocal cord can be most easily perceived. (2.) When the disease is very marked, the edges of the vocal cords can sometimes be seen to be distinctly waved in such a manner, that, taking the anterior insertion of the vocal cord as one point, and its posterior extremity as the other, the edge of the vocal cord does not pass in a direct line between them, but has a more or less sinuous course. (3.) The *processus vocalis* can never be seen with the aid of the laryngoscope when the tensors are paralyzed. This, however, though a confirmative symptom, is not in itself diagnostic, as the extent to which it is apparent depends on its natural development, and on the thickness of the mucous membrane. It not unfrequently happens that, in these cases, the abductive action of the vocal cords is slightly at fault. The cords do not remain near the median line; but they are not drawn aside so completely as in the

normal state. The latter peculiarity is especially seen in the posterior third. The vocal cords do not commonly present the pearly-white color of health, being often of a dirty-gray color; they are not generally much congested. As regards the general symptoms, the character of the vocal affection has been already, to some extent, considered in giving a definition of the disease. It is seldom that the voice is completely lost, and sometimes the ordinary speaking voice is not affected, whilst the singing or preaching voice is very much at fault. Fatigue after, or whilst speaking, is one of the most common symptoms.

Pathology.—The condition is invariably of a so-called functional character—that is to say, it depends on weakness, or a strain of the crico-thyroid and posterior crico-arytenoid muscles. The former are no doubt the principal tensors of the vocal cords; but complete tension can only occur when the abductors act to a slight extent.

Prognosis.—The affection is not in itself dangerous, and usually yields, without much obstinacy, to suitable remedies.

Treatment.—In these cases I have found the best results from the use of electricity. As the external muscles (cricothyroid) are here principally affected, the current can be applied to them without any difficulty. Still the cure has generally appeared to be expedited by the application of the current to the posterior surface of the cricoid cartilages, that is, to the abductors of the cords. In these cases counter-irritation (blistering, etc.) often effects a rapid cure, especially when the disease is unilateral, and the blister is applied over the affected muscle. I have likewise known very good effects result from the persevering use of stimulating liniments, and from frictions of the skin. The following two cases illustrate this affection:

Loss of voice of three years' standing, from paralysis of the tensors, cured by eight applications of electricity to the vocal cords.

Case 40.—Miss Kate H., aged 26, consulted me in March, 1863, for loss of voice. The young lady was delicate-looking, but did not complain of weakness. She was of a cheerful disposition, and did not appear in the least degree hysterical. She informed me that in April, 1860, she took cold, had an ulcerated sore-throat, and lost her voice. She afterwards wrote me a more detailed account of her aphonia, which I shall give, as far as possible, in her own words. "After recovery from the sore-throat, the voice did not return; and in October, 1860, her regular medical attendant applied caustic twice to the throat, but without any effect." She then consulted some of the leading London physicians, and, among others, Dr. Walshe, who clearly recognized the nervous character of the disease, and "recommended galvanism to be applied, first by one of Pulvermacher's chains, and afterwards, if that did not succeed, by means of a battery. Neither produced any effect." This distinguished physician then "strongly urged her to leave it to nature, which she did till April, 1862, when she had the throat painted with iodine, with no other result than making it very sore on the outside." In May, another eminent physician prescribed "zinc pills, which were taken three times a day for a month, without any result. In June, 1862, Dr. Blandford met Dr. Czermak, to examine the throat with the laryngoscope. Galvanic shocks were strongly advised;" and in the following November, Miss H. placed herself under a physician who has paid especial attention to medical electricity. "He applied galvanism every day with a metallic brush, and afterwards in a stronger form for a fortnight. All this time there was not the least return of the voice."

Miss H. applied to me in March, 1863; and, in making a

laryngoscopic examination, the vocal cords were seen to be very pale and narrow. On attempted phonation, they approximated well, but still were distinctly relaxed; and the upward bulging towards their centres was quite perceptible.

I at once applied electricity to the cords by means of my "laryngeal electrode." The operation was repeated every two or three days, and after the fourth application of the electro-magnetic current, the voice returned. It was very gruff at first, and "came and went;" so that, though the young lady recovered her voice one evening, when she came to tell me of her good fortune the next day, she was unable to produce a sound. Gradually the voice became more constant, though its monotony was very striking; every syllable and every sentence was pronounced in the same tone, with an entire absence of expression. After electricity had been applied altogether eight times, the voice was completely restored, and perfect as regards modulation. The laryngoscopic evidence of relaxation of the cords disappeared after the third application of electricity.

Many people would consider this case an example of hysterical aphonia, but I must again repeat that the patient never showed a single hysterical symptom. Being anxious to investigate the case thoroughly, I wrote to Dr. Alfred J. Tapsen (of Gloucester Gardens), the regular professional adviser of the young lady, and he kindly replied as follows: "Miss Kate H. has been a patient of mine for a good many years, and I well recollect her illness in 1860. She suffered from intense headache, a remarkably quick pulse, and total loss of appetite, attended with great prostration, emaciation, and loss of voice. *She had no hysterical symptoms.* Dr. Todd saw her several times, and was quite puzzled what to make of her symptoms. We both had some suspicions that she might be going to have tubercle in the brain or elsewhere. She gradually recovered her health and strength, but never her voice (though I and many others tried all we could think

of). She gave everything a fair trial, being most anxious to regain her voice."

I have entered somewhat minutely into the history of this case, because I was anxious to show that it was entirely free from hysteria, and that the aphonia was dependent on profound disturbance of the nervous system. There were, as Dr. Tapson says, "intense headache, a remarkably quick pulse, and total loss of appetite, with great prostration and emaciation." It is scarcely necessary to observe that such symptoms imply impaired innervation of the most extreme form.

Electricity was clearly indicated in this case. Dr. Walshe, from general investigation, and Dr. Czermak, from special examination of the larynx, both recommended electricity. External electricity was vigorously employed by an experienced galvanist, "without the least return of the voice." Electricity applied directly to the vocal cords succeeded rapidly in restoring the voice, which had been completely lost for three years. No comment on the superiority of the internal method of employing electricity is required.

Aphonia of five months' standing in a child ten years old (from paralysis of the tensors of the vocal cords) cured by one application of electricity to the vocal cords.

Case 41.—Miss Gertrude S., a pretty child, æt. 10, suffering from loss of voice, but otherwise healthy, was brought to me, on August 27th, 1863, by Mr. Taylor, of Guildford. Mr. Taylor gave the following account of the little patient's aphonia. He was called to see her in March, when he found her sitting up in bed, and breathing excessively quickly. The physical signs did not at all explain the rapid respiration; and he was struck with its remarkably nervous character. An attack of bronchitis, in which the nervous symptoms predominated, afterwards developed itself, and on recovery it

was noticed that the child had lost its voice. Various tonics were tried in vain, and change of air to Brighton (where a laryngoscopic examination was made by Dr. Ormerod) failed to restore the voice.

Finding that the larynx was quite healthy, with the exception of a relaxed state of the vocal cords, in the presence of Mr. Taylor I applied electricity to the vocal cords. The voice was then and there perfectly restored, and when the little girl left me, she was able to speak in her natural voice.

This case is very interesting from its occurring to so young a subject.

Dysphonia of two months' duration, from paralysis of the tensors, cured by counter-irritation.

Case 42.—Captain S., æt. 39, of Portsmouth, visited me in October, 1865, on account of weakness of voice, which came on suddenly, after exerting his voice for some time on parade. Before going on the drill-ground, he had been taking part in a swimming-match, and was much fatigued. This was in the month of August. The voice was completely lost at the time, but the next day he recovered “a thick kind of voice.” Since then there had been no improvement in his voice, though he had taken tonics and used a wet compress round the throat at night. On making a laryngoscopic examination, both vocal cords were seen to be much relaxed; the larynx was otherwise healthy. The characteristic waved outline of the free edge of the cords is shown in the annexed cut.

As the patient was unable to stay in London, I ordered a blister (four inches by one and a half) to be applied round the neck—marking the situation of the crico-thyroid muscles myself with nitrate of silver. I also advised that the sore should be kept open with savine ointment, and prescribed a mixture containing citrate of iron and quinine. After three

weeks the voice was so much improved that the blistered surface was allowed to heal. At the end of November the patient called on me in passing through town, to say that he was quite well.

FIG. 48.

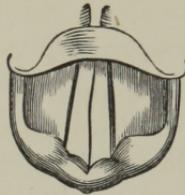


Fig. 48.—VOCALIZATION. PARALYSIS OF THE TENSORS OF THE CORD.

Dysphonia of five months' duration, from paralysis of the tensor of the right vocal cord, cured by electrization of the affected muscle.

Case 43.—Mr. E. M., æt. 44, an auctioneer, consulted me in February of the present year, on account of weakness of voice, which had been coming on for five months. He had tried various modes of treatment, and had lately been using an atomized solution of iron. He stated that he seemed to get better, and then worse again; but that, on the whole, he was in about the same condition as in the previous November. His general health was far from good, and he was in a very depressed state about himself.

On making a laryngoscopic examination, the right vocal cord was seen to be much relaxed. On applying a current through the right tensor, whilst the laryngeal mirror was *in situ*, the effect on the corresponding vocal cord was very evident. This patient continued the treatment himself (with a little American apparatus), applying the current two or three times a day for a month. At the end of that time he stated he was completely cured, and the right vocal cord certainly showed no signs of relaxation.

Paralysis of the Laxors of the Vocal Cords (Thyro-arytenoidei).

Definition.—Feeble action of the laxors; the result of which is, that (the tensors not being properly antagonized) the formation of the lower notes is interfered with, and the pitch of the voice is raised.

Causes.—The causes are, to a great extent, similar to those which give rise to paralysis of the tensors; but this condition more often arises from the too prolonged than the too violently used muscles; that is to say, more often from over-fatigued than strained muscles. The latter cause seems, however, to have operated in Case 44, reported below. The condition is sometimes congenital; or rather, though there is probably no paralysis of the laxors, the tensors have a too great relative power.

Symptoms.—With the laryngoscope, the vocal cords may be seen to be unusually elongated, but this is not always evident. A very minute elliptical opening between the vocal cords (corresponding to their middle third), is more often to be observed in phonation, and the tense condition of the cords often throws a shadow towards the ventricular orifice, which makes this opening appear larger than in the normal condition. This elliptical opening is only to be seen when both vocal cords are affected. When the laxor of only one cord is affected, only one-half of the ellipse is to be seen, and the arytenoid cartilage on the same side appears rather in advance of its fellow. The vocal cords are generally slightly congested. The voice is shrill and grating.

Diagnosis.—It is very important to note whether the elliptical opening varies much in form. If very evident one moment, and the next not to be seen at all, it is due to spasm of the tensors, and belongs to quite a different class of affections to that now under consideration. When due to paralysis of the laxors, the shape in phonation does not vary at all, or only very slightly.

Pathology.—The affection is probably more muscular than nervous, due in fact to exhaustion of the ultimate sarcois elements. When congenital, the condition is incurable.

Prognosis.—These cases are generally obstinate, but ultimately yield to suitable treatment. The condition is not in itself dangerous or a sign of danger.

Treatment.—There are two curative elements, both of which are often of great service in these cases: the one is rest—complete rest for the vocal organ; the other, the local application of electricity. When the case is a slight one, rest—that is, silence—often effects a cure, but where the patient has continued to use the voice to any extent after the symptoms had begun to show themselves, more positive treatment is required. The local electrization generally has to be continued over a longer period than in paralysis of the tensors.

Dysphonia of four months' standing from paralysis of the larynx cured by the direct electrization of the vocal cords.

Case 44.—The Rev. W. C., æt. 25, consulted me at the end of May, 1867, on account of weakness of voice, which had been coming on for the last five months. He attributed the affection to over-use of the voice: it had come on after a week of unusually severe work. He had only been ordained eight months, and “feared that he would be obliged to give up the public duties of the Church.” He particularly noticed that his voice was not only weak, but altered in character; appearing sharp and disagreeable to himself. His general health had not been good for the last eight years, for in 1859 he had suffered from a severe attack of rheumatic fever, and since then had been more or less constantly subject to rheumatic pains.

On making a laryngoscopic examination, the characteristic elliptical opening was seen between the vocal cords. The

surface of the cords was healthy, as was also the rest of the larynx. The appearance is shown in the annexed cut.

FIG. 49.

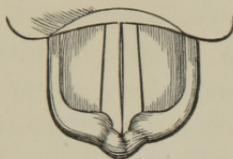


Fig. 49.—PHONATION. PARALYSIS OF THE LAXORS.

He had not had any specific local treatment, but had been told by a physician that the affection was rheumatic, and had taken lithia-water twice a day for a month. No improvement had taken place in the voice. I advised him to give up work altogether—as he was engaged as curate in a very large suburban parish—and to try the effect of direct electrization of the vocal cords. The electricity was applied every day for a fortnight, and afterwards less frequently. The voice soon became so improved in character that by the end of June the patient was able to resume work. This time, by my advice, he has found a church to officiate in which only holds two or three hundred people.

The typically illustrative cases which have been recorded under the last two sections are very rare, and I have had a few others equally uncomplicated. Most commonly both the laxors and tensors are affected at the same time, so that all the notes, or nearly all the notes, are impaired. The cords too are generally congested.

The rule I adopt is first to relieve the congestion by the local application of mineral astringents; then, if the voice is not restored, to apply electricity, giving particular attention to the muscles most affected.

Dysphonia of a year's duration from paralysis of the laxors of the right vocal cord, cured by electricity.

Case 45.—Madame C., æt. 34, a professional singer, consulted me in May, 1865, on account of a difficulty she had experienced during the last year in forming her lower notes. Her voice in the ordinary way extended from *d* above the line to *a* below. A year ago she first experienced slight difficulty in forming the lower *a*, and in January she could not reach beyond *b*. During the last two months she had not been able to sing at all, even in private. She broke down directly she attempted even a few notes. She attributed the loss of power to a strain, as she first noticed the difficulty after the performance of a long and trying cantata, which had been twice encored. At the time she had experienced “a stinging sensation, extending from the right side of the throat up towards the ear.”

She had been constantly under treatment since her voice first became affected. “The only thing which had seemed to do her good was a solution of caustic applied to the throat with a piece of sponge at the end of a whalebone rod.” But though this treatment always gave temporary relief, there was no permanent improvement. On making a laryngoscopic examination, the parallelism between the vocal cords was seen to be lost, the right cord curving away in the centre from the median line.

The treatment (direct electrization of the right vocal cord) was long and tedious in this case. At the end of six weeks there did not appear to be any improvement, and I should have given it up had not the patient most earnestly begged of me to continue a little longer. I was glad that I did so, for a fortnight later the patient perceived a marked improvement in the voice. In order to test the voice, I used to allow the patient to sing a few notes once a week, but at no other time. At the end of three months the voice was decidedly

improved, and the following autumn the voice was so completely restored that the lady was able to accept an engagement in Madrid.

*Spasm of the Adductors (or spasmodic approximation) of the Vocal Cords.**

Definition.—Spasmodic action of the adductors, causing more or less complete (but temporary) approximation of the cords, and giving rise to paroxysms of dyspnœa and stridulous breathing.

SYNONYMS.—*Latin*: laryngismus stridulus, laryngitis stridula, spasmus glottidis, cynanche stridula, cynanche trachealis spasmodica, asthma koppii, asthma millari, asthma intermittens infantum, asthma thymicum. *French*: laryngite striduleuse, faux croup, pseudo croup nerveux, spasme de la glotte. *German*: Kehlkopf-krampf, Stimmritzen-krampf, Cerebral-croup, Pseudo-croup. *English*: Miller's asthma, crowing inspiration, child-crowing, spasm of the glottis, spasmodic croup, spurious croup, cerebral croup, etc., etc.

Causes.—The causes of spasm of the vocal cords are involved in a considerable amount of obscurity, and there is evidence to show that many influences may be concerned in its production; hence it is not surprising that the etiological views concerning it should have undergone various changes and modifications. The causes may be divided into (1) central, and (2) peripheral; the latter being subdivided into (a) direct, and (b) reflex.

(1.) The disease was at one time considered to be always dependent on cerebral disease, or at least on a disordered state of the functions of the brain,† and this view, which has

* In whooping cough, the essential phenomena of the disease is that of spasm of the adductors of the vocal cords, but the limits of this article prevent my touching on that complaint.

† "Commentaries on Diseases of Children," by Dr. John Clarke, 1815.

been assailed in various ways, seems to be again gaining ground. Numerous cases are on record, where other admitted symptoms of cerebral disease manifested themselves before the occurrence of laryngeal spasm. Limited congestion, or interstitial exudation of a serous fluid, near the origin of the pneumogastric or spinal accessory nerves, are probably the conditions of the brain concerned in the production of this phenomenon. In many cases, however, the structural alteration of the brain, if present, is of too delicate a nature for detection, and still more frequently a morbid condition of that organ is produced by the sudden apnœa which occurs. Hence, even when the brain is the primary seat of the disease, it is impossible to speak with certainty as to the nature of the morbid condition. The cerebral affection is probably often dependent on a dyscrasic state.

A rachitic condition of the bones of the skull has frequently been noticed. Out of ninety-six cases of laryngismus examined by Lederer, there was cranio-tabes in ninety-two.* The experience of Drs. Jenner and Wiltshire is of a similar character.† It has been suggested that the thinness of the cranial bones in rickets allows pressure to be exercised on the brain in the occipital region, when the child lies on its back (Elsässer); but it is more probable that the rachitic dyscrasia is accompanied by morbid changes of a nutritive character in the structure of the brain itself.

Scrofula has also been regarded as an active predisposing cause of the disease (Marsh). Sometimes an attack is brought on by tossing the child in the air, and it still more often comes on in sleep. These facts have been adduced by some as an evidence of the cerebral nature of the disease; but it must be remembered that both in sleep and in sudden movements of the body the function of respiration, not less than the

* Rühle, "Kehlkopfkrankheiten," p. 201. Berlin, 1861.

† See Art. "Rickets," Russell Reynolds's "System of Medicine," vol. i, p. 786.

cerebral circulation, is modified, and that the spasm of the glottis may originate in either process. Disease of the cervical portion of the spinal cord sometimes gives rise to it (Marshall Hall). In cases of disease of the brain or medulla, external pressure applied over these parts has been known to cause laryngismus. Hydrocephalus exists in some cases; and mental emotion, especially terror and rage, occasionally give rise to the spasm.

(2.) *a.* Direct pressure on the recurrent or pneumogastric nerves, by enlarged and tuberculous cervical or bronchial glands, has since Dr. Ley's time been regarded as a cause of laryngismus; but in these cases the cause is probably (as Dr. Ley conceived) "paralysis of the dilators of the glottis." At one time, especially in Germany, enlargement of the thymus gland was considered the essential cause of laryngismus, but its influence is now considered to be of a very exceptional character. In so far as these causes operate by producing paralysis of the abductors of the vocal cords, they belong to the last section of neuroses, but they probably often cause spasm of the adductors, by obstructing the venous circulation through the neck, and thus giving rise to cerebral irritation. In the case (No. 46) now recorded, the right recurrent was pressed upon by a strumous bronchial gland, but I was unable to determine what relation that condition had to laryngismus.

b. Amongst the reflex causes of spasm, we have those acting directly on the larynx, and those operating at a distance. Attacks not unfrequently come on whilst the child is sucking, or rather swallowing, and there can be little doubt that the cause here is the passage of liquid into the larynx. Spasm produced by "dangling" the child in the air is probably caused by the impression of a current of air on the glottis. Amongst the reflex causes of laryngismus which act at a distance, there are the irritation of teething, the presence of indigestible food or parasites in the alimentary canal, and

the impression of currents of cold air on the integuments. It sometimes supervenes on the cure of a protracted diarrhœa, or a chronic skin affection; but these causes probably act by setting up cerebral irritation. It has been noticed by Sir William Jenner, that the mother's health has an important influence in the production of rickets, and Kopp* has made precisely the same observation with regard to laryngismus. Here then is another link in the chain of association which Dr. Jenner has sought to establish between these two morbid conditions. The greater liability of the male sex, which occurs in other laryngeal diseases, holds good here. The disease is most frequent between the ages of six months and two years.

The causes already referred to apply principally to children, but symptoms of an analogous character are occasionally met with in adults. Here the cause is generally involved in obscurity. It may, however, result from some irritation in the neighborhood of the glottis, it may be of an hysterical character, or it may occur as a sequel to whooping-cough. I have frequently met with cases of the last kind; so lately as last April, Mr. Francis Corner sent me a gentleman (Mr. W. S., æt. 30), where the spasmodic action of the adductors was evidently due to this cause. A case, in which the symptoms were caused by congestion of parts adjacent to the vocal cords, was in the London Hospital in 1862;† and hysterical cases are by no means unfrequent. There are others, however, to which no probable cause can be assigned.

Symptoms.—The symptoms are so different in many respects, as regards children and adults, that it is best to consider them separately. In *children* the age of the patient destroys the value of subjective symptoms; but those of an objective character are sufficiently marked. The following

* Kopp, "Denkwürd. in der ärzt. Prax." Frank., 1820.

† "Medical Times and Gazette," November 15th, 1862.

is the common history of a first attack. A child put to bed, apparently in its ordinary state of health, wakes up suddenly at about midnight with difficulty of breathing, inspiration being accompanied by a crowing noise similar to that heard in croup. After two or three of these stridulous inspirations, the frightened child bursts out crying, and in a few minutes is fast asleep again as if nothing had occurred. This description does not apply to every case. The child may have been peevish and fretful for a few days before—may have suffered from loss of appetite, and may have been restless at night, or a slight “catch” in the breath may have been previously noticed. The first attack may come on at any other time; but it most frequently occurs during sleep. The next day the child may be quite well, and there may be no further return of the symptoms; but it often happens that another attack comes on about the same hour the following night. The second attack is generally more severe than the first, both in its character and duration. In severe cases, indeed, the paroxysms are of a most urgent kind, and of the most frequent occurrence. A severe fit of laryngismus may be thus described: the breathing suddenly becomes greatly embarrassed, each act of inspiration being much prolonged and accompanied by a harsh stridor; suddenly the sound ceases, the glottis is completely closed, and the respiratory movements of the chest are suspended. The flush, which first lit up the countenance, gives way to pallor, and afterwards to lividity. The eyeballs roll, the veins of the neck are turgid, the fingers close on the thumb, which is bent on the palm, and the hands are flexed on the wrist; spasm likewise affects the heel, the great toe is drawn away from the other toes, and the foot is flexed and rotated slightly outwards. These so-called “carpo-pedal” contractions are, probably, sometimes accompanied with great pain. The disease, indeed, may partake of the character, and assume the form of epilepsy. Notwithstanding the severity of the paroxysm just described, the pa-

tient may survive it, the apnœa being succeeded by stridulous breathing, and by relaxation of the spasmodic contractions of the feet and hands; but when the symptoms are of the dangerous character just described, the paroxysm is almost sure to be quickly followed by others—in one of which the child dies. The severity of the attacks varies between the mild paroxysm, which has been described as occurring at the commencement of the disease, and one sufficiently intense to cause death. The spasm is characterized by its sudden occurrence, by its complete remission, generally by the entire absence of febrile irritation, and by the progressive severity of the spasm, as regards recurrence, duration, and intensity. Some of the associated symptoms of laryngismus may likewise be present, such as hydrocephalus, a rachitic condition, or enlargement of the thymus body.

In *adults*, on the other hand, the symptoms are generally more immediately confined to the larynx and respiratory process. The dyspnœa and stridor are often very great, and there are all the signs of impeded respiration—lividity of countenance, dilated nostrils, protruding eyeballs, &c.; but I have never met with a case in which there was anything approaching to carpo-pedal contractions. In adults also the remission is not so complete as in the case of children, and there is more often some congestion with secretion—occasionally to a considerable extent. With the laryngoscope the vocal cords can be seen on inspiration to be spasmodically approximated. They may separate widely; but instead of remaining apart for a few seconds, they are instantly and spasmodically adducted to the median line, or even beyond it, that is, against one another. Often, in these cases, there is also excessive tension of the vocal cords. Sometimes the closure of the glottis is immediately followed by the spasmodic approximation of the ventricular bands (false vocal cords). In this case the view of the vocal cords is at once occluded. The surface of the larynx may appear perfectly

healthy, or there may be more or less congestion of the mucous membrane; sometimes the vocal cords appear perfectly healthy, whilst the rest of the membrane is hyperæmic.

Diagnosis.—In children the non-febrile and distinctly intermittent nature of the affection differentiates it from true croup, and its own distinctive character from all other diseases. In adults, in addition to the other symptoms, we have the laryngoscopic signs. It is important to note the laryngoscopic difference between spasm of the adductors and paralysis of the abductors. In the paralytic cases the closure of the glottis is more constant, but not nearly so complete, and the vocal cords are never abducted from their paralyzed position: in spasm of the adductors, on the other hand, there is continual movement of the cords, and they are often momentarily widely separated.

Pathology.—The pathology of the disease has been considerably encroached upon in considering its causes; but there still remains something to be said concerning its nature. In *children* it appears to me that there is always an altered state of the nerve-centres, or that the glottic nerves are abnormally susceptible to reflex impressions. Various alleged causes (dentition, indigestion, etc.), appear only to operate when one of these two conditions exists at the same time. The other symptoms (carpo-pedal contractions, etc.), point to cerebral disease or irritation. Further, it is only necessary to state here again, that true laryngismus is essentially a spasmodic affection. In support of this statement, I would remark—1st. That the other symptoms are those of spasm (contractions of feet and hands, etc.). 2d. That paralysis of the abductors of the vocal cords permitting the unbalanced action of the adductors, does not produce the intense stridor met with in the affection now under consideration. 3d. That the total remission of the symptoms points to spasm as the essential nature of the disease. 4th. That where the age and condition of the patient admit of laryngoscopic examination, the

spasmodic condition can be seen. In *adults*, there is generally no evidence of cerebral irritation; but the spasm may occur as an hysterical phenomenon, or be due to catarrhal or other congestion of the larynx. In the latter case it is not necessarily the vocal cords which are affected; the spasm may be caused by circumscribed inflammation of parts in the neighborhood of the cords—especially the ventricular bands.

Prognosis.—In the case of *children*, the prognosis depends on the character of the paroxysm and its supposed cause. Where there is evidence of cerebral irritation, there is always ground for anxiety. Thymic asthma is especially dangerous, and if there is evidence (such as considerable enlargement of the gland) to show that the spasm is of that character, the most unfavorable opinion must be given. The intensity of the paroxysms must always be taken into consideration; but the length of the intervals between each paroxysm is a better prognostic guide—the longer the interval, the greater the chance of recovery. In the case of *adults*, the spasm is generally less severe, the patient's capability of resisting the spasm is of course much greater, treatment (such as inhalation) can be adopted which is not applicable to children, and should tracheotomy become necessary, it is far more likely to prove successful.

Treatment.—The treatment must be twofold: First, to relieve quickly the spasm of the glottis. Secondly, to attack the source of the disease. In the case of *children*, the immediate treatment generally falls to the nurse or mother. The little patient should be raised and placed in a sitting posture, and then he may be slapped on the back, cold water may be dashed in the face, and ammonia or strong acetic acid held to the nose. Putting the lower part of the child's body in a hot bath, and dashing cold water in its face, is a simple and sometimes successful plan. These measures, by giving rise to violent inspiratory actions, are often successful; but remedies calculated to relieve spasm are equally satisfactory.

The warm bath may be used, and as, when the paroxysm is fully established, the patient cannot drink, emetics may be administered, directly there is a sign of stridor. Chloroform often gives immediate relief; but of course must be given with great care to these young subjects. A favorite remedy in Germany, and one that is highly successful, is tickling the fauces with the finger, or a feather, until vomiting is produced. Depressing enemata, such as tobacco, have likewise been recommended; but, in my opinion, they cannot be used with safety on children. Tracheotomy always remains as a last resource. In the case of *adults*, inhalations of chloroform, conium, or simple hot water, often give rapid relief. The chloroform need not be given so as to produce insensibility. I generally recommend that forty minims should be dropped into half a pint of hot water, and that the steam should be inhaled. The same quantity of chloroform should be added every five minutes, until some relief is obtained. The preparations of conium sometimes do good, and the seeds have seemed to me to be very efficacious. Whatever part of the plant, however, is used, it must always be prescribed with an alkali to set free the conia. The *datura tatula** cigars have been smoked with advantage by two patients who were laboring under this affection. Where other measures fail, and the symptoms are urgent, tracheotomy must be performed.

Spasm of the adductors (Laryngismus stridulus) in a child, terminating fatally.

Case 46.—A. E. P., a sickly child, æt. $3\frac{1}{2}$ years, was brought to me at the London Hospital in March, 1868, by Mr. Richardson, of the Commercial Road. He was small, emaciated, not distinctly rachitic, but had suffered from strumous enlargement of the cervical glands. The other

* Prepared by Messrs. Savory & Moore.

children of the family were all healthy, but Mr. Richardson informed me that the father had been severely affected with constitutional syphilis. The paroxysms of dyspnoea occurred frequently, and were of long continuance. The very unfavorable prognosis, which we agreed in giving, was borne out by the death of the child, in a severe attack, at the beginning of May—five months after the symptoms had first appeared.

At the post-mortem, an abscess about three inches in length was found at the right side of the trachea, communicating with the body, or intervertebral substance of the third dorsal vertebra. In the sac of the abscess there were several flakes of cretaceous matter, varying in size from one inch by half an inch, to three-quarters of an inch by one-third of an inch. Near the commencement of the right bronchus, the right recurrent nerve was pressed upon, flattened, and thinned, by the pressure of a diseased bronchial gland about the size of a nutmeg, containing sebaceous-like matter. The nerve was closely united to the diseased gland. The laryngeal muscles were carefully examined, but the results were negative.

*Spasm of the adductors of the vocal cords in an adult,
necessitating tracheotomy.*

Case 47.—Elizabeth P., æt. 24, was brought to me in the autumn of 1863, by Dr. Gibson, of Clerkenwell, on account of stridulous breathing, and an exceedingly frequent hacking cough. The cough, however, was not properly formed, but consisted in a rapid succession of sounding expirations. Often the so-called cough was heard forty-five or fifty times in a minute, for several hours together, and this too when the patient was sitting in a room by herself, and unaware that she was watched. The attacks of severe stridor came on very frequently—at least seven times in the day. She was in very needy circumstances, and worked with a number of other girls at a milliner's. Latterly her fellow-workers had

refused to have her in the same room, on account of the trouble and noise caused by her affection. When I saw her first, the symptoms had been coming on for eighteen months, and she had lately been in one of the London hospitals, where her throat had been burnt with caustic. She had not, however, obtained any relief, and was now worse than ever. On making a laryngoscopic examination, it was seen that the vocal cords were spasmodically approximated, and that there was no structural disease of the larynx. The cords were of the ordinary pale color; they exhibited a continual to-and-fro movement, from the side of the larynx to the median line, where they were spasmodically approximated against one another. When not coughing, the respirations were exceedingly rapid, often sixty in a minute. The patient was weak, but not anæmic, or otherwise out of health.

In this case every treatment was tried without any benefit, or with only the most temporary advantage. Every kind of local application, including caustics, astringents, solution of Calabar bean, etc., etc., were tried. Inhalations also failed, chloroform alone giving temporary relief. Medicines, including powerful narcotics, failed to affect the spasm; belladonna, recommended by Lasègue,* and valerianate of zinc, by Dr. Harley,† in somewhat analogous cases, both failed; and hygienic treatment, including shower-baths, change of air, etc., was also useless.

The patient having become much worse, and the stridor being very intense, tracheotomy was performed, at my request, in July, 1864, by Mr. Francis Mason. I thought that by wearing the tube for some time the tendency to spasm would be overcome. This, however, did not prove to be the case. I have repeatedly endeavored to dispense with the canula. In 1865 Dr. Parker kindly admitted her into the

* "Archiv. Général." Mai, 1854.

† "Medical Times and Gazette," August 1, 1863, vol. ii, p. 116.

London Hospital, and several times the tube was taken out, but invariably after a few hours it had to be replaced on account of threatening dyspnœa.

When examined with the laryngoscope, the spasm of the adductors is seen to be as marked now as ever, but the opening in the trachea renders the patient safe. The respiration is still very rapid, but the cough has almost disappeared.

Spasm of the adductors of the vocal cords; tracheotomy.

Case 48.—Elizabeth E., aged 48, a cook, living at Saffron Walden, was brought to me, in January, 1867, by Dr. Green. The patient stated that she had suffered from difficulty of breathing since July, 1866, when she had a bad cold and croupy cough. Through Dr. Davies' courtesy she was admitted into the London Hospital, under my care. She remained in the Hospital about two months, and during that time suffered from several very severe paroxysms of dyspnœa—so much so, indeed, that tracheotomy was more than once contemplated. The severe attacks were generally accompanied by an abundant thin frothy expectoration; in fact, the symptoms were those sometimes met with in catarrhal asthma, but the obstruction was situated at the glottis. Sedative inhalations and expectorant medicine (*Mist. Casc. Co.*) seemed to give some relief, and she left the Hospital on the 8th of March a good deal benefited. On the 10th, however, she was brought in a hurry to the Hospital for Diseases of the Throat, and being in a state of dangerous dyspnœa, tracheotomy was at once performed by Mr. Evans. The patient recovered from the operation, but has since been obliged to continue to wear the canula. It is perhaps worthy of remark in this case that the ordinary canulæ were quite useless; they either did not reach the trachea, or they were quickly expelled from it. The only tube which the patient can wear is one three and a half inches long; and in order

to facilitate the cleansing of the tube, Mr. Evans has devised a very ingenious arrangement. The external tube is obliged to be so long that the curve will not permit the passage of an ordinary inner tube. Mr. Evans* has, therefore, caused the inner tube to be made in links, like the scales of a serpent, so that it can easily bend, and it is made to move by a little rack. In this way the patient can remove and insert the inner tube without difficulty or force, by turning a little button on one side of the shield of the canula. This ingenious instrument will, I have no doubt, prove useful in many cases where a long tube is required to be used. Though not appertaining to the subject now under consideration, I venture to mention this ingenious modification of the ordinary canula, of which no notice has as yet appeared.

Spasm of the Tensors of the Vocal Cords.

Definition.—Spasmodic action of the tensors, causing the vocal cords to be unduly and irregularly stretched, and consequently giving rise to a voice which is feeble, jerky, unsteady, and constantly rising to a high key.

Causes.—In the few cases (8) of this affection which have come under my notice I have not always been able to ascertain its cause. In three cases, however, the patients were constantly obliged to speak to deaf relatives. In the case of a lady from Watford, who was under my care in 1864, there were a deaf husband and daughter; a tax-collector from Enfield, who consulted me at about the same time, had a wife who was “very hard of hearing;” and the husband of Mrs. B. (Case 50) was also deaf.

In two other cases the cause could not be ascertained—the patients had not been subject to excessive or violent use of the voice. Of the eight cases six were men and two women.

* Manufactured by Mayer, 59 Great Portland Street.

Symptoms.—The sound of the voice is so peculiar in these cases that from it alone they can generally easily be diagnosed. The patient is often able to produce some notes, either in his own natural voice or in a slightly muffled tone; but whilst speaking in this way the current of the voice seems to be partially interrupted, and the sound conveys the idea of an arrested action of the respiratory muscles. In fact, it is very much like the straining and rather suppressed voice of a person engaged in some act requiring the prolonged and steady action of the expiratory muscles (parturition, defecation). After speaking a word or two, or several sentences, in this peculiar tone, the patient may again utter a few words in a comparatively healthy voice, and then may immediately relapse into the diagnostic intonation. No approach to the spasm is perceived as long as the patient whispers, but directly the voice is sounded it becomes apparent. In three cases the spasm was diminished by exertion (such as going upstairs or walking quickly). This appeared to me to be due to exhaustion of the expiratory muscles, but perhaps it may be that the quickened circulation caused by the exertion had some beneficial influence on the spasm. In one case that I have lately seen, exertion increased the spasm. The tense condition of the vocal cords can generally be easily perceived with the laryngoscope. Their surface, as well as that of the rest of the mucous membrane of the larynx, is usually congested.

Diagnosis.—The laryngoscopic differences between this affection and paralysis of the larynx has been already pointed out in treating of the latter affection. The *varying* voice of the spasmodic case is so different to the *constantly* high-pitched, or totally suppressed voice of the paralytic cases, that the laryngoscope is scarcely required for diagnosis.

Pathology.—The condition appears to me to be due to some morbid condition of the sympathetic ganglia. The cerebro-spinal system does not appear to be at fault. From the cases I have seen it appears evident to me that the affec-

tion is not one of simple spasm of the crico-thyroid muscle, but one of spasm of "the expiratory act,"* in which the thoracic and abdominal muscles participate.

Prognosis.—Unless the disease is recognized and treated at an early period, it is likely to prove incurable. I had one patient (the Rev. E. G., Case 49), under my observation for more than two years; and though he did not improve, he did not appear to get any worse.

Treatment.—I was formerly very unsuccessful in the treatment of these cases, two patients having been several months—one longer—under my care without receiving any benefit. But since I have recognized the true nature of the disease, I have been more fortunate. There are two cases under my care at present, one a clergyman in Somersetshire, recommended to me by my neighbor, Mr. Stewart, and another, a clergyman, sent to me by Mr. Corbould, of Bristol, both of whom are almost cured. I say "almost;" for though the spasm has entirely yielded, they are still under treatment, and I shall not report them till the ultimate result is known. Whilst correcting the proofs of this article, I have been consulted by a dissenting minister from Manchester, laboring under the same affection. I expect to be able to cure him also.

The treatment is very simple. It consists in forbidding the patient to speak, under any circumstances, above a whisper. He should be discouraged from whispering more than is absolutely necessary, and the rule of not sounding the voice must never be transgressed, even for a second.

I also cause belladonna to be applied to the outer part of the throat every night. A drachm of the extract should be spread on a piece of lint, about four inches long, and one and a half broad, and worn round the neck, so as to cover both the crico-thyroid muscles. I have used various inhalations,

* I employ this term in the sense used by Dr. Hughlings Jackson ("London Hospital Reports," vol. i, p. 364).

and have certainly seen good result from allowing the patient to inhale the fumes of nitrated paper. It is difficult to understand the *rationale* of the action of inhalations in this affection, unless the intrinsic muscles are also concerned, but it is possible that where the crico-thyroid is alone morbidly active, the beneficial effect of the inhalation may be due to reflex influence, the primary impression being on the mucous membrane.

The following brief records illustrate this affection :

Dysphonia of one year's duration from spasm of the tensors of the vocal cords.

Case 49.—Rev. E. G., aged 45, was recommended to me, in May, 1864, by Dr. Semple. He stated that he began to become hoarse about a year previously, and that now he was quite unable to officiate at church. He had the characteristic straining voice of this affection, and spasm of the tensors of the vocal cords, with congestion of the whole of the lining membrane of the larynx, was seen on laryngoscopic examination. Topical applications relieved the congestion, but did not improve the voice. Tonics, sedatives, and linseed poultices over the crico-thyroid also failed to do any good. In 1866, the patient's voice was not in the least improved.

Dysphonia of four years' standing from spasm of the tensors of the vocal cords.

Case 50.—Mrs. B., æt. 50, from Peckham, consulted me in July, 1864, on account of difficulty of speaking of four years' standing. She said that "she could not get her voice out," and that the affection originally came on with a bad cold. Her husband is very deaf, and she has had to speak very loudly to make him hear. Her general health is not good; she is weak, nervous, and occasionally faints. There does not appear to be any disease of the heart or lungs, and

she is not hysterical. With the laryngoscope the tension of the vocal cords was seen to be so great that they appeared to be abnormally long and narrow, the part posterior to the *processus vocalis* appearing unusually developed.

This patient only visited me twice, and I had no opportunity of trying any course of treatment.

Dysphonia of four months' standing from spasm of the tensors of the vocal cords.

Case 51.—Rev. H. H., æt. 34, of Richmond, consulted me in June, 1866, on account of a peculiar weakness of his voice. He exhibited the characteristic straining in a marked degree, but with longer intervals of healthy voice than I have met with in other cases. It came on suddenly after exposure to cold. His general health was excellent. The vocal cords were seen, with the laryngoscope, to be tense and slightly congested. Absolute silence was unfortunately not enforced in this case, but the patient has derived benefit from having had comparative rest of the vocal organ. By my advice he spent last winter at Tangiers, and has returned home considerably improved.

Diseases of the Sensory System of the Larynx.

Hyperæsthesia.—Increased sensibility, occurring independently of inflammatory disease or structural alteration of the tissues of the larynx, is undoubtedly a rare morbid condition; but it may occur either in an intermittent form, or without any periodic character. A case of the former kind is reported by Dr. Gerhardt,* and a few of the latter have fallen under my notice.

Several cases have also been reported by Dr. Handfield

* Virchow's "Archiv," xxvii. Heft 1 and 2.

Jones.* Neuralgic cases should be treated on the ordinary principles which regulate the therapeutic management of such cases. The inhalation of hot sedative vapors and anæsthetics does good in cases of a non-intermittent character; and the internal use of narcotics is also indicated. Some of the morbid phenomena apparently belonging to motor affections (such as pertussis and nervous laryngeal cough), may be due to increased sensibility of the mucous membrane of the vocal cords, the hyperæsthesia manifesting itself in reflex action.

Anæsthesia.—Though there is great difference between the sensibility of the glottis in different people, anæsthesia rarely occurs as a distinct morbid affection.

Disease affecting the origin or trunks of the pneumogastric nerves, or their superior laryngeal branches, would be likely to diminish the sensibility of the larynx in proportion as the function of the nerves was interfered with.

Romberg has observed that, in cholera, there is impaired sensibility of the mucous membrane of the larynx.†

* "Medical Times and Gazette," May 2d, 1863.

† Hufeland's "Journal der Pract. Heilkunde," February, 1832.

CHAPTER XII

ADDITIONS ON APHONIA.

BY DR. J. SOLIS COHEN, OF PHILADELPHIA.

I HAVE had the opportunity during the past few years of treating some sixty cases of aphonia, notes of which, more or less complete, I have preserved. My experience, though nothing to compare with that of Dr. Mackenzie, has still been considerable, and it is gradually increasing. Though not prepared at present to report my experience in detail, I deem it advisable to present a summary of the same, with short descriptions of some of the more striking cases, including all that have resisted treatment, intending at some future period to make the whole subject of defects of voice and speech the theme of a monograph.

In selecting the cases which follow, I have made it a point to leave out all which have not been under my observation for at least a year, in order that we may judge from the record, of the permanent benefit of the treatment adopted; and also to exclude all cases in which there appeared any concomitant local disease. All these cases are such as are usually denominated functional aphonia. I do not believe in functional aphonia. It seems to my mind that there can be no important lesion of an organ or set of organs without textural change of some kind, although this may be of such nature as to elude our observation.

I can bear testimony to the great value of the galvanic treatment in these affections, as introduced by Dr. Macken-

zie; and in all which I have treated by galvanism, I have availed myself of his electrode. But, as will be seen from a perusal of the following record, I have by no means confined myself to this local treatment, but have often employed with equal advantage, local stimulation of a different character. My impression is, that in these cases of habitual loss of voice, that is, where the patient loses the voice suddenly, and regains it as suddenly after a greater or less lapse of time, and again loses and regains it within a few months or a year, and so on, we can restore it almost invariably at once by any stimulus applied directly to the glottis, be this stimulus galvanism, cauterization, astringency, the mere local contact of a sponge, the shock of a douche, or the inhalation of a stimulating vapor; but in another class of cases, where the voice has been lost gradually, and where the aphonia continues for weeks and months, that the direct application of galvanism is more applicable. The use of tonics, nervous stimulants, counter-irritation, and other remedies, must not be neglected for purposes of improvement of the general health, and the prevention of subsequent attacks; and with females, the uterine condition should be inquired into, and any irregularity, mechanical or otherwise, must be corrected.

Inquiry may be made as to the use of local applications in resort to cases of habitual loss of voice, where the restoration is apt to occur spontaneously. The answer to this is, that it is better to employ means which will restore the voice at once, or very promptly, rather than to let the patient remain for days and weeks, or longer, under the discomfort and annoyance attendant upon the misfortune, and dependence altogether upon those general remedies which should not be withheld, even when local applications are made.

I would state that I am not prepared to indorse the eligibility of the nomenclature, or the divisions of paralytic affections of the larynx, adopted in the preceding essay.

CASES OF APHONIA TREATED BY GALVANISM.

Bilateral Paralysis.

Case 52.—Peter D—y, æt. 12, applied to me December 10th, 1866, for the treatment of a complete aphonia of three weeks' duration. Galvanism was applied locally on the 10th and 11th without effect; on the 12th, the voice returned after a galvanic application, and was nearly as good as originally; the applications were continued daily, and on the 15th, the patient was discharged well. In this case the paralysis was complete, both cords remaining widely separated during voluntary attempts at phonation.

Case 53.—Andrew J. S—h, of Lambertville, N. J., æt. 16, was brought to me, February 8th, 1867, by Dr. L. Lilly of that place; at the suggestion of Dr. Agnew, of Philadelphia, and Dr. Elsberg, of New York, to be treated for a complete aphonia of some fifteen months' standing. The aphonia was discovered on rising one morning, after having been out rather late skating the evening before, and the loss of voice had continued permanent. There was complete bilateral paralysis of the vocal cords, which remained widely separated as in ordinary respiration, without the slightest contractile response to attempts at phonation.

Treatment was instituted February 26th, at which time the condition was exactly as it had been at the first examination. An attempt at an internal application of galvanism was unsuccessful from want of control on the part of the patient. The following day I succeeded in making a local application, and the instrument was placed upon the transverse arytenoid muscle, and the moment the current was established, the cords came together. After withdrawal of the instrument, the patient was able to speak in a good, rough voice, and read for me two or three pages from a book distinctly and without

fatigue. The following day the applications were repeated, followed by still further improvement in the voice. On March 1st and 2d, the galvanism was applied in the same manner, and his voice being in good order, he was sent home with a note to his physician, requesting him to keep up counter-irritation externally until spring had fairly opened, and to enjoin daily exercise in reading aloud and singing.

I have heard from this case from time to time, and at last accounts, more than eighteen months after the treatment above recorded, the cure had continued permanent.

Case 54.—Miss E. S——h, æt. 20, of nervous temperament, but well nourished, applied to me February 26th, 1867, for a complete aphonia of eleven weeks' duration. Both cords were paralyzed. One application of galvanism produced immediate restoration of the voice, though not to its full volume. After three more applications on successive days, the voice had returned to its normal condition, and the patient passed from my treatment. As she resides in this city, and has not applied to me since, I presume the cure has been permanent. I heard from her a few months after treatment, and she had not lost her voice in that interval.

Case 55.—Sallie S., of Woodbury, N. J., æt. 20, at the recommendation of Dr. Flagg, consulted me, February 28th, 1867, for a complete aphonia of eighteen months' duration. I found paralysis of both cords, and recommended galvanism. Domestic relations rendered it inconvenient for the lady to remain in the city at that time. Treatment, therefore, was not commenced until April 16th, when I applied a current of galvanism several times, directly to the vocal cords, without result. On the 17th, similar applications were made with the same negative result. On the 18th, however, the applications were successful, and the voice returned. Applications were made on the 19th and 20th, when the patient re-

turned home, declining to remain in the city a week longer, as I strenuously urged her to do.

On the 29th of April, Miss S. returned to me, having lost her voice again the day previous (Sunday), during meeting; that is, on leaving the meeting-house she suddenly found herself unable to reply to the remarks of her companion. I made a number of applications that morning, occupying in all two hours, but without result. Yielding to the importunities of my patient, who wanted me "to give her her voice back so she could go home the next day," I consented to renew the efforts in the afternoon, and repeated them at rapid intervals between the hours of 5 and 6.30 P.M.; at the end of which time, and under the influence of a strong current (the A—C current of Kidder's machine), I at length succeeded in again restoring the voice; but my patient was exhausted with her séance, and came very near fainting; indeed, she was so weak that I would not allow her to return only with the lady friend who had accompanied her, but escorted her to her friend's residence myself. I very much feared that her voice would leave her again, but it did not. I forbade her returning home next day whether she had her voice in the morning or not; and during the day following she visited my office, and I renewed the applications. She then returned to her home, but on May 3d revisited the city, and called on me to show me how much more powerful her voice was than even after its first restoration.

On September 9th, the father of the lady called to tell me that on the 6th Miss S. found her voice had "left again" in the night; and, being somewhat indisposed, her own physician thought he would try galvanism himself before subjecting her to a journey to the city, and succeeded after two applications, made the same way that I had made them.

April 9th, 1868. Miss S. again called upon me in an aphonic condition. On the 5th instant (Sunday) she had again lost her voice. Her general health was better than it had been

the year previous. I immediately resorted to local galvanism, and the second application was followed by a return of voice, since which time there has, as yet, been no further trouble.

I would call attention to the fact that this patient was anxious to go home every time as soon as her voice had returned. She was perfectly willing to remain till she got it back, but indisposed to let me continue the applications. I believe that if she had followed my advice in the first instance, and allowed me to repeat the galvanic applications every two or three days for two or three weeks, the cure would have been permanent. Since then I am very willing to allow her her own way, as it really does not injure her health, and affords me opportunity for physiological study.

Case 56.—Mrs. Priscilla R——n, æt. 21, of Armstrong Co., Pa., was brought to me, April 20th, 1867, by Dr. Winthrop Sargent, of West Philadelphia, for complete aphonia of some two months' duration. I found complete bilateral paralysis; the cords were very widely separated indeed, and did not at all respond to attempts at phonation. The first application produced contraction, so that the cords nearly approximated, and was followed by the ability to make a slight sound. The second application restored the voice completely. Four applications were made the following week, when the patient withdrew from professional treatment. More than a year afterwards Dr. Sargent informed me that the cure had been permanent.

Case 57.—Sue P——s, æt. 20, of Mifflinburg, Pa., was brought to me, April 24th, 1867, by Dr. Lutz, of New Berlin, Pa., to be treated for a complete aphonia of five or six months' duration, and which first showed itself shortly after convalescence from typhoid fever. The vocal cords moved, but did not approximate their edges; the difficulty was principally with the right cord, but both were affected. I treated

this patient for a month, with local applications of galvanism, seeing her two and three times a week; aided after a while by stimulant inhalations and the exhibition of sulphate of strychnia, which drug I began to administer after she had been under observation about three weeks, in consequence of a halt in one of her limbs, which came on after walking a few hundred yards.

On May 23d, Dr. Da Costa saw the patient with me in consultation, and examined her lungs and heart carefully, but could find no organic lesion. He believed that he detected some atrophy of the left vocal cord; and attributed the lameness to functional disturbance of the spinal cord. By his advice I added gentian to the strychnia mixture which the patient was taking, substituted showers of a solution of sulphate of zinc from Gibbs' douche for the galvanism, and ordered local frictions to the spine and limbs. I continued this treatment until May 29th, when I advised the patient to go to the country or sea-side for the summer, and to continue with her strychnia mixture, gradually increasing the quantity, and to return to me when she got stronger.

Some two or three months after this I received a letter from the lady, stating that she had continued with the strychnia with benefit to her general health and abatement of her lameness, but that the aphonia remained the same, and I might look for her in October. She did not come to the city, however; and about a year afterwards I learned that her condition remained the same; *i. e.*, general health and spirits good, but the aphonia persistent. I addressed her a note a few weeks ago to learn her condition for use in this report of her case, but as yet she has not replied to me.

Here is a case which afforded me every opportunity to do what I liked with the larynx, and yet where even galvanism failed to restore the voice.

Case 58.—Mrs. K——t, æt. 50, of Brooklyn, Pa., was

sent to me by Dr. W. D. Richardson, of Schuylkill County, Pa., for an aphonia of ten months' duration. I examined her September 13th, 1867. There was paralysis, incomplete, of both vocal cords. The second application produced some restoration of voice. The applications were continued daily with decided but very gradual improvement, and it was not until the 19th instant, or about a week, that the voice was really good and strong. The patient remained under treatment until October 10th, during which time the applications were made two or three times a week.

When she returned to her home I advised her physician to keep up external applications of galvanism outside the larynx for two or three months. A few weeks ago I received a message from this lady through another aphonic patient from the same place, and whose voice I had restored a few weeks previous, stating that she was right well; her voice had remained good, and she thought of coming again to the city this winter to pay me a visit.

Case 59.—Lizzie B——y, æt. 27, sent me, October 23d, 1867, by Dr. Hinkle, of this city, for an aphonia of one year's standing. This patient has phthisis and prolapse of the uterus. She was very weak and soon exhausted by the applications of galvanism, so that I felt compelled to discontinue them. I learn, after the lapse of a year, that her general health remains about the same, and that there has been no return of voice.

Unilateral Paralysis of Vocal Cords.

I have seen but four or five cases of paralysis of a single cord. Unfortunately for me, with but two exceptions they declined, as also have several cases of bilateral paralysis who have applied to me, to undergo local treatment, and have, therefore, passed beyond my observation. In none of these

cases was there complete aphonia. The condition was rather one of dysphonia, such as in a case brought to me by Dr. Evans, of Montgomery County, Pa.; loss of power of voice at irregular intervals during the utterance of sentences; change in the *timbre* of the voice during speaking, and so on.

Case 60.—William M——n, æt. 31, of Downingtown, Pa., brought to me, February 14th, 1867, by Dr. Warder, of this city, for the treatment of a bad form of dysphonia of nearly six years' duration. This patient spoke in the ordinary aphonic voice, so that his condition might readily have been mistaken for that of aphonia; but with considerable effort he could succeed in getting a vocal tone now and then, but the effect was so annoying, he preferred to whisper altogether; and there was a certain halt in the tone, if this expression may be allowed, not anything like a stuttering, but a series of futile attempts to accomplish the tone, sometimes terminating with success, but oftener with failure. This man was well-built and healthy, a farmer by occupation, and his inability to shout to his hands, as his business required, was a source of great distress, and had begun to bring on an habitual expression of melancholy, from fear of the incurable nature of his disease. I found the tonsils very much enlarged, so much so as to necessitate their removal, an operation which was accordingly performed by Dr. Warder, before finally resigning the case to my care. I found the trouble principally confined to the left vocal cord, which, in attempts at phonation, came up towards the other with a spasmodic motion, but failed to reach the middle line, leaving the glottis broadly open; hence the uncertainty of the voice. The treatment began, March 7th, by local applications of galvanism, and was continued until April 6th, when the patient was discharged cured. After the third or fourth day of treatment, March 11th, the patient found himself able to speak for several minutes, and more steadily in a low tone, but the moment he

raised his voice, the old difficulty was manifested. By the 16th, he was able to use his voice continuously, and by the 18th, no one would have been able to judge from his conversation, that he had ever had any difficulty of speech.

I found in this case some inequality in the sensibility of the two sides of the larynx. This became equalized by the passage of direct and reverse currents from each side to the other.

Not long since, Dr. Warder informed me that the cure had been permanent.

Case 61.—William B., æt. 26, had dysphonia for two years, and presented himself, in March, 1867. His voice was very hoarse and muffled. There was paralysis of the right vocal cord. This patient could not afford to lose the time from his business necessary for my manipulations, and after a few unsuccessful applications withdrew from treatment. I saw him about six months ago. His condition was the same, and he had consulted several travelling doctors. He promised to come again and submit his cord to galvanism, but has never done so.

I have at present, under treatment, a case of dysphonia of nearly nine years' standing from paralysis of the left vocal cord, in a lad, ten years of age. His condition was noticed subsequent to an attack of measles. The case is somewhat similar to Case 32, p. 209.

Cases of aphonia from paralysis of the vocal cords treated by direct stimulation other than galvanism.

Case 62.—Mrs. Mary Ann C——r, æt. 40, of Bristol, Pa. This case will be found recorded in detail, in the Transactions of the American Medical Association for 1866, p. 247.

Complete aphonia of three months' standing was due to bilateral paralysis. The voice had been lost and regained on

several occasions during a period of ten years. A laryngeal brush armed with tincture of iodine was thrust between the lips of the glottis, with instantaneous cure of the paralysis. The voice returned in a few moments after, and was strengthened by gymnastic laryngeal exercises. No other local treatment was instituted. The cure has been permanent, as I learned from another patient whom I attended but a few months since.

Case 63.—Clara G——n, a patient who came under my care as consulting physician to the Northern Dispensary of Philadelphia. Aphonia of a few days' standing cured by the inhalation of sal ammoniac. I have neglected to record the condition, and therefore presume that the paralysis must have been bilateral.

Case 64.—Miss ——, æt. 20, sent to me, June 25th, 1866, by Dr. Bourns, of Frankford, for a nervous aphonia of four weeks' duration. Immediate restoration of voice by a laryngeal injection of cold water from Gibbs' douche.

Dr. Bourns informed me recently that this patient was well and married. That she lost her voice once or twice since, but he restored it by stimulant inhalations and the use of tonics.

Case 65.—Catharine D——r, æt. 50, unmarried, a stout house-servant of one of my neighbors, came to me, November 2d, 1866, with complete aphonia of eight days' duration. Had lost her voice off and on for four years; the last occasion having been at least two years since, when it remained away for two weeks. Voice restored immediately by a single douche of sulphuric ether. On the 5th inst., while hanging out the clothes, her voice began to fail, and gradually left. It was immediately restored this time by inhalation of the vapor of iodine.

About eighteen months afterwards, this patient told me she had no trouble with her voice since.

Case 66.—Caroline P——s, æt. 16, applied to me, November 7th, 1866, with complete aphonia of over a week's duration. Had never lost voice before. Tried a douche of cold water, and failed to restore voice; then, after a little rest, tried another, and failed again; next time tried sulphuric ether, a douche of which was followed by restoration of the voice, but in quite a hoarse tone. Voice remained good.

Case 67.—Miss B. E., æt. 20, brought to me November 8th, 1866, by Dr. L. M. Emanuel, of Linwood, Pa., for an aphonia of three weeks' duration. Aphonia complete. A similar condition occurred twice, two years before. Two injections of ether spray, followed by laryngeal gymnastics, restored the voice, but not to its normal volume. The patient returned with Dr. Emanuel, and, losing her voice soon again, the doctor, who is an expert laryngoscopist himself, repeated my operation with equal success, since which time the cure has been permanent.

Case 68.—Mrs. L. S——y, æt. 45, had had complete aphonia of several weeks' duration when she presented herself, September 3d, 1867. In this case the voice was restored by the mere introduction of the mirror. September 23d she applied to me again in an aphonic condition. Wishing to demonstrate the case to my class, I told her to return on the 25th, when, in the presence of my class, I restored the voice by the introduction of a sponge probang moistened with water, and introduced after the method of Dr. Horace Green.

Case 69.—Catharine F——k, æt. 52, sent to me, October 4th, 1867, by Dr. Hargadine, of St. Mary's Hospital, to be treated before my class for an aphonia of two weeks' duration. Voice restored by simple introduction of mirror. This patient presented herself again during the winter, and her

voice was immediately restored under the influence of a repetition of the same manœuvre.

Besides these cases of aphonia, I have had several of different character. I have had two or three in which the patients could sing,—one lady doing duty in a city church choir,—but could not speak in an ordinary tone, aphonia being complete in attempted conversation. Another similar case of aphonia I found in a young public school teacher, who lost her voice every day immediately after leaving school, to be restored upon resuming her duties the next morning. All day Saturday and Sunday she remained aphonic. This case was cured by local galvanism, and the internal use of *ignatia amara*.

Then I had another case of a young girl in a store, who always lost her voice at twelve o'clock, and remained aphonic till next morning. This patient was benefited by laryngeal gymnastics.

Then I saw a case of atrophy of the left vocal cord in a young United States naval engineer, æt. 21, sent to me September 14th, 1867, by Prof. F. G. Smith, of this city. This young man had lost his voice off Vera Cruz, twice in eighteen months, for a period of about six weeks. At the time I saw him his voice was good. The left vocal cord in this instance was not more than two-thirds the size of the sound one.

Besides these aphonic cases, I have seen several cases of peculiar defects of voice in professional vocalists, such as inability to sing certain notes, while all the others could be readily produced. These cases have done well under inhalations of iodine, and vocal gymnastics by means of short singing exercises, bringing in the notes upon which the trouble occurs.

All these varying affections of the voice, together with some observations on stuttering and stammering, I hope soon to bring before the notice of the profession in the form of a Monograph upon Defects of the Voice.

CHAPTER XIII.

EXAMINATION OF THE NASAL PASSAGES.

BY DR. J. SOLIS COHEN, OF PHILADELPHIA.

Indirect Examination of the Nasal Passages Posteriorly, or Rhinoscopy.

RHINOSCOPY is the term adopted by Czermak to designate his method of examining the naso-pharyngeal space by means of reflected light. Attempts in this direction had been made by Bozzini (see p. 14) in the early part of the present century, and subsequently by others, but their experiments had not been prosecuted with satisfactory results. It remained for the indefatigable Czermak to renew these attempts as a natural outgrowth of the sister art of laryngoscopy; and after tedious experiments he finally succeeded in developing the art of rhinoscopy to such perfection as placed it among legitimate resources of physical exploration. Czermak's first communication was published in the "Wien Medizinisch Wochenschrift," for August 6th, 1859, and is entitled "Ueber die Inspektion des Cavum pharyngo-nasale und den Nasenhöhle vermittelst kleiner Spiegel." "Inspection of the pharyngo-nasal space and the nasal passages by means of small mirrors." Since this period the subject has been thoroughly studied, first by Semeleder and Voltolini, and afterwards by many others, so that this department of medical diagnosis has become amply represented in Continental professional literature.

It is readily conceded that a great advantage is gained by the inspection of structures so frequently the seat of disease as are the posterior portions of the nasal passages and the

parts adjacent. A greater or less amount of chronic catarrh, attended by annoyance rather than severity, or at least some degree of irritation of these parts, exists in a very large portion of the community as they come under the notice of the physician. These cases have long been noted for their obstinacy, their indisposition to become modified by treatment. If we would study the medical history of these cases, we would find that systematic efforts at cure were rarely instituted, because of the impracticability of appreciating the exact pathological condition, especially at an early period of the disorder. Consequently, if a case exhibited no positive disposition to run into ulceration, and thus become ozænic, if the expression may be employed, the sufferer was usually dismissed with advice to snuff up some powder or medicated water, and to take some mild alterative internally, either according to extemporaneous formula, or in the form of mineral waters, natural or artificial; with injunctions to avoid exposure to "cold," and so on. And the same practice is still pursued by those who have not availed themselves of the new method of exploration. It is only in the severer cases of chronic inflammation, attended with copious discharge, especially when fetid from the existence of ulceration, that active measures are taken; and then the condition is regarded as incurable, so that the patient is received with reluctance and treated without interest.

The ability, by means of the rhinoscope, to recognize pathological changes, and to watch the effects of medication, leads to greater hope of success in relieving these troubles, and the period is not far distant when they will be treated with as much confidence as chronic inflammations of the same class, met with elsewhere.

Examination by the Rhinoscope.

The laryngoscopic apparatus suffices for rhinoscopic examination. The only difference is in the position of the mouth-

mirror, which is to be placed behind the velum and uvula, with its reflecting surface directed upwards and forwards, so as to throw the light upon the posterior opening of the nasal passages and the parts in immediate proximity. The image of these parts is then seen in the same mirror. The primary requisite to successful examination is the existence of sufficient room between the velum and the posterior wall of the pharynx to receive the mirror. When the hard palate extends very far back, it would be impossible to succeed with the examination, as happened in one case under treatment by myself. Such cases, however, are altogether exceptional. As cases run, an examination may always be readily effected; though not always, by any means, with the facility of laryngoscopic examination.

It is essential that the soft palate should hang free from the posterior wall of the pharynx. Now, when the mouth is kept open for purposes of examination, there is an involuntary disposition to breathe through it, which causes the palate to apply itself against the posterior wall of the pharynx, and thus cut off all communication between the mouth and the nares. If nasal respiration is instituted, the palate drops, and the communication is again free, as it is in ordinary respiration when the mouth is closed. Hence we teach a patient to breathe through the nostrils while the mouth is open. This response of the palate to nasal or buccal respiration, and its play backwards and forwards, can be readily observed in a looking-glass. If the patient cannot succeed in maintaining respiration through the nostrils, we may force his palate to drop by causing him to emit nasal sounds, such as the French "en;" and, as the expiratory current passes by the nostrils, the palate falls. This plan was suggested by Czermak. Should this manœuvre fail, we resort to forcible separation by means of a broad and flat blunt hook passed under and behind the velum, and then drawn forwards by the observer. This plan is often but partially successful, inasmuch as it

usually induces spasmodic action of the palatine muscles, the disposition to which spasm is to be overcome only by repeated contact of the instrument, until its presence and pressure is tolerated, or until the irritability of the muscles is exhausted. The same amount of time and patience devoted to the proper regulation of the respiration will insure the success of the latter, and more desirable, method of securing space enough between the pharynx and the palate for the introduction of a mirror.

I employ usually the same mouth-mirror for rhinoscopic as for laryngoscopic purposes, only I find more frequent occasion to employ a mirror of rather a smaller diameter. The majority of authors insist that the rhinoscopic mirror should be attached to its stem at a right angle, or very nearly so. There is no necessity for this, nor is such a mirror as conveniently manipulated as the ordinary laryngeal mirror. Another point insisted upon is that the mirror, for ordinary use, shall be from three-eighths to five-eighths of an inch in diameter; but there is no necessity to employ such a small mirror except in rare instances. The mirror that I use most frequently is an inch in diameter, and from this I vary, according to the case, to seven-eighths and three-quarters of an inch; and it is rarely indeed that the use of a smaller one becomes imperative in the adult; while, on the other hand, I have occasionally been able to employ a mirror an inch-and-a-quarter in diameter with the greatest freedom. The advantage to be gained in the use of as large a mirror as the case admits of is obvious.

A mirror attached to its shank at a right angle is of most use when the head is inclined decidedly forwards, as has been recommended by some Continental authorities, who claim that the soft palate is thus caused to hang forward somewhat of its own accord, and thus increase the posterior pharyngeal space. If the head is kept erect, as it should be, and a mirror at a right angle to its shank is used, the hand of the examiner will be much more apt to be in his way than with a mirror at

an angle of say 120° or thereabouts. If, after introduction, a vertical position of the mirror is desired, it can be produced very readily by depressing the handle, a movement which lowers the hand at the same time, so that it becomes still less likely to intercept the light. On the other hand, when the object is to gain a view of the upper portion of the "posterior nares," or the vault of the pharynx, in a right-angled mirror, the handle will have to be raised so as to obliquize the mirror, and may thus intercept vision. A reflection of the parts, exact as to size, etc., such as we obtain of our faces in an ordinary looking-glass, could be obtained only in the absence of necessary structures, which prevent our seeing the reflection when the mirror is exactly behind the nares in a vertical plane. It is only a perspective image of the parts in front of and above it that can be seen in the mirror at best, and this we secure, with the laryngeal mirror in position for rhinoscopy, much more readily than with the so-called rhinoscopic mirror.

It was thought desirable, as a rule, by Czermak and many others, to resort to mechanical means to raise the uvula and velum, and draw them forwards and upwards, in order to increase the naso-pharyngeal space, and permit a better view of the mirror in position. For this purpose many instruments have been devised, in the form of bent rods, hooks, forceps for seizing, and forceps for dilating, etc. One of the most serviceable instruments for this purpose is a flat hook, of silver or other metal; about three or four lines in breadth, fenestrated or not according to fancy, and terminating in an edge turned up for one or two lines. This is passed behind the velum, and hooked upon its roof, as it were, which is then gently drawn upwards and forwards, the uvula lying upon the flat of the palate-hook. Sometimes the extremity of the palate-hook is made double, like the blades of forceps, and the velum is seized between the blades; sometimes the hook is made with a spring, that closes down upon the anterior sur-

face of the velum when the palate-hook is in position behind; and various other devices have been made.

I find few patients able to bear these instruments without at least some little training, and have therefore discarded their use, except in cases where the uvula is so long as to obstruct the view, and is not excised at the time; or in certain cases of pathological alteration, where everything is to be examined with exceeding minuteness, whether annoying to the patient or not. In employing the palate-hook, it must be warmed before introduction, so that it may not induce spasm.

Now, with a mirror in one hand, and a palate-hook in the other, how is the explorer to make an application if necessary? Methods have been devised by Kramer, Wagner, and others, to let the palate-hook rest upon a contrivance suspended from the forehead, or a clamp spanning the bridge of the nose. These inelegant appliances are said to be well borne. I have never had occasion to resort to them.

Where the space between the velum and pharynx is narrow, necessitating the employment of small mirrors, it may be gradually enlarged to some extent by successive drawings forward of the velum by means of a broad, blunt hook; these manipulations being repeated at intervals for several days or weeks, as the case may be.

An appliance all but absolutely necessary for successful examination is a tongue-depressor, to increase the space between the tongue and the velum, so as to gain room for the passage of the mirror. A tongue-depressor for this purpose should be long enough to extend to the base of the tongue if necessary, and should not be fenestrated, nor reflect light; and should be of such shape that the hand holding it should be out of the way.

I use the tongue-depressor pictured in Fig. 50, and which was originally devised for laryngeal examinations when such an instrument is required (*The Medical Record*, vol. i, p.

348). It is made of a single piece of hard rubber, and the portion forming the handle is bent under, so as to be out of the way. The tongue-depressor may be confided to the patient, so that the operator may be able to manipulate the mirror and instrument, or mirror and palate-hook, as the case may be.

FIG. 50.

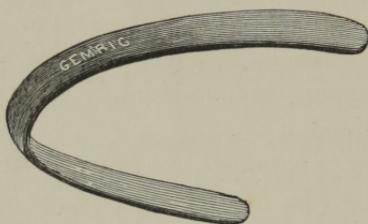


Fig. 50.—HARD RUBBER TONGUE-DEPRESSOR.

Instruments combining tongue-depressor and mirror have been invented by Voltolini, Wagner, Mackenzie, Simrock, and others. I have had no experience with these “rhinoscopes,” having rarely encountered a case where the reflector and mirror used for laryngeal manipulations, with the addition of the tongue-depressor, has not served to fulfil every indication of diagnosis and treatment.

The structures submitted to rhinoscopic examination are :

The posterior surface of the uvula and velum ;

The posterior aspect of the nasal passages, to wit, the septum, turbinated bones, and meatuses ;

The pharyngeal openings of the Eustachian tubes ;

The vault or roof of the pharynx ;

The lateral walls of the pharynx ; and

The upper portion of the posterior wall of the pharynx.

These structures cannot all be examined at the same moment ; but by gently rotating the mirror so as to turn its reflecting surface towards the different points, we are able to

take a complete survey of the whole in detail. Occasionally I have encountered a case in which I could employ my largest mirror, an inch and a quarter in diameter, and thus see the image of both posterior nares and both Eustachian openings at the same time, securing in one glance very much such a view as is represented in Fig. 51. With small mirrors we examine each side separately; larger mirrors are placed in the middle line of the pharyngo-nasal space.

The extreme lower portion of the septum and nares, being covered by the velum as it bends downwards, is not usually seen, but the upper three-fourths of the space can almost always be examined.

If a good view is obtained, we procure some such image as is represented in Fig. 51. The parts are rendered very distinct in outline for purposes of study. With the exception of the image of the inferior turbinated bone, everything can be recognized under favorable circumstances by those accustomed to these examinations, as distinctly as represented. Indeed, I often am able to see still more of the turbinated bone within the superior meatus, which is here represented entirely in shadow.

It is very essential to become familiarized with the appearances represented in the rhinoscopic mirror, in order to be able to recognize the individual structures; not only because these parts are rarely submitted to dissection in the prosecution of our anatomical studies, but also because the idea of the relation of parts as seen in the skull deprived of soft tissue is not realized in the examination under consideration. I have known the reflection of a back tooth to be taken for the nares of that side with its turbinated bones covered with inspissated mucus; and the ashy color of the reflected tooth was not, at first sight, unlike the recollection of the appearance of the posterior nasal region in a recently boiled skull.

Let us now examine the image as represented in Fig. 51. We find the most prominent object to be a bright columnar

ridge in the centre, gradually expanding above. This is the nasal septum. It is, in health, of a pale yellow, or yellowish-pink color, at its narrow portion, but as it expands, its color

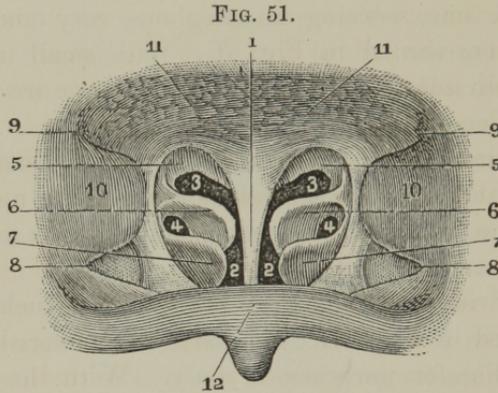


Fig. 51.—RHINOSCOPIC IMAGE.

1. Septum. 2. Free space of nasal passage. 3. Superior meatus. 4. Middle meatus. 5. Superior turbinated bone. 6. Middle do. 7. Inferior do. 8. Position of the opening into the Eustachian tube. 9. Fossa of Rosenmüller. 10. Lateral wall of pharynx. 11. Superior wall of pharynx. 12. Posterior surface of velum.

gradually merges into the red of the pharyngeal mucous membrane above. If we follow the outline of the expanding portion of this septum, we define upon each side the corresponding posterior nasal opening, the lowermost portion of which is cut off from view by a horizontally curved, red projecting ridge, which, with as much of it as is reflected below, is the posterior surface of the velum. Following the inner curve of this velum round on either side, we observe it rising over the outer portion of each nasal opening, beyond which it bends sharply over a well-marked protuberance formed by the lateral wall of the pharynx, beneath which is the entrance to the pharyngeal orifice of the Eustachian tube. Following this protuberance backward, we observe it marking a canal,

the terminal fossa of which, as it runs upwards and outwards, is the fossa of Rosenmüller,* and lies between this lateral projection and the posterior wall of the pharynx. In this fossa the Eustachian catheter often becomes engaged during the introduction of that instrument.

To return to the central portion of the image. The parts in shadow each side of the septum represent the free cavity of the nares on each side respectively. Following this shadow from below upward on either side, we see it terminate in a large shadow, which represents the superior meatus; the bright portion above this is the upper turbinated bone, the lower border of which turns down and seems to be lost in a central bulbous portion, which is the middle turbinated bone; this is partly covered below by another prominent object more deeply shadowed, which is the inferior turbinated bone; above this inferior turbinated bone and to the outside, we observe a shadow, representing what is seen of the middle meatus. Occasionally, but not in the image figured, we can discern the position of the inferior meatus, just below the lower turbinated bone.

Ordinarily we cannot see more than the most posterior portions of the nasal passages, as represented in the figure; but sometimes, especially when the mirror is in a vertical plane, and much of it hidden behind the velum, we can distinguish the lateral portion of the middle turbinated bone, and the lower and lateral portion of the superior turbinated bone for a considerable distance. The superior turbinated bone is seen more deeply situated than the middle turbinated bone; and the inferior turbinated bone is not nearly as distinctly prominent as the middle turbinated bone, although its outline is accurately defined.

The color of the healthy mucous membrane of the nasal and naso-pharyngeal structures, as seen in the mirror, varies

* Recessus pharyngeus.

from a pale grayish-red or yellow with a suspicion of pink, to the more decided red of the pharyngeal mucous membrane. The narrow column of the septum and the space between the anterior wall of the pharynx comprising the space between the outer border of the nasal opening and the projection in the figure marking the lateral wall, are usually of a pale, pinkish-yellow, sometimes decidedly yellow; the opening of the Eustachian tube is red; the superior turbinated bone is a very light pink; but if any of its under or lateral surface is seen, this is dark-gray; the middle turbinated bone looks gray, but is very distinct, and the inferior turbinated bone is very much darker, like slate; the other parts are red, the prominent structure beneath the angle marking the opening into the Eustachian tube, being of a lighter red than the projection in front of and above. The precise tint of each structure varies with the character of the light, its position influencing shadow, and the position of the patient, while special colorations may be consequent on disease, and vary with its character.

The presence of mucus is easily recognized, and when present usually hangs about the turbinated bones, the septum, and the Eustachian opening.

In gaining a view of the posterior nares, the first reflection seen in the mirror as it is passed under the velum, is the image of the posterior aspect of the uvula, velum, and palatine arches, presenting together much the general appearance of the outline of the image of the septum and nasal openings, especially should one of the molar teeth be reflected just to the side of the uvula. When this image of the velum and arches is seen, the handle of the mirror should be gradually depressed, or the reflecting surface slipped up further behind the velum, when we will see the velum, as it were, gradually extending upwards, and then turning on itself backwards at a right angle, looking not unlike a shelf of flesh, on top of which and somewhat in its rear, we begin to

recognize the true image of the septum and nares making its appearance in the mirror.

Irritability of these parts to a degree precluding immediate examination, as will occasionally be met with, is to be overcome on the same principles as already laid down in the article on laryngoscopy. Patience and gentleness, exhibited in repeated manipulation of the parts, will almost always result to the satisfaction of the examiner.

Direct Examination of the Nasal Passages Anteriorly.

We can learn a great deal from examination of the nasal passages anteriorly. For this purpose the head of the patient is thrown back, and the point of the nose turned up so as to get the parts as much as possible in a horizontal line; and then reflected sunlight or artificial light is thrown in. We obtain a still better view of the parts, by introducing a small speculum into the nostrils as far as the position of the nasal bones, so as to stretch the cartilaginous portion. The best instrument for this purpose is a small three-leaved steel speculum devised by Elsberg, of New York, and modelled upon the dilator of Trousseau, sometimes used to facilitate the introduction of the canula after tracheotomy. This permits of great distension of the anterior portion of the nostril without producing pain, and is therefore a very valuable instrument. Should it not be at hand, a two-leaved ear speculum, or a tubular ear speculum, or in default of this, a bit of catheter, will assist the examination, though by no means supersede Elsberg's dilator.

We can thus see sometimes, in the healthy subject, clear back to the pharynx, and recognize the upper surface of the velum. In cases of disease we recognize polyps and other growths, ulcers, perforations of the septum, thickening of the mucous membrane, alterations and destruction of portions of the turbinated bones, etc.

An examination of this kind should never be neglected in treating naso-pharyngeal troubles, and should always precede the rhinoscopic examination, or follow it.

Czermak states* that by dilating the nostrils of a cadaver, and then introducing a small mirror with its reflecting surface forwards and upwards, he was able to distinguish a bristle which he had passed through the lachrymal canal.

This will give an idea of the value of the art of reflection in examining the nasal passages anteriorly.

The Application of Remedies to the Naso-pharyngeal Region.

Local applications are made to these parts, by the douche, syringe, sponge, brush, cautery, insufflator, scarificator, forceps, etc., in the same forms, and for the same purposes as elsewhere. The applications are sometimes made through the nostrils, at others through the mouth, according to the seat of disease, its nature, and its ease of access. In making caustic applications far back through the nostrils, the instrument should be passed through a short catheter, in order to protect the structures anteriorly. The best form of instrument for this purpose is that usually used in making applications to the os uteri. The curve of the instrument should be slight, and its terminal extremity short. In size it should be adapted to the parts; the ordinary size of laryngoscopic instruments will suffice. For applications through the mouth, instruments with the laryngeal curve will answer very well, but the terminal extremities need not be quite so long; from an inch to an inch and a half will answer for most purposes. The galvano-cautery and the strangling noose or ecraseur come in play here for the removal of gelatinous and fibroid polyps, even more than in the operations upon the larynx.

* Der Kehlkopfspiegel, etc. Zweite Auflage. Leipsic, 1863, p. 52

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 ERRATA.

- Page 70—9th line from bottom, for 48 read 91.
 Page 73—5th line from bottom, for *cricoid* read *thyroid*.
 Page 73—4th line from bottom, read *cricoid cartilage, with rings of trachea below*.
 Page 79—4th line from bottom, for (*cr*) read (*t*).
 Page 79—3d line from bottom, omit (*t*).
 Page 132—10th line from bottom, for *right* read *left*.

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