



DR. CHARLES A. GUILMETTE.

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DR. GUILMETTE'S
VOCAL PHYSIOLOGY;
OR,
PROGRESSIVE SYSTEM
FOR THE
SCIENTIFIC EDUCATION
OF
THE HUMAN VOICE.

EDITED BY
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PROPHECY, LETTERS ON THE PROPHETIC SCRIPTURES, LEC-
TURES ON CHRISTIANITY AND INFIDELITY, THE TRACT
ON PREVAILING PRAYER, ETC., ETC.

"Ad *actionis* autem usum atque laudem, maximam sine dubio partem VOX obtinet."
CICERONIS DE ORATORE LIB. III. CAP. LX. § 224.

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INTRODUCTION

BY THE

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THE IMPORTANCE OF THE RHETORICAL ART.

AMONG the illustrious men of Europe who have written, during the nineteenth century, on the mechanism and diseases of the human voice, are Colombat De L'Isère, founder of the Orthophonic Institute at Paris, and François Bennati, Physician of the Italian Theatre in that city.* Each of these

* Bennati was born at Mantua, in 1788, and died at Paris on the 10th of March, 1834. See the *Nouvelle Biographie Générale*. Paris, 1855. Tome Cinquième, p. 367, Art. *Bennati*.

For biographical sketches of *Colombat De L'Isère* see the *New American Cyclopædia*, published by D. Appleton & Co.,

great men gained a prize for the labor of his brain, and each was eminently successful in the practice of his profession. Bennati, himself a vocalist as well as a physiologist, restored the voice to its healthy functions in many instances of *aphonia*, and other maladies;* and Colombat De L'Isère from November, 1827, to April, 1840, out of six hundred and eighty-three cases of all sorts of defects of speech, gave permanent relief in five hundred and twenty-four.†

New-York, 1859. Vol. 5, p. 485: also Pierer's *Universal Lexikon*, (a work in the German language,) Altenburg, 1850. Vol. 4, p. 171. Art. Colombat De L'Isère.

These books containing the notices of Colombat and Bennati, as above, will be found in the New-York Mercantile Library. There is another notice of Colombat De L'Isère in the *Conversations-Lexikon* (German) Leipsic, 1852. Vol. 4, p. 296.

* See Bennati's "*Recherches Sur Les Maladies qui affectent les organes de la voix humaine.*" Pp. 59-112. Paris, 1832.

† See the tabular statement annexed to the second volume of Colombat De L'Isère's great work: "*Traité de tous les vices de la parole, et en particulier du bégaiement, ou Recherches*

In England there have been various works on the vocal organs, and their treatment, both in health and disease. It will be sufficient to enumerate Gardiner's Music of Nature, Vandenhoff's Elocution, Bishop on the Impediments of Speech, Urling on Vocal Gymnastics, Hunt on Stammering, and on the Philosophy of the Voice, etc., Charles W. Smith's pamphlet on "Reading, Speaking, and Action," Dr. Mackness on "*Dysphonia Clericorum*,"* and the chapters on Clergymen's sore throat, in Dr. Fenwick on "the causes and prevention of diseases."

In our own country we have had Rush, and Russell, and Barber, and Bronson, and Comstock, and Sargent, and Mandeville, and others, in whose works, as in those published

theoriques et pratiques sur L'Orthophonie." Troisième Edition. Paris, 1840.

The author of the above work received from the Royal Academy of Sciences, a prize of five thousand francs.

* Clergymen's Difficulty of Voice.

in England and France, will be found much valuable information respecting the human voice.

But after all that has been done, the field is not yet exhausted. Vocal diseases seem of late to have rapidly increased; and both in public and private life many are those whose comfort and usefulness have been more or less impaired by these insidious maladies.

In the city of New-York, Dr. Charles Alexander Guilmette has gained an enviable celebrity, not only by his great theoretical knowledge of the voice, but also by the application of that knowledge to the development of the respiratory and vocal mechanisms. Second to none as a professional singer, and remarkably skillful in the treatment of vocal diseases, he has already succeeded in awakening, to a considerable extent, the attention of the public to the physiological cultivation of organic elocution.

Having, while an inmate of Dr. Guilmette's family for more than six months, enjoyed unusual opportunities for becoming acquainted with his progressive method for the education of the human voice, I have here attempted, with his sanction, to unfold it.

This great system has been brought to the test of actual experiment in the training of his own voice, and in the advantage received by those who have availed themselves of his instructions. It needs no recommendation from me. It stands on its own merits. The diligent student has only to practise faithfully, judiciously, and perseveringly, the respiratory and vocal exercises here set forth, and, perhaps to his own surprise and that of his friends, he will soon have, in the invigoration of his health and the improvement of his voice, demonstrative evidence of its truth.

I have taken some pains to examine the best English, American, and French writers on the human voice, and I hazard little by

the assertion that there will not be found in any of them, within the same compass, as great an amount of useful, practical information, in regard to the scientific training of the respiratory and vocal organs, as Dr. Guilmette imparts orally to his pupils in that course of lessons on vocal physiology which is embodied in the present work.

And is not the subject one of the very highest importance? The sad deficiencies of a large proportion even of educated men, in respect to vocal culture, is a matter of daily observation. The same training, essentially, is necessary to make a good elocutionist, as to make a good singer; and yet years are devoted to music under the best and most celebrated professors, while the occasional reading or recitation of a piece of prose or poetry, at school or college, is too often practically regarded as sufficient to make an accomplished orator.

Not so thought the great masters of the

rhetorical art at Athens and Rome. Day after day, and year after year they devoted themselves to its most assiduous cultivation. We learn from Quintilian a fact which he relates on the authority of Cicero, that "Caius Gracchus, in deploring his brother's death, excited the tears of the whole Roman people."* In the third book "*de oratore*," Cicero records the words of Gracchus, and says that such was the effect of his delivery "in the eyes, the voice, the gesture, that his enemies could not refrain from tears"—"occulis, voce, gestu, inimici ut lacrimas tenere non possent."†

When Æschines, after his unsuccessful prosecution, nominally of Ctesiphon, but really of Demosthenes, was banished to

* "*Eādem* [by the same, that is, actione, by action, delivery,] C. Gracchum, in deflenda fratris nece, totius populi Romani lacrimas concitasse." Quintiliani Institutionis Oratoriæ Lib. xi. Cap. iii. § 8.

† *De Oratore* Lib. iii. Cap. lvi. § 214.

Rhodes, he read to his pupils the great oration of his eloquent antagonist; and when his audience expressed their unqualified admiration, what would you have thought of it, said he, had you heard him deliver it himself?

Accordingly, notwithstanding the indefatigable pains which the orators of antiquity were accustomed to take with the subject matter of their discourses, in the selection and arrangement both of the topics and the words, they regarded delivery as of supreme and paramount importance. This was what they meant by "*action*," when they assigned to it the first, second, and third place in eloquence. For, when Cicero, following in the track of Demosthenes, took this view of the subject, he employed the Latin word "*actio*" (*action*) to signify not merely gesture, but precisely what we mean by "*delivery*." He says, in his treatise entitled "*Orator*" and addressed to Marcus Brutus,—"*For action is,*

as it were, *a certain eloquence of the body*, since it consists of voice and motion.”—“Est enim *actio* (action, that is, delivery) quasi *corporis quædam eloquentia* quum constet e voce atque motu.”* In the third book of his work “*de Oratore*,” he says—“But as to the effectiveness and excellence of *action*, THE VOICE doubtless has the chief rank.”—“Ad *actionis* autem usum atque laudem, maximam sine dubio partem VOX obtinet.”† In this he is followed by Quintilian, who says—“By most persons PRONUNCIATION, (that is, delivery) is called *actio*”—“PRONUNTIATIO, a plerisque, *actio* dicitur”—and, after citing the opinion of Cicero, he adds—“one may use either term indiscriminately”—“*utraque appellatione indifferenter uti licet.*”‡

Thus we see that Demosthenes and Cicero and Quintilian, all regarded *action*, or *delivery*

* M. Tullii Ciceronis ad M. Brutum Orator. Cap. xvii. § 55.

† Ciceronis de Oratore Lib. iii. Cap. lx. § 224.

‡ Quintil. Institutionis Orat. Lib. xi. Cap. iii. § 1.

—including in this term the voice, the look, the gesture, “*oculis, voce, gestu,*”* in short, the complete and perfect transcript of thought and passion—as the chief constituent of eloquence. This is, unquestionably, the practical common sense view which has been unconsciously taken by the great mass of mankind in all ages of the world.

But with all our modern discoveries in science—our steamboats, our locomotives, our electric telegraphs, and our chemistry of the sunbeam—we are probably (at least, as it respects effective public speaking,) far behind the ancients in the cultivation of the human voice. And yet there never was a finer field in the world for the successful employment of eloquence than in these United States of America. In the primary assemblies of the people, in the halls of legislation, in our schools, colleges and lyceums, at the bar and in the pulpit, other things being equal, elo-

* *Ciceronis de Oratore Lib. iii. Cap. lvi. § 214.*

quence is emphatically the grand road to the highest honors and the most extensive usefulness.

But alas! how often do we find men of the greatest attainments in literature and science, either wholly or partially disabled by vocal disease; for God's government, in the physical as well as in the moral world, is a government of law, and he who transgresses must abide the penalty.

The clergy—a class of men who occupy the most useful and the most exalted of all professions, who have a higher office than any earthly prince or potentate can give them, that of ambassadors for Christ, and who, in many respects, are the leaders of public opinion—are by no means exempt from this deficiency.

The experience of twenty-three years in the ministry of the gospel—during the earlier part of which, I was a Professor in one of the Theological Seminaries of the Protestant

Episcopal Church—and the opportunities for observation in the East and in the West, at the North and at the South, have only strengthened my convictions that the whole science of elocution is far from receiving, in the course of a liberal education, the high place to which it is justly entitled.

Our young men, after devoting years of hard study to Latin and Greek, and mathematics, and other branches of polite learning, complete their preparatory professional studies, and enter on the great business of their lives—perhaps in the public preaching of the gospel—with little or no acquaintance with vocal physiology; and unless they have been previously trained to use their respiratory and vocal organs in a healthy and natural manner, and have strengthened them by this practical discipline, the amount of labor which those organs are required to perform is ruinous to the mechanism of the human voice.

The result is, in a multitude of cases, that

men who might be exceedingly useful in the active duties of the ministry—to say nothing of our temples of science, our courts of justice, and all the arenas of popular debate—break down prematurely with pharyngitis or some other variety of vocal disability, partial or total, drop into an untimely grave, or lose years of their valuable lives in seeking the restoration of health.

With the finest of all themes on which to expatiate—the attributes and government of God and the corresponding relations of man—no class of public readers and speakers ought to be so eloquent as the clergy; and yet how often are they justly subject to the reproach of the tragedian, that the minister of Christ delivers truth as if it were fiction, while the actor proclaims fiction as if it were truth. The one preaches his audience to sleep; the other charms and electrifies them by the melody of his intonations, and the intensity with which he identifies himself with

the character, the circumstances, and the passion he is representing.

It has sometimes been objected to the study of elocution, that it is fitted to make artificial readers and speakers. As well might one object to the study of navigation, as fitted to make artificial sailors; or of music to make artificial singers; or of grammar and rhetoric to make artificial composers. Nature without instruction too often degenerates. We see this in the slovenly walk and the stooping attitude of those who have not been properly trained. The reverse we witness in the erect carriage and the firm step of the disciplined soldier. Nor must it be inferred from this that the orator is obliged, during the progress of his discourse, to chain down the soaring energies of his genius, by reverting in his mind to the rules and technicalities either of grammar, or rhetoric, or parliamentary action. That was a part of his preliminary training: it has become in-

woven, as it were, with the very texture of his soul: and, while pouring forth the flood of thought and feeling, he no more stops to think of etymology, and syntax, and prosody, and inflection, and emphasis, and intonation, than the accomplished musician, whose fingers move like lightning over the keys of the piano, stops to think of his elementary solfège amid the applauses of his charmed and delighted hearers.

The orator, like the musician, has previously had the requisite discipline. He surrenders to the thought that is stirring up the innermost depths of his own spirit; he gives involuntarily the practical embodiment to that thought in every look and motion; his voice instinctively assumes the requisite intonation and inflection; and, while retaining his own self-possession and the command of his audience, he first binds them with a spell, and then carries them, where he will, by the irresistible prowess of a cultivated elocution.

It was thus that Demosthenes, when the destinies of his country were trembling in the balance, waked up the mighty heart of the fierce democracy of Athens, and overwhelmed his antagonists by "arguments red hot with passion." The vast multitude were moved, as the forest by the rushing tornado, and with one voice they exclaimed: "Let us march against Philip."

But to return to the work now presented to the public: its object is to give some useful hints to all classes of men—and more especially to the clergy—as it regards the development and physiological use of the respiratory and vocal organs.

Dr. Guilmette's progressive system, for the scientific education of that part of the human mechanism, is founded upon nature; and the revelations of nature are but the voice of God echoing back the declarations of his word.

We are told on high authority that "the

blood is the life," (Deut. 12 : 23,) but what is it that gives life to the blood? The air that we breathe; and accordingly one of the first things that God did, after creating the body of man, was to put breath into it. In the language of the sacred oracles: "The Lord God formed man of the dust of the ground, and *breathed into his nostrils* THE BREATH OF LIFE; and man became a living soul." (Gen. 2 : 7.)

Now one of the leading principles, to which great prominence is given in Dr. Guilmette's system, is that *voice proper is breath converted into sound*; and that *the diaphragm, the principal muscle of respiration*, is the grand agent to propel the vocal pulmonic stream.

Hence, other things being equal, the more breath one has, and the more diaphragmatic strength, so much the more power of voice.

The agency of the diaphragm in respiration was strikingly illustrated at the Bellevue

Hospital, in the practice of an eminent New-York physician, Professor Fordyce Barker, M.D.

It was in the case of a woman, who died from difficulty of breathing. Dr. Barker, after careful investigation, had affirmed that the diaphragm was completely blocked up against the lungs, and had no space to perform its appropriate functions.* The *post mortem* examination showed the accuracy of his diagnosis.

But although the diaphragm is the *principal* muscle of respiration, the abdominal, dorsal, pectoral, and costal muscles, are auxiliaries; and in the opinion of Dr. Guilmette, if one of the attendants had alternately pressed and relaxed the ribs of the patient, there might have been kept in

* This obstruction to the diaphragm occurred during the last stages of gestation, and was caused by extreme distension of one of the chief organs of the abdominal viscera.

the body breath enough to prolong its life until relief could be afforded by a surgical operation. The physician left the room, for a moment, to get the requisite instrument; but when he returned, the woman was dead.*

Of the *vocal cord theory*, which has been so extensively prevalent, we find the following important account in Colombat De L'Isère's valuable treatise on the diseases and hygiene of the organs of the voice.

“ In 1742 *Ferrein* decided that the larynx was an instrument with strings, and compared it to a violin. This opinion made

* On the 30th of May, 1860, I addressed a note to Professor Barker, enclosing the above statement of the case at the Bellevue Hospital, and the next morning received the following answer, containing his voucher for the accuracy of that statement, and his kind permission for its publication :

DEAR SIR: I have only time to say that I believe the statement of facts to be correct, and I have no objection to its being published. Very truly yours,

FORDYCE BARKER.

Rev. EDWARD WINTHROP.

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much noise at the time, and received an almost general assent, which it was certainly very far from deserving. This learned man compared the ligaments of the glottis to the strings of a violin, and gave them the name of *vocal cords*. The current of air was the bow; the thyroid cartilages, the points of support; the arytenoid, the pegs; and finally the muscles which are inserted in them, the powers designed to stretch or relax the cords.”*

* “En 1742, *Ferrein* voulut que le larynx fût un instrument à cordes, et le compara à un violon. Cette opinion fit alors beaucoup de bruit, et reçut un assentiment presque général, qu'elle était certainement bien loin de mériter. Ce savant comparait les ligamens de la glotte aux cordes d'un violon, et leur donna le nom de *cordes vocales*. Le courant d'air était l'archet; les cartilages thyroïdes, les points d'appui; les arythénoïdes, les chevilles; et enfin les muscles qui s'y insèrent, les puissances destinées à tendre ou à relâcher les cordes.”

Maladies de la voix, par Colombat De L'Isère. Paris, 1834. 8vo, pp. 50, 51.

J. F. W. Lane, M.D., has translated the greater part of this work into English. The first edition of his translation, (A.D.

With the great Colombat De L'Isère, Dr. Guilmette discards the theory that voice proper is produced by the so-called vocal cords. This theory may be disproved by actual experiment: for one may bring into full play all the vocal muscles, and direct the pulmonic stream with the utmost force possible against the vocal ligaments, and yet at the same time so entirely suspend the voice proper, that, from the lowest to the highest intonation, nothing shall be heard but a whisper, whether percussive or prolonged. This, most assuredly, would not be so, if the larynx were an instrument with musical strings, and the vocal ligaments, when swept by the current of air, were analogous to the cords of a violin.

The theory is also extremely pernicious, for it has a tendency to bring on physical

1845,) was published by Otis, Broaders & Co. Boston, 1 vol. 18mo. The second edition, (A.D. 1857,) was by Redding & Co., No. 3 State street, Boston, 18mo.

disease by concentrating the mind on the throat, *instead of fixing it on the diaphragm as the grand propelling agent.*

According to Dr. Guilmette's philosophy of the voice, the breath, rendered vocal, is expelled from its reservoirs, the lungs, by the diaphragm and auxiliary muscles. It then traverses the entire isthmus of the throat, namely, the bronchi and the trachea, and after passing the laryngeal chamber is accumulated in the concavity of the epi-glottis or valve of the larynx proper. This pulmonic stream—which, from its first point of departure, that is, from its very starting-point in the lungs, has been made vocal by the mucous membranes under the influence of those nerves from which they derive their mobility and sensibility—is next radiated by the epi-glottis to the posterior wall of the pharynx; proceeds to the soft veil of the palate; and, finally, passes over the entire surface of the chamber of the mouth, and

issues through the lips, if the latter be open, or if they be closed, the column is driven into the nasal cavities, till it finds its exit, after reverberating, more or less, over every sinus of the face and skull.

Agreeably to this philosophy, while one is speaking or singing, there should be comparatively but little muscular action of the throat, no more than is absolutely necessary for intonation, that is, for the production of acute or grave sounds; the trunk should be erect; the shoulders thrown back; the neck straight and uncompressed, and if turned either to the right or left, the body also should be turned at the same time, and in the same direction, so as to avoid stricture of the vocal tube; the anterior wall of the chest should be elevated; the ribs expanded; the lungs well supplied with air; the upper and lower jaw sufficiently separated from each other, in order to prevent the sound from becoming nasal; the vowels carefully

moulded ; the consonants distinctly articulated ; free play given to the diaphragm ; and the apex of the vocal stream so directed as to skim gently over the soft palate, strike with its force against the hard roof of the mouth, and reverberate to the very orifice of the lips.

Thus we return to nature : and the throat receives no more injury, in its strictly physiological or healthy use, than the pipe of a bellows from a steady column of air.

Let these principles of vocalization be thoroughly carried out, and the general laws of hygiene at the same time faithfully observed, and we shall hear less of sore throats, inflamed lungs, diseased stomachs, paralyzed nerves, and disabled voices. Public speaking will be an agreeable exercise to those who are properly trained, and will conduce to their vigorous health.

EDWARD WINTHROP.

June 2nd, 1860.

CHAPTER I.

THE RESPIRATORY AND VOCAL MECHANISMS.

What is Voice?

Voice is breath made vocal or phonetic : in other words, *voice is breath converted into sound*. Therefore, other things being equal, the more breath one has, the more voice, and the less breath, the less voice.

What are the reservoirs in which the breath is contained?

These are called *the lungs*, and are suspended within the right and left cavities of the *thorax* or chest by the *wind-pipe*, which is bifurcated inferiorly, its two branches being named *bronchi*. The substance of the lungs

is very soft and elastic, and thus they are capable of great dilatation and compression.

How many air-cells in the entire chambers of the lungs?

The almost incredible number of six hundred millions, the aggregate surface of which is equal to about twenty times the exterior surface of the human body.

Can the number and size of the air-cells be increased?

The *number* of the air-cells can not be increased, any more than the number of the eyes: but their *size* may be very much increased. In most persons, a vast multitude of these cells remains undeveloped.

Is exercise in the open air beneficial to the lungs?

Most assuredly: for it expands the lungs: while, on the other hand, the confinement of a person to his bed, for three or four days, will shrink them up to half their volume.

Can a person with a very small and contracted chest have large lungs ?

Not while the chest remains thus small and contracted, for in that case the lungs have not room for their full development.

Does it, therefore, follow that every person with a large chest has large lungs ?

Certainly not. The thorax or chest is the respiratory chamber or apartment in which the lungs are contained. It is the house in which they live, and move, and have their being. Now an apartment may be large, and yet its occupants small. A house may be large, while its tenants are dwarfs and pygmies. Or to change the figure: the exterior shell of a nut may be large, and firm, and strong, while, at the same time, the kernel within is shrunk and withered. So in regard to the lungs.

What would you infer from this, as to dumb-bells ?

Those who rely exclusively on dumb-bells

for the development of the lungs will find themselves miserably disappointed. They may thus increase the circumference of the respiratory chamber, but if they would develop the lungs to the utmost, THEY MUST BREATHE *artistically* and *systematically*.

What effect has position on the lungs?

In a sitting position one loses from ten to fifteen cubic inches of lung capacity: in a recumbent supine position, (that is, lying on one's back,) from twenty to thirty-five inches: in a recumbent prone position, from forty to fifty inches: and when the body is doubled up, as when one doubles or folds a sheet of paper, the lungs lose about one half their capacity. Erect position, therefore, is every thing for the full and healthy play of the lungs.

What effect is produced upon the blood by the reception of pure atmospheric air into the lungs?

The blood is thus vitalized, and fitted to

subserve its various purposes in the animal economy. The vitality of the external tissues, however, is dependent not immediately and directly on the lungs, but on the air which is taken up by the capillaries. No matter how large a man's lungs might be, if his skin were varnished, he would suffer very much and soon die. If we were constituted like the feathered songsters, who breathe through every plume, we should have a voice equal to that of fifty stentors.

Should the air have free access to the neck as well as to the lungs?

If you want to retain a healthy voice, never keep the neck tightly and closely covered. Let the air circulate freely around it, in order that the skin may become as hard as possible: for such is the natural effect of exposing even delicate tissues to the air, as might be illustrated by numerous cases in surgery.

What is the passage through which the air

has its ingress and egress to and from the lungs ?

It is a tube which may be considered as divided into three parts. First, we have the *larynx* or human whistle ; next, the *trachea* or wind-pipe proper, composed chiefly of cartilaginous rings situated one above the other, and which are incomplete behind, their ends being connected by a membrane which forms the posterior part of that portion of the tube ; and thirdly, the two branches into which the wind-pipe divides itself from the lower extremity, and which are called *bronchi*, and composed of fine cartilage.

To what is the larynx attached at its upper extremity ?

It is attached to the hyoid bone, and connects itself with the tongue, and is consequently affected more or less by the movements of that organ.

What are the cartilages of the larynx ?

The cartilages *proper* of the larynx, as given by anatomists generally, are four in number, the thyroid, cricoid, and two arytenoid. There are other minor cartilages termed *corniculated*, from the Latin *corniculum*, which means *a little horn*. The office of the corniculated cartilages has not been satisfactorily discussed or explained by either ancient or modern physiologists.

Dr. Guilmette positively asserts, from experiment and observation, that the office of the *cornua* (horns) situated upon the upper surface of the hyoid bone, (a bone which lies at the base of the tongue, and immediately above the walls of the larynx proper,) is to serve as a martingale to the contractile functioning of the tongue; and that the office of the *cornua* on the upper surface of the arytenoid cartilages is to aid and regulate these same cartilages in the lengthening, shortening, and fixing of the thyro-arytenoid ligaments.

What do you mean when you say that the cornua on the upper surface of the hyoid bone serve as a martingale to the contractile functioning of the tongue?

Those cornua secure the tongue more strongly to that bone, and prevent the fibres of the base of the tongue from too great a contraction laterally, while we are contracting the apex of the tongue for the articulation of consonants. Were it not for this arrangement we should incur the danger of closing the laryngeal orifice more than it ought to be, and of thereby producing a constricted sound, as in persons of acute voices frequently happens notwithstanding this provision of nature, because of their directing the mind to the upper part of the larynx, and contracting it when there is no necessity. The sound from this contraction constitutes what is commonly called "the throat tone."

Whence are derived the names *thyroid*, *cricoid*, and *arytenoid*?

From the Greek language. The word *thyroid* signifies having the shape of a shield, the word *cricoid*, having the shape of a ring, and the word *arytenoid*, having the shape of a ewer, pitcher, funnel, or ladle. These cartilages of the larynx were evidently thus named from their supposed resemblance to such objects.

Where is the thyroid cartilage situated ?

It is situated at the anterior part of the larynx, and is the largest of all the cartilages of that organ. In fact, it forms almost the entire front wall of the larynx, and that projection in the neck which is commonly called *Adam's apple*.

Where is the cricoid cartilage situated ?

At the lower part of the larynx. Being in the shape of a ring, as its name indicates, it is united by its upper edge to the inferior borders of the thyroid and arytenoid cartilages. Its lower edge is attached to the first ring of the trachea.

Where are the two arytenoid cartilages situated?

They are united by their anterior edges to the posterior borders of the thyroid, and are situated behind the thyroid and above the posterior part of the cricoid.

With what is the larynx lined?

It is lined with a delicate substance called the mucous membrane, the continuation of which is the lining also of many other vital organs of the human body.

By what is the larynx moved?

By certain organs called the vocal muscles, of which it is unnecessary here to speak particularly, but which are described with more or less minuteness in the leading works on anatomy.

What is the glottis?

It is a small oblong fissure situated at the upper part of the larynx. Its superior and inferior lips have been styled the *chordæ vocales*, vocal cords.

Which are the vocal cords proper ?

The inferior or lower ones.

What is the more appropriate name of these inferior or lower vocal cords ?

They are more appropriately styled the *thyro-arytenoid ligaments*, and derive their appellation from the organs to which they are attached.

To what *are* these ligaments attached ?

They are attached anteriorly to the thyroid cartilage, and posteriorly to the superior edges of the arytenoid cartilages.

How are the superior vocal cords formed ?

They are formed by a membranous fold of the larynx, and of the epi-glottis on either side of its base.

This laryngo-epiglottidean fold always exists more or less when the vocal organs are in a passive state: but in persons whose voices have been thoroughly educated, this membranous fold, when the current of air is driven through the larynx with great force, becomes

a mere extension of the epi-glottis, increasing its length.

What are the ventricles of the larynx ?

Two small cavities or chambers forming recesses, as it were, in the opposite walls of the larynx, and situated between the upper and lower vocal cords.

What is the office or use of the *thyro-arytenoid ligaments* or lower vocal cords ?

They hold the larynx firmly in whatever position it may assume favorable to the production of acute or grave sounds. The larynx takes the proper position, and then these vocal ligaments accommodate themselves to that position, and hold the larynx in it.

What is the common theory in regard to the vocal office of these ligaments or cords ?

The prevalent opinion has been that they give *vocality* to the breath—that is, convert it into sound. These ligaments were supposed to perform the office of *musical strings*, like the cords of a violin ; and certain muscles

were regarded as the *tuning* power by which they were stretched or relaxed at will.

This theory—certainly in England and in the United States of America—has been quite popular, has been received without much examination, and has found favor with many physicians. You can take up scarcely an English or an American work on the human voice without finding it gratuitously assumed.

When and by whom was it first promulgated?

In 1742, by Ferrein, an eminent French anatomist and surgeon.

Has it fallen into some disrepute in France, the country where it originated?

If we may rely on the authority of Colombat De L'Isère, we should infer that such was the fact: for he says that "physiologists and especially modern naturalists have had reason to reject the theory of *Ferrein*, and to cease to

regard the larynx as an instrument with strings.”*

Can the common vocal cord theory be disproved by actual experiment?

Most unquestionably. Dr. Guilmette, in the presence of leading medical men in the city of New-York, and before a large audience, has brought into full play all his vocal muscles, and directed the pulmonic stream with the utmost force possible against the vocal ligaments, functioning them to the utmost of their ability, and yet, during this exercise, has so entirely suspended the voice proper, that nothing has been heard but a whisper from the lowest to the highest notes.

What fact has often been noticed in regard to the mucous membranes?

* “Les physiologistes, et surtout les physiciens modernes ont donc eu raison de rejeter la théorie de *Ferrein*, et de cesser de regarder le larynx comme un instrument à cordes.” (Maladies de la voix par Colombat De L'Isère. 8vo, Paris, 1834, p. 51.)

If the mucous membranes with their attendant nerves are in a perfectly healthy state, we have a clear resonant voice. If those membranes be inflamed or relaxed, the voice is immediately affected.

Hence, what follows on disproving the vocal cord theory?

The vocal cord theory being disproved, there seems strong reason to believe that *the mucous membranes, under the influence of those nerves from which they derive their mobility and sensibility, produce the simple voice proper.*

Where does this vocality commence?

It commences, in all probability, from the very first point where the pulmonic stream proceeds from the lungs, and continues and is increased according to the amount of membranous surface which is physiologically contracted, till that stream makes its final exit at the lips.

Who originated this theory respecting the mucous membranes?

Dr. Guilmette claims it as an original discovery of his own.

What is the epi-glottis ?

It is a fibro-cartilaginous valve placed at the superior part of the larynx, and fixed to the upper border of the thyroid cartilage, behind the base of the tongue. It is sometimes regarded as one of the cartilages of the larynx. It is, however, a part of the larynx, only in the same sense in which the cover, that is fastened to the top of a silver cup, is a part of that utensil. The Greek preposition *epi* means *upon*, and hence the name *epi-glottis* signifies *upon* the glottis. It is situated immediately above the superior laryngeal orifice formed by the laryngo-epiglottidean fold already noticed.

Except when we are engaged in the act of swallowing, the epi-glottis always remains raised, so as to leave the larynx open for respiration.

What, then, is its office ?

It serves as a valve which, by closing the upper orifice of the larynx during deglutition, prevents the introduction of articles of food and drink into the air-passages. It also acts by its concave surface, as a reflector to radiate the sounds which issue from the glottis. If there be no epi-glottis, the vocal column ascends in a straight line until it meets the dome of the pharynx, and is thence driven behind the soft palate into the nasal chambers.

The epi-glottis, however, is not absolutely indispensable to deglutition, for even when this organ has been entirely destroyed by disease, the larynx, as nature often does in other emergencies, accommodates itself to the circumstances.

What are the other principal vocal organs?

The pharynx or back part of the mouth, the veil of the palate, the uvula, the tonsils, the palatine arch, the nasal cavities, the maxillary sinuses, the lips, the jaws, the tongue, the

teeth, the cheeks, the buccal chamber, and the diaphragm.

What is the pharynx?

The pharynx or back part of the mouth is a large muscular bag or pouch having seven *foramina*,* namely, the Œsophagus or tube through which we swallow food, the larynx, the buccal cavity, or chamber between the cheeks, the two nasal chambers, and the two Eustachian tubes communicating with the drum of the ear.

It is a portion of the superior part of the vocal instrument, and receives the column of air after it has passed through the larynx and been radiated by the epi-glottis.

What is the veil of the palate, or, as it is frequently called, the soft palate?

It is a movable, soft, and broad curtain attached to the posterior extremity of the palatine arch, and separating the anterior portion

* *Foramina*, that is, orifices, openings, or holes.

of the mouth from the pharynx. In other words, the soft palate is a continuation of the arched roof of the mouth, and is composed of two folds of membranous tissue. It is consequently an extension of the sounding-board or reverberating surface.

In grave voices, that is, in voices having a bass register, it is situated closer to the posterior wall of the pharynx than in acute voices. The reason of this is, that in grave voices the larynx being situated lower in the neck, the vocal radii, after having been accumulated by the concavity of the epi-glottis, would (even if the lips and jaws were well opened) pass into the nasal chambers, unless the soft palate were further in advance in the mouth. But the fact that such is its situation, its edges hugging closely the posterior wall of the pharynx, prevents the escape of the voice into the nasal cavities, and drives it forwards into the buccal chamber.

Can an artificial soft palate be constructed

and fitted in the mouth, when a person has been born destitute of this important organ?

Such a case occurred in April, 1860, in the practice of an accomplished dentist in the city of New-York.

A lady from one of the Southern States, who was born without a soft palate, had placed herself under his care. The case was a very remarkable one, inasmuch as the hard palate or arched roof of the mouth was cleft through to the anterior process of the upper jaw, in other words, to that part of the jaw where the front teeth are inserted—no soft palate existing, and the fissure so wide as to prevent the uniting of its edges by the surgical operation termed *Staphyloraphy*. In consequence of this malformation, not only was the voice prevented from passing into the chamber of the mouth because of the entire absence of the soft palate, but the patient was frequently annoyed by the passage of food and liquid into the chambers of the nose. The eminent

dentist, who had charge of the case, easily conceived the idea that the fissure might be closed by means of an artificial palate, but the great difficulty was to make a *soft* palate that would attach itself closely to the soft parts of the anterior walls of the throat, and perform its functions so as to prevent not only the passage of the voice into the nasal chambers, but also the regurgitation of food.

After consulting with Dr. Guilmette concerning the action of the soft parts of the throat, during deglutition and the production of voice, and after having received the assurance that an artificial *velum* might be made continuous with the hard palate, he constructed one so delicate in its form and substance that the adjacent organs were easily educated to bear the presence of this foreign body. It was made of vulcanized india-rubber; it fitted admirably in the chamber of the mouth, and firmly retained its position. The

lady could take it out, and re-adjust it at her own pleasure.

The editor of this work had the satisfaction to see her on the morning of the 26th of April, 1860, and to examine the natural conformation of her mouth, and also the artificial soft palate, both when out of the mouth and likewise after it was adjusted. It was one of the most remarkable pieces of mechanism that could have been constructed, and will always attest the skill of the artist.

This case was particularly interesting in its relations to vocal physiology, as it furnished a practical illustration of the fact that, in the absence of the soft palate, the voice is necessarily driven up into the nasal chambers, and hurried onwards till it finds its exit at the nostrils.

What extraordinary case, connected with the structure and action of the soft palate, occurred in the practice of Dr. Guilmette ?

A well-known professional singer in the city of New-York, aged about twenty-four, in possession of a beautiful treble voice, capable of executing melodies written for a soprano, extending as far as C in alt, came to Dr. Guilmette for vocal instruction.

This young man's voice, though of such wonderful compass, was at that time purely pharyngeal, that is, it was what is called the *false* *falsetto*, or, as Colombat De L'Isère more correctly styles it, the *faucette* voice.

On examining his vocal organs, Dr. Guilmette found that they all presented the appearance of marked health and freshness, particularly the soft parts of the throat. The organs were all situated as they should be, with this slight exception, that the position of the larynx was even higher than in the ordinary soprani, and its anterior conformation was not that which usually pertains to a voice of such remarkable acuteness.

This fact led Dr. Guilmette to examine

more closely the position and action of the principal stays that hold up the larynx in the throat, namely, the anterior pillars of the soft palate. He found their traction on the larynx to be very great, consequent on their unusual shortness, thickness, and hardness.

From this state of things he became satisfied that a slight transverse incision into the anterior pillars of the soft palate, on a line with the base of the tongue, would cause the larynx to drop, although but a little, yet sufficiently to enable it to work favorably to the production of a register of intonations pertaining to itself. After convincing his friend of the simplicity of the operation as well as its safety, Dr. Guilmette obtained his consent to perform it. This was done, and was attended with very little hemorrhage. The only disagreeable feeling which the patient experienced after the operation—to use his own language—was a sensation like

that of something in his throat, which he wished to swallow, but could not.

Dr. Guilmette requested him to use his voice as little as possible, and not to attempt to sing for at least two months, and for the first three days, to speak on a monotone, such as would not oblige the larynx to change too frequently.

The result was that, at the end of six weeks, he came to Dr. Guilmette in great glee, announcing the fact that his voice was changing. This was indeed the case. The character of the voice then resembled very much that which we find in youths arriving at the age of adolescence.

Dr. G. strongly insisted on the necessity of his remaining quiet for some time longer. A year has passed away, and now (A.D. 1860) he is in possession of a voice which is as beautiful and true a tenore-contraltino as Dr. Guilmette ever heard in his life.

What is the uvula ?

An appendix or prolongation of the soft palate, hanging down in the shape of an inverted cone.

The excision of the uvula should never be resorted to, except in extreme disease and when all other means have failed to reduce it.

What are the tonsils ?

They are two almond-shaped glands situated between the pillars of the soft palate, one of these pillars being attached to the posterior wall of the pharynx, and the other to the base of the tongue.

What is the office or use of the tonsils ?

They secrete a viscid mucus which mixes with the food during mastication, and is necessary to the healthy lubrication of the adjacent organs.

What is the palatine arch ?

It is the hard roof of the mouth, and, with the cavities of the nose and the maxillary sinuses, forms part of the reverberating surface.

What are the maxillary sinuses?

They are those cavities in the anterior part of the head, which are formed by the jaw, and whose office has just been mentioned.

What is the vocal office of the lips, jaws, tongue, teeth and cheeks?

This question will be answered more particularly in a future chapter, when we treat of the moulding of the vowels and the articulation of the consonants. It is sufficient, at present, to say that they modify the voice proper as it issues from the buccal chamber.

What is the buccal chamber?

It is the cavity which is bounded laterally by the cheeks, and hence its name, * superiorly by the roof of the mouth, posteriorly by the back wall of the pharynx, and anteriorly by the lips.

The conformation of the buccal chamber is one of the grand characteristics which distin-

* From the Latin word *bucca*, which means *cheek*.

guishes the physical organization of man from that of the lower orders of the creation. According to Dr. Guilmette, the imperfection of its anterior part in brutes is what precludes them from the faculty of speech.

What is the principal muscle of respiration, and the grand agent in propelling the vocal pulmonic stream?

The diaphragm, which is the flooring of the lungs and the ceiling of the abdomen. The concave base of each lung rests upon it during tranquil breathing; and the inferior surface of the diaphragm lies over almost the entire surface of the liver, which rests sluggishly on the stomach proper. It thus divides the organs of the chest from those of the abdomen, and is in continual motion from the moment we come into the world until we make our final exit.

What is the structure and shape of the diaphragm?

It is tendinous in the centre, thin, almost

circular, unequally convex upwards, and fleshy at its circumference.

To what is it attached?

To the *ensiform* or *xiphoid* cartilage, which terminates the sternum or breast-bone beneath, and derives its appellation from its resemblance to a sword—the terms *ensiform* and *xiphoid* having the same meaning, the one being of Latin and the other of Greek origin.

It is attached also “to the six last ribs, to the *aponeurosis* stretched from the last rib to the transverse *process* of the first lumbar vertebra, and lastly to the bodies of the three or four first lumbar vertebræ.” *

What is meant by the term *aponeurosis*?

“The ancients called every white part *neuron*, (nerve,) and regarded the *Aponeurosis* as a nervous expansion. The *Aponeuroses* are *white shining membranes*, very resisting, and composed of fibres interlaced. Some are con-

* Dunglison.

tinuous with the muscular fibres, and differ only from tendons by their flat form."

What is meant in anatomy by the term *process* in its technical application?

The term *process*, when thus used, denotes the "eminence of a bone—also, any part which seems prolonged beyond other organs with which it is in connection." This is agreeable to its etymology, for the term *process* is evidently equivalent to *that which proceeds from*.

Does the diaphragm *ascend* or *descend* during inspiration?

It first descends, and, after reaching the lowest point, if the inspiration be continued, it finally flattens itself and projects in an outward direction.

What is the movement during expiration?

The diaphragm, during expiration, (if the previous inspiration has been a protracted one,) first recedes or retires inwardly, and then

ascends, thus recovering its natural form of an irregular arch.

By what experiment may the descent of the diaphragm during inspiration, and its ascent during expiration be illustrated?

The following experiment beautifully illustrates these movements of the diaphragm.

Take a glass jar or receiver open at the bottom, and having an orifice at the top through which passes a glass tube connected with a membranous sac (a bladder, for example) suspended in the receiver. Let the construction of the receiver be such that no air can come in from the sides, or from the top, except through the opening at the superior extremity of the glass tube.

This tube represents the wind-pipe: the membranous sac represents the lungs: and the glass jar or receiver the walls of the chest.

Immerse the lower part of the jar in a basin

of water. The water will represent the diaphragm.

On raising the jar a little, which is the same as causing the water (the diaphragm) to descend, the pressure from below being removed, the air from above rushes through the glass tube attached to the neck of the membranous sac, and fills and distends the latter.

On the contrary, when we lower the jar, which is equivalent to causing the water (the diaphragm) to ascend, then the pressure of the water on the external surface of the sac shrivels it up, and thus squeezes out the air which escapes through the glass tube.

The rushing in of the air through the tube (when by raising the jar the pressure of the water against the sac is removed, there being thus a space or vacuum between the water and the sac) corresponds with the act of inspiration in which the diaphragm descends. The escape of the air through the tube, as

above illustrated, corresponds with the act of expiration when the diaphragm rises.

In performing this experiment, what caution should be observed ?

The jar should be raised *very gradually*, so as to fill the sac to its utmost capacity. If we raise the jar suddenly, then the sac will be but imperfectly filled. So during inspiration the air should be sucked in very gradually in order to dilate *the lungs* as much as possible. Sudden, violent and spasmodic efforts will fill them but very imperfectly and partially.

What instrument has been invented by Dr. Guilmette to show the quantity of air which each individual can take into his lungs by diaphragmatic action ?

An instrument called the **INSPIROMETER**.

A glass receiver, on the exterior surface of which is marked a graduated scale of figures, is partially immersed in water. This receiver is open at the bottom so as to admit the water, and has a gutta percha tube connected

with it at the top. The individual gradually sucks in the air through the tube, and during this act of one inspiration the water ascends. When he has finished, it is prevented from descending by turning a valve near the top of the instrument. The number on the graduated scale, corresponding with the upper and level surface of the column of water in the receiver before he commenced breathing through the tube, subtracted from that to which the water has risen, shows the number of cubic inches of air which have been taken into the lungs during one inspiration. Thus if the column of water stood at the number two hundred, and the individual, during a single protracted inspiration, had raised that column to the spot marked three hundred and sixty, then the difference between the two, namely, one hundred and sixty, would show the result. In other words, the power of his diaphragm is shown, in this case, by the fact that, during a

single inspiration, he has taken one hundred and sixty cubic inches of air into his lungs.

How does Dr. Guilmette's Inspirometer differ from the Spirometer invented by the celebrated Dr. Hutchinson of London?

The object of Hutchinson's Spirometer was to show the size of one's lungs by measuring the quantity of air sent forth during *expiration*, but the Inspirometer measures the quantity taken in during *inspiration*.

What advantage has Guilmette's Inspirometer over Hutchinson's Spirometer?

The Spirometer is not a fair test of diaphragmatic power, because, during the ascent of the diaphragm in expiration, it may be very much aided by the auxiliary muscles, whereas, during its descent in inspiration, it receives very little, if any such assistance.

What are the *auxiliary* muscles of respiration?

The abdominal, dorsal, pectoral and lateral muscles.

What benefit do these muscles afford when the action of the diaphragm is arrested?

By means of those muscles the lungs can obtain a certain amount of breath. Even when nothing else can be done, the spine comes to our aid, and by bending the body, and thus curving the spine, we get a sufficiency of breath to sustain life.

Has the diaphragm hitherto received, in popular treatises on the human voice, the attention which it really deserves?

Although all physiologists attach, in their elaborate writings, much importance to the diaphragm, yet they neglect the fact that the physiological use of the voice depends mainly upon the highest educational functioning of this muscle, and that if we have in our midst much *dysphonia clericorum* * as well as *dysphonia cantorum*, † it is because of a generally prevailing ignorance respecting the in-

* Clergymen's vocal difficulty. † Singers' vocal difficulty.

dispensable necessity of a healthy, vigorous, and regular action of this organ, for the most efficient style of speaking and singing.

What is meant by the term *physiological* as applied to the use of any organ?

By the term *physiological*, as thus employed, is meant that which is natural and healthy, in distinction from that which is unnatural and unhealthy, and which is therefore called *pathological*.

What natural phenomena are dependent on the diaphragm?

The natural phenomena of sighing, yawning, coughing, sneezing, laughing, sobbing, crying, hiccoughing, singing, speaking, etc. In fact, not only the functions of the throat and chest, but also those of the abdomen are mainly dependent on this organ: and, when properly educated, it is the chief agent in producing all the dynamic effects pertaining to the voice.

Can one of the lungs be severed without the destruction of human life ?

One of the lungs may be severed, and the man may breathe and live. The wound may cicatrize and be healed.

What would be the effect of severing the diaphragm ?

In that case the man must die. The respiratory chamber ceases to be air-tight, and respiration cannot be properly performed. A few spasmodic gasps, and then life is extinct.

What effect has the temperament on the diaphragm ?

The strength of the diaphragm depends, in a great measure, on the temperament. Hence the man of bilious temperament, even with comparatively small lungs, may be able by means of powerful diaphragmatic descent to take into his air-receivers a larger quantity of breath than the man of nervous temperament though the latter might have larger

lungs and more ample thoracic or chest capacity. The reason of this is, that in the bilious temperament the tissues of the body are coarser and stronger, and the powers of endurance greater. People of nervous temperament have less endurance, and therefore require a greater amount of physical education. The sanguine-*nervous*-bilious temperament is the best for public speakers and singers. Those who have a strong infusion of the *nervous* in their temperament are the orators and poets that electrify the world.

How shall we avoid an improper and unphysiological mode of employing the vocal mechanism ?

Remember that the vocal element is the breath—the lungs, its reservoirs—the throat, the tube through which the pulmonic stream is to pass—and *the diaphragm, the grand propelling agent*. In public speaking or singing, therefore, there should be no perceptible effort in the throat, and until the diaphragm

be thoroughly educated to do its work involuntarily and spontaneously we must concentrate the mind on this very important muscle of respiration, instead of fixing it, as many do, on the abdomen.

How should the column of air be directed?

Its force, if we desire to use a large quantity of voice, should strike against the hard roof of the mouth, and the head of the column be directed forwards to the lips in order to get all the reverberating surface possible. It should also skim gently over the surface of the soft palate to avoid paralyzing that membranous and delicate organ. In other words, there should be no more contraction of the soft parts of the throat during the emission of voice, than is necessary to their physiological functioning for intonation.

How is all this to be accomplished?

As the mind is the engineer that presides over the respiratory and vocal mechanisms, you must accomplish the object by confining

the attention of that engineer entirely to the organ which, at any given moment, is being particularly educated. Learn one thing at a time, and learn it well. You will thus master the whole subject, for the aggregate is made up of the individual units.

If we fail in the first attempt what is to be done ?

“Try—*try again!*” with the full determination to succeed, and the heart thoroughly engaged in the work. We can do almost any thing, if we only think we can, and then, with a calm reliance on the aid of divine Providence, make the effort with all our might.

“Possunt quia posse videntur.”

The eagle who turns his blazing eye to the burning sun builds his nest on the highest cliff of the mountain-top. The man who is always creeping along the mountain's base will never reach its towering summit, or be

rewarded with the most extensive view of the rich and glowing landscape.

In the practical study of vocal physiology, as in other departments of learning, set your standard high. If you do not accomplish all that you wish, you will accomplish much more than if your standard is low. A calm and just estimate of your own powers, accompanied by corresponding aspirations and exertions, until they are crowned with ultimate success, is not necessarily pride, in the bad sense of that term: for pride, in that import of the word, is not a well-regulated self-esteem, but that false and excessive estimate of one's own abilities and claims, which shows, in this respect, an ill-balanced mind, and often embodies a disposition to exalt one's self at the expense of the rights, comforts, conveniences, and feelings of others.

In making efforts for the attainment of any great and important object, you may often fail. But do not be discouraged.—“Failures

are, with heroic minds, the stepping-stones to success."

But to resume the thread of our discourse, let me ask :

In speaking or singing should there be any spasmodic muscular exertion of the throat ?

There should be no more muscular effort in that region, than simply to regulate the pitch, or intonation of the voice in respect to its being high or low, except occasionally when we wish to make a grand '*tour de force*,' and bring all our powers into action for the purpose of swelling the volume of sound.

What must be done after such forcible muscular contraction ?

There should, if possible, be a long pause, in order that by complete relaxation the organs may have time to recover themselves fully.

What is the position most favorable for respiration ?

When the body is erect, the chest elevated, and the neck straight, we are in the position required.

What should be done with the hands when at rest during public speaking or singing ?

Do not let the hands hang down while you are thus employed. There is considerable weight in the shoulders, arms, and hands ; and if the hands hang down, the chest is depressed.

A good position for the hands when at rest is to keep them gently and gracefully closed in front, in the region of the diaphragm. The elevation of the chest can thus be kept up, and the hands be moved in gesture either to the right or to the left.

What is the relative position of the respiratory organs during inspiration and expiration ?

In inspiration the lungs and heart are lengthened downwards ; the clavicle or collar-bone, the sternum or breast-bone, and

all the annexed ribs are raised ; the upper ribs converge, the lower diverge, the upper cartilages form a right angle with the sternum, and the lower cartilages of opposite sides, from the seventh downwards, move further asunder so as to widen the space between them just below the xiphoid cartilage — the effect being to shorten the neck, compress the abdominal viscera, and raise, widen, and deepen the chest.

During expiration the position of the ribs and cartilages is reversed ; the sternum and ribs descend ; the upper ribs diverge, the lower converge ; and thus the movement of these organs is the opposite of that which takes place during inspiration.

What may be said of the last act of expiration — the one which immediately precedes death ?

It is usually more extensive and forced, than that which takes place during ordinary tranquil breathing.

What physical exercises may be performed with advantage in order to strengthen, develop, and get the control of the respiratory mechanism ?

Stand up, and take your position : heels together ; body erect ; neck straight ; draw in the pit of the stomach, and, before commencing to breathe artistically, elevate the chest so as to give all possible play to the diaphragm ; place the tips of the fingers on that very important muscle, and get the entire control of its movements by directing to it the attention of the mind, which is the grand engineer.

Having made these preparations, breathe a few times in the ordinary tranquil way, as preliminary to the deep, artistic breathing which is to follow.

Then make the orifice of the lips as small as you can—draw in the air as slowly and with as little effort as possible, with no more force than is necessary to produce the gentle

trembling of a rush-light—and when the lungs are full, which you can ascertain by the protrusion or swelling out of the diaphragm, stop breathing, and for a few seconds retain the breath thus accumulated. Then breathe out the air as slowly as you can, and during expiration let the chest go down very gradually indeed.

Repeat this artistic breathing a few times, in order that every cell in the lungs may be filled with air. Begin these exercises at first with great caution, as the blacksmith begins his work with a little tap of his hammer on the anvil before he gives the ponderous blow.

What is next to be done after having filled the lungs to their utmost capacity?

Pronounce aloud the words *one, two, three, four, five, six, seven, eight, nine, ten*, and take a short breath between each of them. In the act of pronouncing them blow forth *a stream* of air through the vocal tube, remembering

that voice proper is simply breath converted into sound. Begin the utterance of each of these words very gently and softly, and then gradually swell out and prolong the sound. After having practised on the words separately, it will be useful occasionally to pronounce them all in one breath.

What is the object of the foregoing exercise ?

It is *to get the command over the breath in the utterance of words.*

Should we speak during *inspiration*, or *expiration* ?

Always during expiration, and never during inspiration.

What will be the effect of attempting to speak during inspiration ?

It will produce stammering.

What does this fact suggest in regard to the philosophical cure of stammering by means of vocal exercises ?

One who has a tendency to stammering or any such impediment should be careful, before commencing to speak, to see that his lungs are supplied with a sufficient quantity of air, and then utter his words while the pulmonic stream is going forth—thus overwhelming the spasm with the breath column. The vocalization or utterance should be *simultaneous with expiration*, and, though the lungs have been well filled with air, the breath should all be converted into sound; for it is the *substance* and *element* of the sound, and therefore, both in speaking and in singing, should go forth from its reservoirs neither faster nor slower than the sound itself. This perfect control over the column of breath can be accomplished only by *the scientific education of the diaphragm*.

It is thus that Dr. Guilmette, while the vocal pulmonic stream was issuing from his lungs, has been able (after a full inspiration)

to prolong a single musical note for more than a minute and a half. That was a very wonderful achievement, and could be done only by a person of great diaphragmatic strength and after thorough training.

Again: one who has a tendency to stammering should likewise avoid too much labial contraction, particularly in the articulation of those consonants where the lips come together, for it will only increase the difficulty. His vocal exercises should be chiefly on the moulding of the vowels, a topic which will be fully discussed in the next chapter. In some cases, however, the prolonged vibration of the apex of the tongue while rolling or trilling the sound indicated by the letter R, is also very useful to overcome the spasm of the hyo-glossal muscle.*

Should a speaker deliver his discourse with a succession of spasmodic jerks?

* That is, the muscle of the tongue connecting it with the hyoid bone.

By no means—unless he wishes to injure his voice, and diminish the effect which his speech would otherwise produce on the audience. Let the voice be all pulmonic, as distinguished from what may be called the spasmodic and muscular, and let the orator blow forth a steady stream of air from the very depths of his lungs. It is *the pulmonic voice* which enables us to give the proper effect to those dynamic words which intensify the poetry of language; and it is by the physiological use of the diaphragm that we can impart to that style of voice all those varieties of light and shade that are so impressive in accomplished orators and vocalists.

Is the difference between the pulmonic and the muscular tones the same as the distinction between head and chest tones?

Not at all. The latter distinction belongs to the registers of the voice, which we shall discuss in a future chapter.

We must carefully discriminate between the *modifications* of the breath, and the *simple voice proper*, or breath converted into sound. The *modifications* of the column of breath made vocal are produced by the jaw and other organs. The use of the larynx in regulating the pitch and giving variety to the intonations of the voice, will be noticed hereafter.

What other caution may here be given to a public speaker ?

Never huddle yourself up, bending and stooping over, and crowding your vital organs together, just before addressing an audience. Give yourself every possible advantage for the healthy, physiological use of the voice ; and if you are sitting, then keep yourself erect, and, without attracting the attention of those before you, gently suck in the air. This will insure you a good supply of breath before you begin.

But to return from these digressions, which, however, are none the less practical and useful: what is the next respiratory exercise?

The next exercise is for *the development of the chest and lungs.*

Take your position as before: heels together, body erect, chest elevated, diaphragm free; fill the lungs with air, place one hand on each side of the chest, and swell out its walls very gently and slowly, while retaining the breath for a few seconds. Do this very cautiously: otherwise, as the lungs are now distended to their utmost capacity, you might rupture a vessel. Be careful to let the air pass out very slowly, and the walls of the chest descend very gradually.

This exercise will give you immediate pulmonic development. Do not be alarmed, if it should at first make you a little giddy.

The reason of this is, that the conduits to the brain are not yet equal to the quantity of blood which should be carried to that organ.

If you feel giddy, give the head a slight shake, and wait a few moments till the giddiness passes off.

What is the object of the next exercise ?

It is to get a proper action of the diaphragm.

This muscle, as we have already shown, descends in inspiration, and when it has reached the lowest point, if the breathing be continued, it protrudes or swells out, and then, during expiration, it retires inwardly, and ascends.

The body being erect and the chest elevated, as in the preceding exercises, place the backs of the fingers towards each other, and let their extremities touch the region of the diaphragm.

In this way command that great muscle of respiration, and concentrate the mind upon

it. The mind, as we have already said, is the engineer, and the engineer must have his thoughts on the engine which he is going to work, that is, the diaphragm.

Fill the lungs with air, and cause the diaphragm to have its appropriate play. Move it in and out. Do this not only by respiration, but also by the direct action of the muscle itself, independently of the breathing.

What is the object of the next exercise ?

It is for the development of the ribs. One part of the ribs is gristly or cartilaginous ; the other part is osseous. If we do not exercise the ribs, they become more and more osseous, and less and less cartilaginous. Therefore cultivate elasticity of the ribs. Let the bones be well lubricated by constant exercise, and then they will not easily be fractured. Laboring men are thoroughly impregnated with fluid. The work they have to do is constantly exercising their bones, and keeps them from getting dry. It

is otherwise with persons of sedentary habits. Hence even a slight fall will sometimes fracture their limbs.

How is the exercise for mobility of the ribs to be performed ?

Place the right thumb in the right arm-pit, and the left thumb in the left arm-pit, the fingers resting downwards and obliquely on the chest, so that the extremities of the hands shall incline towards one another. Press in the ribs, squeezing out the air by thus contracting the walls of the chest and also by expiration at the same time ; then gradually and slowly fill the lungs with air. After doing this twice or thrice very slowly, repeat the exercise rapidly several times, independently of breathing, that is, without stopping to pay any particular regard to respiration. In this rapid exercise press in the ribs, and then let them recover themselves, drawing back the shoulders vigorously,

and causing the elbows to approximate towards one another behind.

By the faithful practice of this exercise get all the flexibility of ribs that you can, for costal mobility is of immense importance with respect to the physiological use of the voice.

What is the last exercise which at present claims our attention ?

It is for the development of the muscles. What lathing is to the walls of a house or an apartment, the ribs are to the lungs ; and what plastering is to the walls, the muscles are to the chest.

Stand up as in the preceding exercises, and take an erect position, the heels touching one another.

As preliminary to the grand exercise for the muscles, extend the arms at right angles to the chest or even as high as the mouth, and then draw them backwards, and project them forwards with moderation several times.

Then extend the hands and arms forward to their utmost length, and on a level with the mouth, palm to palm, and fingers to fingers in close contact—the fingers stretched out, not interlaced — pronounce the words *one, two, three*, and at the word *three* draw the arms forcibly back, closing the fist. In this powerful exercise take time, get ready, and when you are fully prepared, contract with all your might; then relax immediately. Next place the hands on the chest, wait a few moments, and then project the arms forcibly forwards, bringing the arms and fingers together, as in their former position. Repeat this exercise a few times, and stop when you find yourself perspiring.

What caution should be observed in all these exercises?

Be very gradual in the doing of them. Educate the organs. Let them have time to become accustomed to their work. It is not

so much the *quantity* of exercise : *quality* is the thing.

Never mind if you sometimes feel a little sore, particularly about the ribs. It will not hurt you. But be careful not to overdo the matter. Do not attempt too much at once. Give yourselves all the needful rest.

How often should these exercises be practised ?

Until the respiratory mechanism is fully developed, those for the ribs and muscles should be practised at least twice a day, but never immediately before or immediately after a full meal. The breathing exercises, six or eight times every two hours.

What is Dr. Guilmette's personal experience in regard to the benefit of respiratory and vocal exercises, as affecting his own individual health ?

In the year 1853 he weighed 120 pounds. His maximum thoracic capacity, or circum-

ference of the chest after a full inspiration, was 37 inches. The duration of inspiratory movement, or length of time occupied by a single inspiration protracted as much as possible, was a little over one minute. The duration of expiratory movement, accompanied from beginning to end by vocal sound, was less than one minute.

At the present time, (June, 1860,) his weight is 154 pounds. His vital capacity volume 225 cubic inches; that is, he can take in that quantity of air during one inspiration, as indicated by the Inspirometer. His maximum thoracic capacity, $43\frac{1}{2}$ inches. His minimum, or smallest circumference of the chest, after expelling the air from the lungs, as much as possible, $36\frac{3}{4}$ inches. Duration of inspiratory movement, 123 seconds. Duration of expiratory vocal movement, 95 seconds. His height, about five feet four inches.

'Should the voice ever be subjected to

severe exercise, immediately after a full meal?

Never, if it can possibly be avoided; for the stomach, being then filled with food, presses upwards against the liver, crowding the liver against the diaphragm, and thus preventing the free play of the principal muscle of respiration.

What is the *best* time for the vigorous exercise of the voice?

If you breakfast at 9 or 10 o'clock, A.M., and dine at 5 or 6 P.M., the *best* hours for such an exercise are from 11 A.M., to 2 o'clock P.M. But if you breakfast very early, and dine at noon, a good time will be when four hours have elapsed after dinner, or two hours after breakfast.

But not to anticipate the subject of vocal hygiene, which properly belongs to a future part of the work — will you now recapitulate the leading principles of Dr. Guil-

mette's theory respecting the production of voice ?

Voice is breath made vocal or phonetic ; in other words, *voice is breath converted into sound.*

The air which inspiration has introduced into the lungs, is driven out from their cavities by expiration, and traverses the entire surface of the windpipe, larynx, pharynx, etc. ; and it is *during* EXPIRATION *and simultaneously with it* that voice is produced in a physiological, natural, and healthy manner. To speak during inspiration is pathological, abnormal, and unhealthy ; and the attempt to do so has a tendency to make one stammer.

Next : the diaphragm is the principal muscle of respiration. It is to the highest educational functioning of this organ, that we must chiefly look for the ability to produce all those varieties of light and shade in the

human voice, which form the perfect transcript of the passions and emotions of the soul.

Thirdly: the commonly received vocal cord theory is false. Its advocates maintain that the thyro-arytenoid ligaments of the glottis perform the office of musical strings, and that the current of air, in playing upon these ligaments, is like the bow which sweeps the cords of a violin. This theory may be disproved by auricular experiment.

Fourthly: the *mucous membranes*—or lining of the bronchial tubes, wind-pipe, larynx, pharynx, soft palate, buccal and nasal cavities, etc.—under the influence of the nerves of mobility and sensibility, produce the voice proper. In other words, the air, driven out from the lungs, causes, by its more or less rapid passage, the mucous membranes to vibrate in accordance with their healthful contraction or expansion. The movements of

the larynx, and the consequent lengthening or shortening of the vocal tunnel, modify the sound in respect to intonation, and make it acute or grave, as the designs of the individual require.

Thus the air which is taken into the lungs and then, by the expiratory movement, driven out during vocalization, is the pulmonic stream that constitutes the substance of the human voice; the diaphragm, the chief agent which propels that stream; the mucous membranes, with their attendant nerves, the vibratory or efficient cause that makes it phonetic; the larynx, epi-glottis, pharynx, soft palate, buccal chamber, lips, tongue, teeth, etc., the instruments which modify it; and finally, the MIND is *the engineer* which presides over all this complicated mechanism, directing, controlling, and governing it at will.

Are these principles of great use in regard to the preservation of life and health?

They are, so far as vocal physiology is concerned, of supreme and paramount importance. They are useful to all, but especially to public speakers and singers.

What then should be done by parents and guardians of youth ?

They should take heed that those committed to their charge have a sufficient supply of pure air to arterialize their blood ; that they take enough bodily exercise to strengthen, but not fatigue and exhaust their muscles ; that their studies and toils should not overtax the brain, and should alternate with cheerful but innocent recreation ; that they retire at seasonable hours to invigorate their nerves by the requisite amount of quiet sleep ; and that their respiratory and vocal organs be so trained and developed as to endure without danger all the labor which may devolve upon them in the various duties of life.

Thus would our physical well-being be greatly advanced, human life would be very much prolonged, the feeble would be strengthened, and those who start with healthy constitutions might, with reasonable prudence, be expected, God willing, to live to a vigorous old age.

APPENDIX.

DR. GUILMETTE'S VOCAL EXERCISES.

CHART NUMBER ONE.

1.	2.	3.	4.
1 3 5 8	1 4 6 8	1 3 5 7 ^b	2 4 5 7
1 3 8 5	1 4 8 6	1 3 7 ^b 5	2 4 7 5
1 5 3 8	1 6 4 8	1 5 3 7 ^b	2 5 4 7
1 5 8 3	1 6 8 4	1 5 7 ^b 3	2 5 7 4
1 8 3 5	1 8 4 6	1 7 ^b 3 5	2 7 4 5
1 8 5 3	1 8 6 4	1 7 ^b 5 3	2 7 5 4
3 1 5 8	4 1 6 8	3 1 5 7 ^b	4 2 5 7
3 1 8 5	4 1 8 6	3 1 7 ^b 5	4 2 7 5
3 5 1 8	4 6 1 8	3 5 1 7 ^b	4 5 2 7
3 5 8 1	4 6 8 1	3 5 7 ^b 1	4 5 7 2
3 8 1 5	4 8 1 6	3 7 ^b 1 5	4 7 2 5
3 8 5 1	4 8 6 1	3 7 ^b 5 1	4 7 5 2
5 1 3 8	6 1 4 8	5 1 3 7 ^b	5 2 4 7
5 1 8 3	6 1 8 4	5 1 7 ^b 3	5 2 7 4
5 3 1 8	6 4 1 8	5 3 1 7 ^b	5 4 2 7
5 3 8 1	6 4 8 1	5 3 7 ^b 1	5 4 7 2
5 8 1 3	6 8 1 4	5 7 ^b 1 3	5 7 2 4
5 8 3 1	6 8 4 1	5 7 ^b 3 1	5 7 4 2
8 1 3 5	8 1 4 6	7 ^b 1 3 5	7 2 4 5
8 1 5 3	8 1 6 4	7 ^b 1 5 3	7 2 5 4
8 3 1 5	8 4 1 6	7 ^b 3 1 5	7 4 2 5
8 3 5 1	8 4 6 1	7 ^b 3 5 1	7 4 5 2
8 5 1 3	8 6 1 4	7 ^b 5 1 3	7 5 2 4
8 5 3 1	8 6 4 1	7 ^b 5 3 1	7 5 4 2

STA-BAT MA-TER DO-LO-RO-SA,
 JUX-TA CRU-CEM LA-CRI-MO-SA;
 DUM PEN-DE-BAT FI-LI-US.

DR. GUILMETTE'S VOCAL EXERCISES.

CHART NUMBER TWO.

PERMUTATIONS

OF THE

FIVE ORGANIC VOWEL SOUNDS,
I E U A O.

N. B.—Let there be a PROMPT and FIRM moulding of the sounds which Dr. Guilmette represents by these characters.

$1 \times 2 \times 3 \times 4 \times 5 = 120$ THE NUMBER OF THE PERMUTATIONS.

EXERCISES.

	II.	III.	IV.	V.
I.	i u e a o	i a e u o	i o e u a	e i u a o
	i u e o a	i a e o u	i o e a u	e i u o a
	i e a u o	i a u e o	i o u e a	e i a u o
	i e a o u	i a u o e	i o u a e	e i a o u
	i e o u a	i a o e u	i o a e u	e i o u a
	i e o a u	i a o u e	i o a u e	e i o a u

VI.	e u i a o e u i o a e u a i o e u a o i e u o i a e u o a i	VII.	e a i u o e a i o u e a u i o e a u o i e a o i u e a o u i	VIII.	e o i u a e o i a u e o u i a e o u a i e o a i u e o a u i	IX.	u i e a o u i e o a u i a e o u i a o e u i o e a u i o a e	X.	u e i a o u e i o a u e a i o u e a o i u e o i a u e o a i
XI.	u a i e o u a i o e u a e i o u a e o i u a o i e u a o e i	XII.	u o i e a u o i a e u o e i a u o e a i u o a i e u o a e i	XIII.	a i e u o a i e o u a i u e o a i u o e a i o e u a i o u e	XIV.	a e i u o a e i o u a e u i o a e u o i a e o i u a e o u i	XV.	a u i e o a u i o e a u e i o a u e o i a u o i e a u o e i
XVI.	a o i e u a o i u e a o e i u a o e u i a o u i e a o u e i	XVII.	o i e u a o i e a u o i u e a o i u a e o i a e u o i a u e	XVIII.	o e i u a o e i a u o e u i a o e u a i o e a i u o e a u i	XIX.	o u i e a o u i a e o u e i a o u e a i o u a i e o u a e i	XX.	o a i e u o a i u e o a e i u o a e u i o a u i e o a u e i

DR. GUILMETTE'S VOCAL EXERCISES.

CHART NUMBER THREE.

CLASSIFICATION AND PERMUTATION

OF THE

ORGANIC LABIAL, LINGUAL, AND LARYNGEAL ARTICULATIONS.

I.—ORGANIC LABIAL ARTICULATIONS.

Labial Proper, - - - - -	P——P
Semi-Labial, - - - - -	F——F

II.—ORGANIC LINGUAL ARTICULATIONS.

Apex of the Tongue Straight, - - -	T——T - Hard.
Apex of the Tongue Curved, - - -	L——L - Soft.
Dorsum of the Tongue Arched, - - -	K——K - Hard.
Apex of the Tongue Straight, - - -	R——R - Hard Vibratory.
Apex of the Tongue Curved, - - -	R——R - Soft Vibratory.

III.—ORGANIC LARYNGEAL ARTICULATIONS.

B——B G——G D——D V——V

N. B.—1. The principal Laryngeal Sound represented by the character B should, for the purpose of enlarging the chamber of the larynx, be practised *forcibly*, several times a day, regardless of the grammatical *name* which designates it as a Consonant.

2. Prefix the articulation of each of the above Consonants to the closed Organic Vowel *I*, taking care to keep passive those vocal organs whose immediate functioning is not required. Let the *mind* be very vigilant over the active organ and none other, taking care to retain it for a second or more in its position, after the articulation shall have been given.

3. The same rule should be strictly observed in the moulding of the Organic *Vowel* sounds. Otherwise, the slurring and drawling of the vocal *element* will be the result, and a miserably defined vowel will characterize the performance of the singer or speaker.

CHART NUMBER THREE. (CONTINUED.)

EXERCISES ON THE PERMUTATIONS OF THE LABIALS, LINGUALS, AND LARYNGEALS.

1.—The Twenty-four Permutations of the Linguals T L K R.

TLKR	TKLR	TRLK	LTKR	KTLR	RTLK
TLRK	TKRL	TRKL	LTRK	KTRL	RTLK
KRTL	RKTL	LKTR	LRTK	KLTR	RLTK
KRLT	RKLT	LKRT	LRKT	KLRT	RLKT

2.—The Twenty-four Permutations of the Labials P and F, with the Laryngeals B and G.

PFBG	PBFG	PGFB	FPBG	BPFG	GPFB
PFGB	PBGF	PGBF	FPGB	BPGF	GPBF
BGPF	GBPF	FBPG	FGPB	BFPG	GFPP
BGFP	GBFP	FBGP	FGBP	BFGP	GFBP

3.—The Twenty-four Permutations of the Principal Labial P with the Two Principal Linguals T and K and the Principal Laryngeal B.

PTKB	PKTB	PBTK	TPKB	KPTB	BPTK
PTBK	PKBT	PBKT	TPBK	KPBT	BPKT
KBPT	BKPT	TKPB	TBPK	KTPB	BTPK
KBTP	BKTP	TKBP	TBKP	KTBP	BTKP

DR. GUILMETTE'S VOCAL EXERCISES.

CHART No. IV.



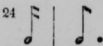
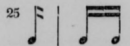
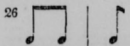
ON QUANTITY.

Words on the bar.

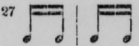
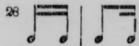
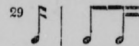
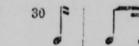
 seven inches.

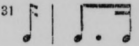
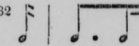
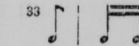
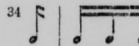
1 	2 	3 	4 	5 	6 
Breathe	All	Fierce	Man	Bet	Pit-ty
Swarm	Charm	Fire	Boy	It	Minute
Dream	Soul	Power	Dog	Pit	<i>Minnet</i>
7 	8 	9 	10 	11 	
Damage	Ef-fi-gy	To - ry	Ei - ther	Wor-thi-ly	
Pic - ture	Chival-ry	Puisne	Grandeur	Cor - di - al	
<i>Pik-cher</i>	<i>Shivalry</i>	<i>Pu - ne</i>	<i>Gran-jer</i>	<i>Cor - je - al</i>	
12 	13 	14 	15 		
Vic - to-ry	Mis-chie-vous	In - fi-nite	Loy - al - ty		
Te - di-um	I - di - om	Im - pi-ous	Im-pu-dent		
<i>Te - je-um</i>	<i>I - je - um</i>	<i>Ex - tir-pate</i>	<i>In - ju - ry</i>		
16 	17 	18 			
Mu-si-cal-ly	I-ma-ge-ry	Mis-rep - re - sen - ta - tion			
Ho-no-ra-ble	Ce-re-mo-ny	Ex-com-mu - ni - ca - tion			
19 	20 	21 			
Impos-si-bility	Im - pe-ne-tra-bi-lity	Incompre-hensi-bility			

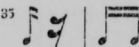
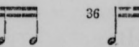
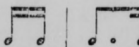
Syllables before the bar.

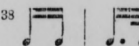
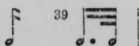
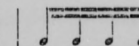
23 	23 	24 	25 	26 
Ac - quit	De - lay	Ap - prove	Pa - ci - fic	Per-se - vere
E - mit	Gal-lant	Be - guile	In - trepid	Ma-ga - zine
De - pict	Mamma	De - lude	Fa - na-tic	In - va - lid

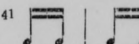
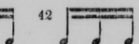
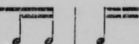
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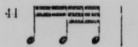

27  28  29  30 
 E - pi - demic Mis - de - mean - or O - be - di - ent Dis - dain - ful
 Pa - ne - gy - ric Con - tra - dic - tion O - be - je - nt Dis - grace - ful

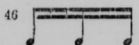
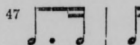
31  32  33  34 
 Le - thar - gic Im - me - di - ately Ju - di - cious I - den - ti - ty
 E - nor - mous *E - me - jit - ly* In - si - pid Mag - ni - ficent

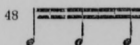
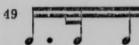
35  36  37 
 A - bom - in - a - ble In - di - vi - du - al Machi - nation
 Un - pardon - a - ble Hy - po - the - ti - cal *Ma - ke - na - shen*

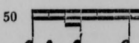
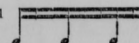
38  39  40 
 Minis - te - ri - al Multi - pli - ci - ty Dis - pro - por - tion - a - bly
 Im - per - cepti - ble In - de - fati - gable Un - in - tel - li - gi - ble

41  42  43 
 Dis - o - be - di - ent E - ty - mo - lo - gi - cal Re - crim - i - na - tion
 Hip - po - pot - a - mus Spi - ri - tu - al - i - ty Hu - mi - li - a - tion

44  45 
 En - cyclo - pe - di - a Re - com - men - da - to - ry

46  47 
 Qua - li - fi - ca - tion Hie - ro - gly - phi - cal

48  49 
 Re - con - ci - li - a - tion Ra - ti - o - ci - na - tion
 Mal - ad - min - is - tra - tion *Ra - si - o - si - na - chen*

50  51 
 Im - ma - te - ri - a - li - ty Va - le - tu - di - na - ri - an.

(GARDINER.)

Editor—Rev. Edward Winthrop.

ADVERTISEMENT.

THE Second number, to conclude this treatise on Vocal Physiology, will, it is expected, be ready for publication during the ensuing autumn.

It will be highly practical, and will treat of the moulding of the vowels, the articulation of the consonants, the registers of the voice, pitch or intonation, rhythm or melody of speech, vocal quantity and hygiene, vocalization, gesture, declamation lyrical and parliamentary, the physiology of passion — in short, it will be a perfect blending of the organic and intellectual constituents of elocution, thereby forming the most complete work of the kind for the scientific education of the human instrument for speaking and singing.

The charts appended to this number properly belong to the second part of the work, and should be transferred to the end of the volume when it is completed. They are, for the present, here inserted, for the immediate convenience of Dr. Guilmette and his vocal pupils.

June 16th, 1860.