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MEDICAL SCIENCE

IN RELATION TO THE

VOICE AS A MUSICAL INSTRUMENT

BY

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(JOHN HULLAH, Esq., LL.D. *in the Chair*)
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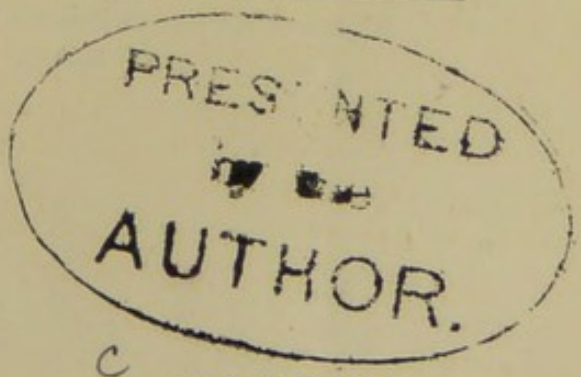

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PREFACE.

THIS paper met with so kindly a reception at the hands of the members of the Society before whom it was read, and an abstract of it, which appeared in the *Times*, was translated into so many foreign journals, and occasioned so many requests for more detailed information, that I have been induced to reprint it (by permission) from the Transactions of the Musical Association.

Necessarily condensed, and written amid the occupations of professional work, my subject has not been treated so completely as I could wish. I trust, however, at a not far distant date, to offer some remarks more exhaustive of the interesting questions briefly touched upon in this essay.

36 WEYMOUTH STREET, PORTLAND PLACE, W.
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ON MEDICAL SCIENCE IN RELATION TO THE VOICE AS A MUSICAL INSTRUMENT.

By Lennox Browne, F.R.C.S. Edin.,

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The subject which I have chosen for the consideration of the Musical Association presents to the most casual observer so many obstacles in the way of treatment that it will be easily believed I approach my task with feelings of diffidence. The largeness of the field for discussion, the difficulty of treating the musical or, to me, unfamiliar portion in a manner worthy of this Association, and the fear lest the medical portion may be tediously or too technically dwelt upon, have tended to render me distrustful of success. Were I not well assured of the generous forbearance shown by professional men to those who have real desire to contribute to our common knowledge, I had many times turned back from the plough to which I have put my hand.

I shall, in consideration of the musical character of many of my audience, probably treat my subject most acceptably by suggesting rather than asserting points on which I venture to differ from or to think unnoticed by those who have written on the voice as a musical instrument; while to those who may expect some advice as to the medical management of the voice, I shall as far as possible direct attention how to form and educate it so as to perfect it in health; and I shall not at all attempt to dwell on the treatment of the organs of voice, when from various causes, whatever their nature, they may fall into a state of disease.

This limitation of the subject embraces, however, a sufficiently wide ground, and I will therefore, without further preface, proceed to consider, very briefly it must be, some of the principal points offered for our notice. They are—

1. The laws of musical sound bearing on the question to be discussed.

2. The organs of human voice combining to form a musical instrument, with the various functions of each organ.

3. The management of those parts under control of the vocalist which may perfect the voice, and by inference.

4. The defects occasioned by mismanagement.

Lastly, such directions of hygiene as may apply to all who wish to exercise their voice as a musical instrument.

Musical sound is produced by communication to the auditory nerve of sonorous shocks following each other at regular intervals with a sufficient rapidity of succession, the regularity of the intervals distinguishing it from noise, which is an irregular succession of sonorous shocks.

The pitch of a musical note depends solely on the number of vibrations concerned in its production, the more rapid the vibration the higher being the pitch.

The amount of motion communicated by a vibrating string to the air is too small to be perceived as sound, even at a small distance from the string. Hence, when strings are employed as sources of musical sounds, they must be associated with surfaces of larger area, which take up their vibrations and transfer them to the surrounding air—in other words, by a sound-board or box. The *timbre* or quality of a sound depends almost wholly on the quality and disposition of the sound-boards, as in the harp, the violin, the piano ; and it may be noted that these sound-boards are not of variable size, but of equal capacity, whether for high or low notes.

The laws of vibrations of stringed instruments bearing on our subject are that the number of vibrations depends—first, on the power of lengthening or shortening of the string; secondly, on the tension or relaxation of the string ; thirdly, on the variations in the thickness of the string ; and lastly, on the density of the string—that is to say, the shorter, the tighter, the finer, and the lighter in weight is the string, the more rapid will be the vibrations in a given time ; in other words, the higher will be the pitch of the note produced.

When we come to reed instruments or reed pipes, the reed or tongue takes the place of the string, so far as the generation of the sound is concerned ; but the length and calibre of the pipe determine the pitch, and determine it in as definite proportion as is the case with stringed instruments. It is not necessary to trouble you with figures ; but the bearing of these laws on our subject will presently be made evident.

I have only enumerated as axioms a few laws of sound necessary to be borne in mind in consideration of the present communication. I need not, however, say that there are many other laws of sound bearing on the question of the production of the human voice of equal importance, but to which it is unnecessary on the present occasion to allude, seeing that I do not intend to make reference to facts based on them in this paper.

Before looking at the structures concerned in the production of the voice, let us define as clearly as we can what is this voice. Well, it is a sonorous vibration or series of vibrations produced by air driven from a bellows along an elastic pipe across two reeds or cords placed in that pipe ; the consequent musical sounds or voice issuing by certain canals and passages of varying calibre and length.

Speech or spoken voice is composed of the articulation or formation into letters and words of these sonorous vibrations. This articulation is produced by parts in no way connected with the production of sound, and by parts placed quite at the point of exit of that sound ; in fact, by the lips, tongue, and soft palate, the soft palate being the backward boundary of articulation.

Song or singing voice differs from speech only that it is a higher development of the same power. It consists in the varia-

tion and modulation of the emitted sounds. According to the musician, it is the faculty of producing by means of the voice all the notes of the different musical scales.

Beethoven frequently treated the voice as a musical instrument, irrespective of the expression of words. This is exemplified in his Choral Symphony and Fantasia. Some singers unconsciously treat the voice in the same way by entirely neglecting or by slurring the articulation of their words; but in general acceptation singing implies expression of words uttered on the various musical notes. It may be said that the power of the artist is exhibited in proportion as the hearer is struck with the force and beauty of these words musically pronounced by a singer. I may say in passing that I am fully aware that the foregoing, like all arbitrary definitions, falls far short of indicating either the likenesses or differences between speech and song. Musical intonation is as necessary to the former as the latter, so much so that, as Professor Hullah well puts it in his admirable lectures on the *Speaking Voice*, 'that which is effectively and agreeably said must be (partially) sung.' We all know this by experience when we say that such or such an orator has a musical voice. Signor Salvini is a striking example of a man whose voice may be almost said to sing to his hearers, so beautifully true and flexible is it. Italian recitative is not much more than impassioned perfect speaking.

For the complete development of the power of conveying words and sentiments in song many qualifications are necessary, with only some of which can we now deal.

It is only with voice production that we are now concerned, and it is our object to consider how these various musical notes forming the voice may be so produced as to allow the singer to retain to himself the power to express on them any emotion he may will. For the right understanding of this matter we must look at the formation of the parts concerned, and endeavour to find for each part its proper function. In other words, we must know something of the anatomy and physiology of the vocal organs.

The vocal apparatus may be conveniently divided into five parts. They are generally divided into only four :—

1. The lungs or bellows.
2. The trachea or windpipe, carrying air to—
3. The larynx or voice-box, in which are situated the vocal cords or reeds.
4. The variable cavity, being that portion above the voice-box to the soft palate called the pharynx, as well as the nasal passages, the latter common to some extent also to—
5. The articulating cavity, comprising that portion from the soft palate to the lips, whence the sound is emitted.

[Short anatomical description of the various parts omitted. The reader may be referred for such information to Professor Huxley's or any other Manual of Physiology.]

Voice is produced by vibration of the vocal cords caused by the passage of air driven from the lungs. The first desideratum,

therefore, for voice production is to have a bellows full of air, and then to know how best to economise that air. On this depends the whole art of voice production. The lungs may be expanded or inflated in three different ways :—

1. By pressing them downwards against the lower wall, which is purely muscular and elastic, and has on its opposite or inferior side soft and yielding parts. In this method the shoulders and chest wall or ribs remain unmoved.

2. By pressing the lungs outwards against the more or less elastic framework of the ribs. In this method also the upper part is not brought into movement.

3. By drawing the lungs upwards with the collar-bone or clavicle and shoulder-blades ; those parts which are fixed in the first and second methods. The first way is called the abdominal or diaphragmatic (after the muscles which regulate the movement), the second is known as the lateral, the third as the clavicular. All breath-taking in singing, as in speaking and in ordinary life, should be abdominal. As the abdominal breathing is prolonged it becomes lateral, which in its turn may, if further prolonged, become clavicular ; but clavicular breathing is a method of respiration totally vicious, and to be avoided. It is a method never exercised by nature in a state of health, but only when from disease either the abdominal or chest muscles cannot act, and it is the method least efficacious in filling, as it is the one calculated most to fatigue the chest, for it compresses the vessels and nerves of the throat, and this leads to engorgement and spasmodic action of the muscles. The lateral method is more commonly exercised by women than by men, and under some circumstances is necessary to them ; but it is an error to suppose that the clavicular method is ever necessary to either sex under any condition of health.

Whilst the inspiration should be as gradual and as imperceptible as possible, it should also be as full as possible, so that it need not be repeated more frequently than is absolutely necessary. The expiration should not be wasted, jerky, or in gasps, but steady and gradual ; for it is on the extension with regularity of expiration that depends the intensity or force, the duration, and the steadiness of vocal vibrations. And here it may be remarked that he is the best singer who can so control the expiration that the least possible amount of air sufficient to cause vibration is poured with continuous effect upon the vocal organs.* Hence, as one so well knows, the greatest singers appear to have an inexhaustible supply of breath. The method of respiration I have indicated as the natural,† and therefore the best, was the one taught by the Italian school of the last century. There is just as much teaching of what may be called the decorations of the voice in the

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* The direction of Signor Garcia for a singer to practise his voice with a lighted candle before the mouth is known to many. If the flame is extinguished, or even wavers, it is a sign that too much air is being expended.

† I have to thank Mr. William Shakespeare, a favourite pupil of the celebrated Maestro Lamperti, for much useful information and practical illustration on this important subject.

present day as then; but the art of forming a solid basis of voice by long exercise on a right method of breath-taking seems to be almost lost, or, if not lost, is overlooked. Forming the voice, or placing the voice, means nothing more than practice of scales on a right method. To attempt florid passages before such practice has been thoroughly carried out is as futile as to attempt to draw from the life or to colour before one can make straight and curved lines in black and white. It is astonishing how perseverance on a right method will make an agreeable and effective voice out of a naturally poor organ. I could mention the instance of two young ladies who made their *débuts* last year on the London Italian stage. One, with but slight *physique* and but few natural gifts, sings the most difficult music with such rare precision and accuracy as to give complete satisfaction; the other at once inspires her hearers with only feelings of regret that a really charming natural voice has not been made more flexible by the practice of simple scale singing before opera was attempted. I venture to think that more error has been promulgated in vocal instruction and more injury done to voices from faulty methods of breath-taking than from any other cause. As has just been said, the force, intensity, and sustaining power of the voice depend on a good method of breath-taking and emission. When it is considered that the Conservatoire of Music of Paris* teaches that it is necessary to breathe differently for singing than for speech, it is not to be wondered at that the voices of French singers become so often trembling, small, and early fatigued.†

The air carried from the lungs by the windpipe (which we shall presently see is not a mere passive tube) impels against the vocal cords, which act as reeded tongues, and divide the air into a number of puffs or explosions. The series of musical notes thus produced vary in pitch, according to most writers, solely as these cords are tightened or relaxed, so as to vary the configuration of the space between them, called the glottis, and thereby to modify the character of the explosions.

The notes having been formed by vibration of the vocal cords, are carried into a very variable cavity, the pharynx. This vari-

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* 'Quand on respire pour parler ou pour renouveler simplement l'air des poumons, le premier mouvement est celui de l'aspiration, alors le ventre se gonfle et sa partie postérieure s'avance un peu. . . . . Au contraire, dans l'action de respirer pour chanter, en aspirant il faut aplatir le ventre et le faire remonter avec promptitude, en gonflant et avançant la poitrine.'—*Méthode de Chant du Conservatoire de Musique.*

† I cannot forbear mentioning that I have received a most interesting communication from a lady in Amsterdam, who, having read a translation of the brief abstract of my paper which appeared in the daily press, recounts how sad were the results to her voice of the teaching in a certain Conservatoire on the Continent; how that four years of rest and medical treatment did nothing for her, but how that Mons. Wartel, the able instructor of Mesdames Nilsson and Trebelli, at once recognised the cause of her loss of voice, and placed her in the way of regaining it 'in three months as strong as it ever was before.' This lady very sensibly suggests that 'a kind of diaphragmatic *gymnastique* would not only enlarge the respiratory organs, as does singing with good breath-taking, but that it would thus cause women who are not singers to make more healthy blood, and to gain more strength in general.'

able cavity is not only, as is generally taught, a simple resonant box, but it plays, in my opinion, a very important part in the actual alteration of pitch. The formation of notes into articulate sounds commences only at the fauces and soft palate; but the pharyngeal tube before that point possesses a power of lengthening and shortening itself, of expansion and compression, that is quite independent of articulation, of resonance, or of *timbre* or tone quality. Without going further into the anatomy of the subject, it may be stated that the peculiarity of all the parts connected with the organs of voice is their extreme mobility and variable capacity, and, it may be added, their mutual inter-dependence. It is on true economy of the air in the lungs that depends the intensity of the vibration of the vocal cords. It is in a great measure on the power to stretch or relax those cords that the extent or pitch of the voice depends. This much is admitted; but the tube that carries the air from the lungs to the vocal cords has a power to modify the voice, as has that portion of the tube above the cords before it arrives at the point where articulation begins. These are facts on which I wish particularly to dwell, because I think they are not sufficiently considered by those occupied in voice production. Pupils are generally told that the whole variation of pitch in the human voice—a variation of from two to three, or even, as in the rare instances of Sassi, Catalani, and one or two others, three octaves and a half of voice—depends solely on the variation of tension of two small membranous reeds, less than an inch long, which, in the case of a man, have a power of alteration in length of only one-sixth of an inch between their highest and lowest note, while in women they do not vary in length more than one-eighth of an inch. Between these two cords is a space—the glottis—which, as it is taught, can be lengthened, shortened, narrowed, or widened, by the tension, relaxation, the approach or the separation of the vocal bands; and it is these different configurations, formed, let it be borne in mind, by ends of extremely limited power of tension and relaxation, which, say physiologists, determine the pitch of the voice. Dr. Mandl, a physician devoting himself to throat affections, and of high repute in Paris, and who is Professor of Hygiene of the Voice at the Conservatoire of Music—a post as yet unknown in the academies of this country—remarks that, because the larynx or voice-box can move in its totality, as in the act of swallowing, or in protruding and retracting the tongue, it is proved that the position of the larynx is independent of the height of the sound. In the same way we are told that because the windpipe—that is, the portion between the lungs and the voice-box—has but a limited power to shorten itself, therefore that portion of the vocal apparatus plays also only the passive part of an air-conducting pipe. One might as well say that because the vocal cords separate in inspiration and approach in expiration, that is all they have to do, or that because the tongue is the organ of taste, it plays no part in the articulation of words. I have on more than one occasion seen how very small an interference with the rhythmical action of the windpipe will cause extreme disturbance of breathing, in the same way that a very slight constriction of the

gullet will interfere with the swallowing of a bolus much smaller than the strictured orifice. With this disturbance of the breathing from a very slight alteration of the calibre of the windpipe ensues an enfeeblement of the voice out of all proportion to the interruption in the current of air.

I must confess that I have not seen that variation in the shape of the glottic orifice during vocalisation that has been dwelt upon by various writers since the discovery of the laryngoscope; and, as it has been my practice to make drawings of the laryngeal condition of almost every patient presenting abnormal appearances, as well as the larynx of many hundred persons presenting no abnormality, I should, I think, have noticed these changes in configuration, at any rate, in some instances. I mention this fact of my making drawings because, although the figures drawn might not be perfect, the habit of observation is rendered much more accurate by the mere act of delineating what one sees. Nor can I think of any provision of nature by which the vocal cords are stopped so as to produce all the varied notes in the vocal scale.* We must look, therefore, for something more to account for the causation of variation of vocal pitch; and this something is to be found, I suggest, in the conditions of the vocal pipe, by which I mean that portion leading from the lungs to the vocal cords as well as that portion which is above them.

The experiments of Savart long ago proved that a tube of constant length may be made to produce a great range of sounds by making it of elastic sides susceptible of variations in tension. The analogy between such a tube and the trachea is perfect. The windpipe cannot shorten or lengthen to any very great extent, but it can be increased in tension by two sources, one the action of the transverse muscular fibres which bind the ends of the cartilages together, the second the elevation of the larynx which accompanies to so remarkable an extent the elevation of the pitch of the voice, a movement which Dr. Mandl would have us believe is totally independent of the alteration in pitch. Sir Charles Wheatstone† more than forty years ago drew attention to this relation of the variation in tension of a tube to a free reed, and illustrated it by the instrument known as the jew's-harp, in which the reed being once set in motion by air from the mouth produces one steady bass sound. The variation of sounds is produced wholly in proportion as the skill and will of the performer varies the cavity of the mouth so as to present a succession of

* I do not forget in making this statement that Signor Garcia, in his masterly communication to the Royal Society (Society's Proceedings, Vol. vii. No. 13, 1855), came to the conclusion that 'the remarkable arrangement of the fibres (of the intrinsic muscles of the larynx—i.e. those acting on the vocal cords themselves) enables us to explain the elevation of the voice'; nor do I for a moment venture to dispute his facts; but I think that he and all other teachers since him, following in his wake, attempt to prove more than can be proved from the action of the vocal cords alone. He admits that the trachea may modify the force of the air from the lungs, and that the pharynx modifies the *quality* of the voice. My suggestion is that pitch and quality are both modified by these causes.

† See the interesting paper of Professor Grylls Adams in the current volume of the Transactions for 1876, pp. 84 *et seq.*

volumes of air calculated to vibrate the different multiples of the primary bass sound. This influence of the tube is by experiment found to be the same, whether the tube is placed after the reed, as in several wind instruments, or before (and after) it, as in the vocal organs. By my observations a very similar thing takes place above the larynx as below it. When one looks at the vocal organ by means of the laryngoscope, the note 'ah' being sounded, the vocal cords are seen to approximate, and the larynx or voice-box is not moved. On the low note 'o' or 'oo' being sounded down goes the larynx, drawing with it the epiglottis; the tube above the vocal cords is lengthened. Then let the person under examination sound 'a,' 'e,' or 'i,' all high vowel sounds; up goes the voice-box, often so close to the tongue as to get almost out of sight. The tube is shortened with the elevation of pitch. But also the soft palate is pressed back against the back wall of the pharynx, so that the tube is diminished still further by the cutting off the nasal portion of the canal, and the actual calibre of the pharyngeal tube is enlarged or diminished (as we have seen to be the case with the windpipe) by the action of the constrictor muscles of the pharynx and the pillars of the fauces. Nothing so destroys the high notes of the voice as enlarged tonsils. Dr. Bennati, who wrote some forty years ago a work, *Sur le mécanisme de la voix humaine*, mentions as an unexpected effect of removing the tonsils that he found the operation to be followed by the raising of the voice half an octave. This I can readily believe, because the presence of these enlarged glands so very much diminishes the power of the pharynx to modify the higher notes. For the consolation of those who suffer from enlarged tonsils, and are deterred from having them removed by fear of the voice being injured, it may be mentioned that many of our greatest singers, from Madame Patti downwards, have undergone the operation with the greatest comfort to themselves and with the result of increasing rather than of diminishing the range of the voice.

I am well aware that I have left altogether untouched many points of great importance in voice production, as, for example, the resisting power of the inspiratory muscles to control the exit of the air from the lungs, and the influence of the ventricles of the larynx in controlling both the entrance and exit of air in the glottis. I have been obliged to pass over interesting points, as the difference between male and female voices, as well as the varieties of voice known as tenor, baritone, and bass, soprano, mezzo-soprano, and contralto. A matter on which more knowledge is greatly wanted is the cause of the power to pass from one register, as it is called, to another without a break. One of the most noteworthy facts concerning the human voice as a musical instrument is the marvellous power which it possesses to sound the very smallest musical intervals, a faculty strikingly evidenced in the voices of the Orientals* and the New Zealanders. I should have wished also to have dwelt for a little on the production of the falsetto, a problem full of interest and never yet

* This subject is referred to by the Rev. Sir Gore Ouseley in his communication in the current volume of the Transactions, 1876, page 31.

satisfactorily solved. Signor Garcia thinks that 'the lips of the glottis (vocal cords) come in contact by their edges alone, and offer little resistance to the air; hence arises the great loss of this agent and the general weakness of the sounds produced here.' He places it as between the chest and head registers. I am not able to give much information as the result of my own observation concerning the production of the falsetto for two reasons. One is that the epiglottis always rises as soon as formation of such notes is attempted, drawing up with it the larynx, so as to very frequently obscure the image in the laryngeal mirror. My observation on this point is exactly contrary to that of Signor Garcia, who says that "every time the epiglottis lowers itself, and nearly closes the orifice of the larynx, the voice gains in brilliancy, and when, on the other hand, it is drawn up the voice becomes immediately veiled." Another reason why it is difficult to see in the mirror the exact appearance of the organs when falsetto notes are produced is the fact that the pressure of the mirror against the soft palate necessary to see the larynx appears to interfere with that perfect tension of this part inseparable from the production of these notes. I have not been able, by actual observation, to confirm or, indeed, to contradict Signor Garcia's theory. In those few cases in which I have well seen the larynx I have failed to discover any appreciable difference in the opposing edges of the vocal cords.

[It may be interesting to quote some remarks on this subject of Mr. Sims Reeves, in a letter he did me the honour to write since this paper was read. He suggests 'that the falsetto is like a false note made by flute players; it is, as it were, outside the tone. The same with violinists when they make the harmonic sounds.']

I have been asked to say something on the relations of the throat and ear in music. This question is based on a wrong understanding of the connection of these parts. In cases of so-called throat deafness the passage leading from the back of the throat (posterior nostrils) to the ear may be obstructed and thickened, and so the intonation and articulation will be more or less impaired; but the fact of a person singing true or false depends on causes independent of any such connection. In those cases where it is not due to wrong voice production, it may be caused by what may be called sympathetic disturbances, as nervousness, indigestion, and general *malaise*. The singer almost always knows in such a case when he is out of tune. The instances in which the auditory nerve is impaired so that the subject of it is not aware of his faulty intonation are fortunately rare, and are, of course, hopeless. Song practice on a right method of voice production and learning to play a musical instrument are probably the best means for bringing the voice into accord with the ear.

My object has been to draw attention to the fact that, valuable as has been the laryngoscope in a physiological, as it is undoubtedly in a medical sense, it has been the means of making all theories of production of voice too dependent on the vocal cords, and that the importance of the other parts of the vocal apparatus in their actual influence on the pitch has been overlooked. It is therefore impossible to say that the voice is this musical instru-

ment or that. It has been at various times treated as a wind instrument, a reed instrument, a string instrument, and as a flute instrument. Efforts to make an artificial human voice on any one separate principle have signally failed; witness the so-called *vox humana* stop of the organ, or the attempts of Müller and Helmholtz to imitate the voice by means of bands of india-rubber placed in apposition at one end of a glass tube. Many vocal notes strongly resemble those of the clarinet, others those of the violoncello; while, in the higher register, the instrument which appears to me to act most perfectly in musical unison with the human voice is the flute. One has only to listen to Madame Patti in the song with double flute accompaniment in the last act of *L'Etoile du Nord*, or to Sir Julius Benedict's lovely composition, 'The bird that came in spring,' with similar accompaniment, to appreciate what I mean. Not that I would imply that the vocal organ is a flute instrument, or indeed any of the other instruments to which it has been likened. It is probably a combination of all. To quote again Professor Hullah: 'The *vox humana* of the Divine artificer is an incomparably more complex as it is an incomparably more beautiful instrument than any of its compeers. Fearfully and wonderfully is it made. Not only is its mechanism more intricate, not only are its constituent parts more numerous and delicate than those of any artificial organ, but the action of these is complicated by conditions from which every other instrument is free.' In studying its nature we must not look at one part or two, but at all parts as units of a whole. Dr. Marcet relates a case in which a man regained his (speaking) voice, having lost by disease his vocal cords; and an American physician has published how he artificially constructed a vocal cord lost by disease. One sees daily amongst the common causes of loss of voice a too feeble current of air to cause sonorous vibration of the cords, inflammatory conditions of the cords preventing their approximation or elasticity, a disordered state of the secretory membranes and glands of the air passages destroying their whole tone, or conditions which may interfere with correct articulation. These are only enumerated to give a few instances of the many causes of disease which may act separately or in combination to destroy or weaken the voice; but, setting disease aside, I venture to say that three-fourths at least of the professional voice-using people, clergymen, barristers, vocalists, and actors, who suffer from fatigue of the voice, are victims to vicious voice production, and that many of the most common of the diseased conditions are due to this cause. Although it is most desirable in any given case of enfeeblement of the voice to examine the voice-box, it is simply astonishing how seldom is the cause to be found in the vocal cords; or, to put it another way, how seldom it is necessary or even judicious to treat the disease only or at all locally. In offering, therefore, a few suggestions as to the hygienic management of the voice, it is necessary to direct attention to matters which apparently are entirely outside the question. One hears of this lozenge or that gargle or syrup as a universal panacea for all the troubles to which vocalists are subject. I am sorry to say that singing masters not unfrequently

err in this respect, and prescribe for their pupils remedies of which they know nothing, except that they may have been serviceable to themselves or their friends, probably for totally different diseased conditions.* I shall not be surprised if singing masters retort that I have taken my revenge in the present communication by trenching on their ground. If, however, I tell of no universal medicine to regenerate a lost voice, or to cause one to form on barren soil, it is simply because I know of none.

Remarks on the general medical management of the voice must be brief for two reasons: first, for want of space; and, secondly, because there is so little to be said that can be applied generally. The best advice I can offer is that the voice should be treated by its possessor as a musical instrument. No one would expose his piano to all changes of weather or temperature, nor would he leave his violin out in open air all night. On the other hand, it is not necessary that the one should be kept in a room of specially prepared even temperature nor that the other should be constantly swathed in flannel. One hears a great deal of the injurious effects of climate on the voice, especially of the climate of this country and of America. Presupposing a naturally healthy constitution—and it is worth noting what good general health the best singers enjoy—I do not believe that climate is nearly as much to blame as is generally supposed. Sopranos who have never learnt to produce the voice properly, and foreign tenors who have used up all the voice they ever had before they come here, may complain of '*ce vilain climat*,' but when we consider that Madame Patti can sing equally well in such varying climates as those of a winter in Moscow or St. Petersburg, a spring in Vienna or Buda-Pesth, then in Paris, Brussels, or London, with an autumn tour through the English provinces, and with often no longer interval of time between two engagements, say from Vienna to London, than is occupied in the journey; when one finds that Mr. Santley and Mdlle. Albani have both returned from long tours through America without losing one iota of the quality of their voice, and that Mdlle. Tietjens has actually come back from the same country with renewed vocal beauty and strength, it will be agreed that the cause of frequent non-appearances is not always truly, however conveniently, explained by the state of the barometer.

All who use their voice should, then, guard carefully their general health on rational but not exaggerated principles. While good health is essentially necessary to good voice, it may be said that, as a simple matter of hygiene, practice of the respiratory muscles, on a right method, be it always remembered, such as singing implies, is often of the greatest service in improving the health of the lungs.

The singer should not be afraid of air, but he should avoid

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* I have had analyses made of, I think, every variety of patent voice lozenges. There is not one that does not contain more or less Cayenne pepper or some like irritant, and that is not consequently harmful. I take this opportunity of disavowing any connection with some lozenges bearing the same name as my own. However useful they may be as 'bronchial troches,' they are totally unsuited for voice lozenges.

sudden changes of atmosphere, and also dust. His diet should be liberal, but always of food most easily digested and free from all irritating ingredients. Above all, he should never foster the idea that alcoholic stimulant of any kind is necessary to the exercise of his art any more than it is to that of the painter or the author.*

Remembering how much the abdominal muscles have to do with voice productions, he should sing when the food is digested and the stomach is of least capacity, and therefore least likely to interfere with that of the chest. I would say that an hour and a half to two hours is necessary to elapse after food for singing in public or company, and an interval of at least an hour should occur before practice. In like manner the garments of both male and female singers should be free, especially should they be so about the waist and at the neck.

The voice should be always exercised on notes well within the range of the singer; indeed, it might be said on all grounds that, except on the rarest occasions, the extreme limit of the voice should never be attempted, for it is certain that, not only is it most injurious medically to sing always at full voice, but that the greatest pleasure is given by those voices which seem to have a reserve of power, or, to put it another way, those voices in which the hearer never feels that the mechanism is going to fail. It is for this reason that, as a rule, although tenor and soprano voices elicit most admiration, it is the deeper voices that engender most sympathy.†

It is the musician's rather than the doctor's duty to point out how important a part the brain and heart must play in developing perfect singing. There must be ability to interpret sentiments as to express them; there must be conscience in study as well as talent; there must be power to recognise defects, and perseverance to overcome them. Without such qualifications, however marvellous the natural beauty of the organ, its possessor will be unable to prevent his hearers from feeling that there is '*vox et præterea nil.*'

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* It is impossible to say how much mischief has been done by the absurd accounts of the variety of beverages indispensable to our former great singers. Whatever may have been the practice in the past, such notions as that the drinking of so many bottles of beer or stout per evening will give voice are as obsolete as, I am happy to say, is the idea that no man is a hospitable gentleman who allows his guests to go home sober. I am glad to quote here Mr. Sims Reeves' observations on this point in a letter already referred to:—'I was much interested in the remarks made by you at the meeting of the Musical Association with regard to the use of stimulants. By long experience I find it much better to do without them entirely. A glycerine lozenge is preferable; on very rare occasions a small quantity of claret and water may be necessary, but all alcoholic stimulants are detrimental. I formerly, and for many years, used beef tea, but that was too heavy. If one could limit oneself to a tablespoonful at a time, the latter might be the best; but a large draught clogs the throat, and produces more saliva than is necessary, and induces the desire to swallow often.'

† I regret to say that I have seen not a few instances of good baritone and mezzo-soprano voices utterly ruined by the endeavours of masters to convert them into tenors and soprani.

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