

**On excision of the enlarged tonsil, and its consequences in cases of deafness with remarks on diseases of the throat / [William Harvey].**

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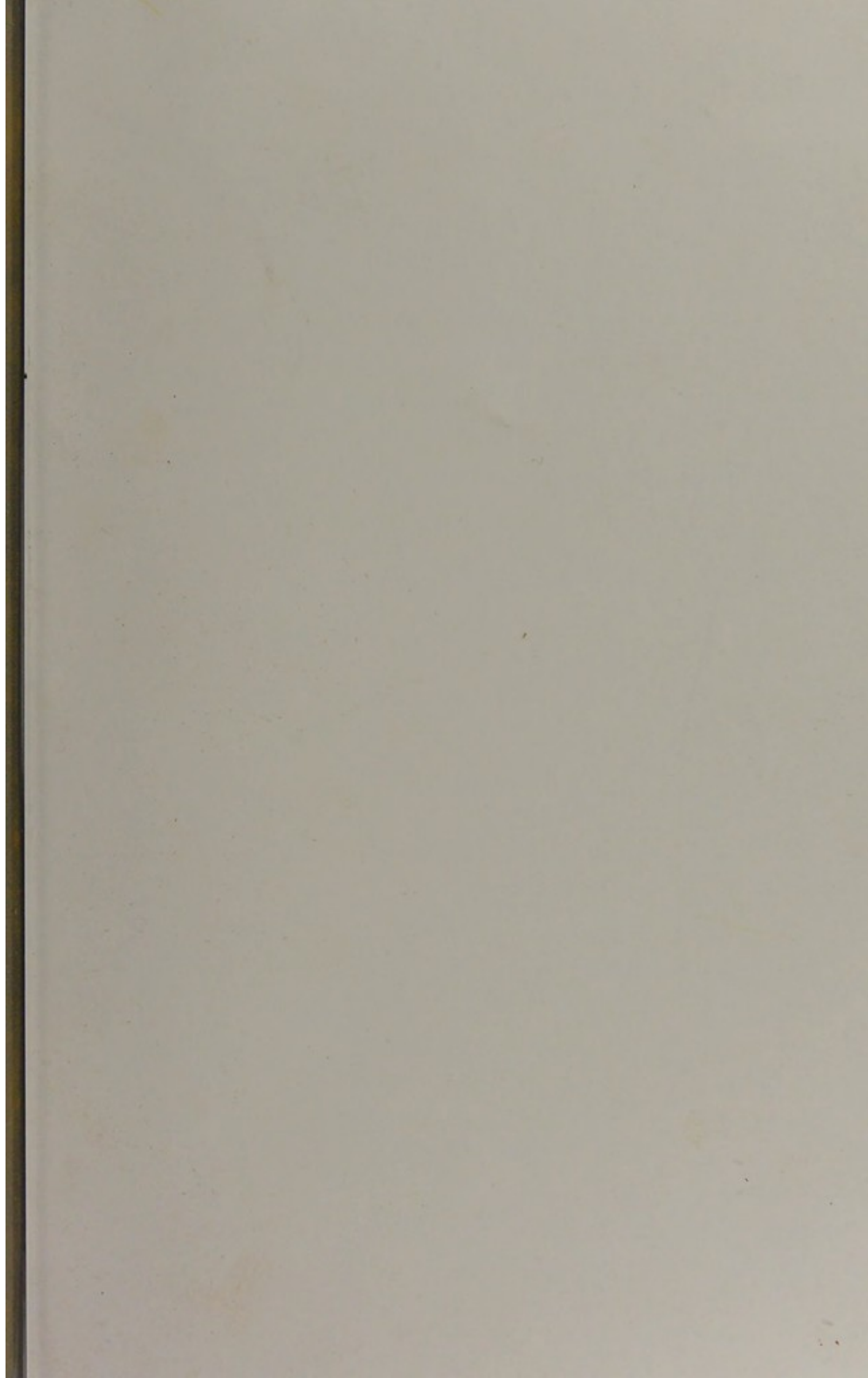
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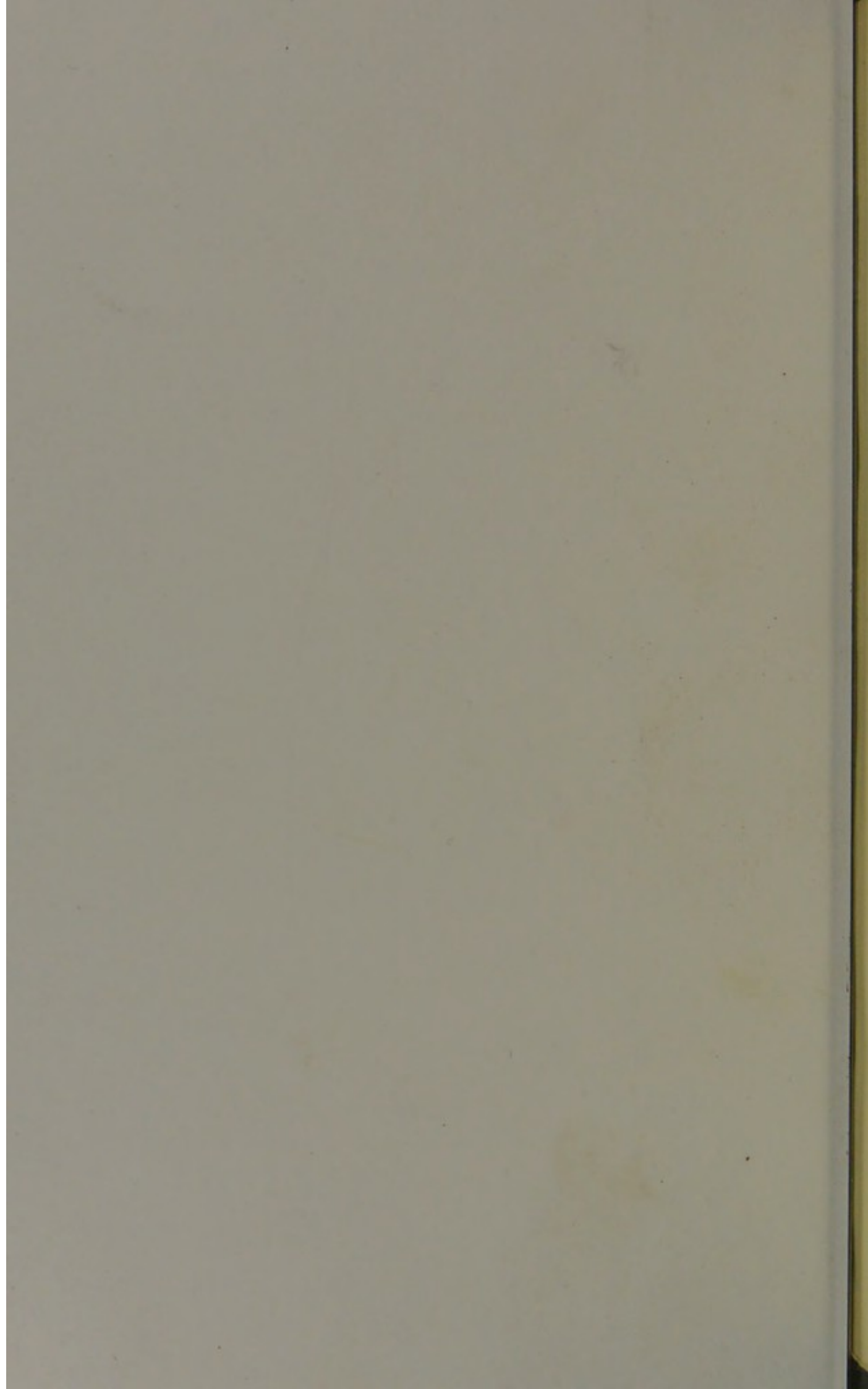
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ON EXCISION  
OF  
THE ENLARGED TONSIL  
And its Consequences  
IN CASES OF DEAFNESS.

WITH  
REMARKS ON DISEASES OF THE THROAT.

BY  
WILLIAM HARVEY,  
MEMBER OF THE ROYAL COLLEGE OF SURGEONS OF ENGLAND;  
FELLOW OF THE ROYAL MEDICAL AND CHIRURGICAL SOCIETY OF LONDON,  
AND OF THE LONDON MEDICAL SOCIETY;  
SURGEON TO THE ROYAL DISPENSARY FOR DISEASES OF THE EAR.

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LONDON:  
HENRY RENSHAW, 356, STRAND.  
HUNTON, YORK.  
1850.

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21 2

OF PARLIAMENT

THE PARLIAMENTARY PAPERS

AND RECORDS

IN CONNECTION WITH

THE DEPARTMENT OF THE INTERIOR

AND

THE DEPARTMENT OF THE CROWN

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## PREFACE.

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THE objects which influenced the Author in sending forth this book to the public are soon told. Having the charge of an institution wherein ample opportunities offered of investigating diseases of the ear on a large scale, he determined on testing the utility of excision of the tonsil and uvula in relieving deafness. In the winter of 1848, he had the honour of reading a paper before the Medical Society of London on that subject; he then stated that he had performed excision with the view now mentioned, in fifteen cases, on individuals of all ages, before and after puberty, and that the result had proved very unsatisfactory. He further sought the personal experience of the members on the subject, rather than the recorded opinions of authors. Since that period, however, farther ex-

perience has been attained by him. He reviewed the entire subject, and reconsidered the results of excision of the tonsils upon the constitution. He has collected and arranged one hundred and sixteen cases of persons in whom it has been performed with the like intention. Many of these cases have been sent him by friends on whose judgment he could rely. The results of his experience derived from various sources are communicated in this brochure. He has endeavoured to show that the operation exercises no beneficial influence whatever over such imperfections of hearing, and pointed out the misery oftentimes resulting from it. He has also shown how such misery may be avoided by adopting the more comprehensive line of treatment herein set forth. In dealing with the subject, it has been necessary to differ entirely with some valued friends, who still abet and practise excision of the tonsils for the relief of deafness. That occasions may arise when operations may be called for in order to afford relief for the distress occasioned by enlarged tonsils, he does not mean to deny; but that deafness could be one of those occasions—at least, as long as the anatomical relations of the tonsil and the aperture of

the Eustachian tube continue the same as they now are, he can by no means admit.

It would afford him satisfaction to know that his time has not been unprofitably employed, and that he has thrown some light upon these important subjects—important, from the frequency with which cases of enlarged tonsils are presented to the surgeon, and particularly in young subjects; their influence on the economy, and their erroneously supposed connexion with that distressing malady, defective speech. The plan of treatment recommended here, he believes, offers more chance of discussing these chronic enlargements than any other, and he is not aware of its having been recommended before. It has been most successful in his own practice, so far as his experience has enabled him to judge, and he would not have recommended it, had he not been convinced of its beneficial results.

It is gratifying to the Author to witness the rapid discoveries now being made in the treatment of diseases of the ear, generally. The remarks made in our periodical medical literature of the day can no longer point to such diseases as being an opprobrium to medicine; “for,” says Mr. Wilde, “the progress



which this branch of medicine is making is in all probability as rapid as that of any other department of the healing art."

"It has been truly stated, when discoursing on the ear, that whoever has witnessed, and attentively observed, the distressing effect arising from a loss or diminution of its sensibility, will readily acknowledge that such deprivation throws us at a distance from our fellow-creatures, and, in the present state of society, renders us more solitary beings than the loss of sight itself; though the rapid glance of the eye, the immense distance to which it enables us to carry our perceptions, and the extended circle it embraces, have given rise to some of our most pleasurable and magnificent sensations, though it has brought us acquainted with objects which seemed ever placed far beyond our reach, still the more humble sense which we are now considering, the more confined dominion of the ear, has contributed most effectually to the every happiness of life. It enables us to hold communion with our fellow-creatures, to improve and exalt our understandings by the mutual interchange of ideas, and thus to increase the circle, not only of our physical, but of

our moral relations; the charms of eloquence, the pleasure resulting from the concord of sweet sounds, inexplicable, perhaps, as it remains, are other sources of intellectual enjoyment, which contribute to place this sense among the most delightful as well as the most important we possess. Whatever, therefore, by explaining its structure, or examining its functions, can lead us to improve its natural, or restore its disordered sensibility, cannot be a subject of trivial moment."—*Rees' Cyclopædia*.

2, Soho Square, June, 1850.

our moral nature; the claims of conscience, the  
 pleasure resulting from the exercise of moral  
 faculties; justice as it reveals another source  
 of intellectual enjoyment; the obligations of  
 the moral agent; the field of duty as well as the  
 moral imperatives we possess. It is not, however,  
 a mere catalogue of abstract propositions; it  
 is a treatise which is designed to be useful in  
 the highest sense of the word, and to be  
 a source of pleasure to the reader.

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SECTION II. OF THE EXTENT OF MORALITY.

SECTION III. OF THE FOUNDATIONS OF MORALITY.

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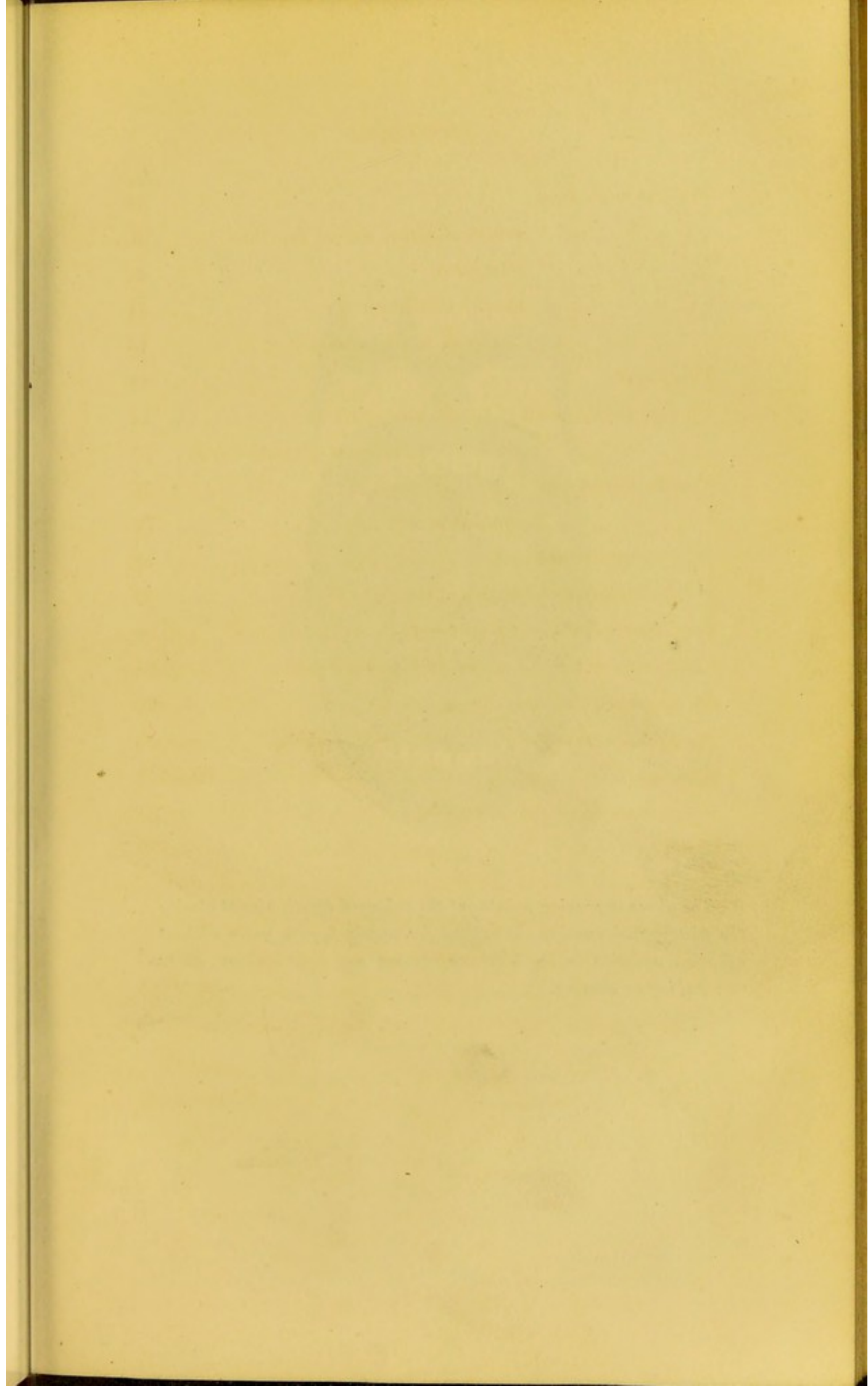
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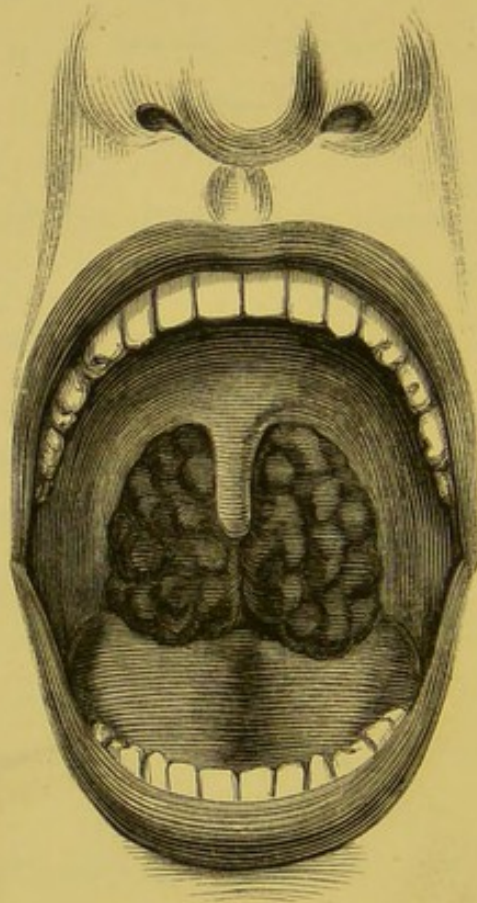
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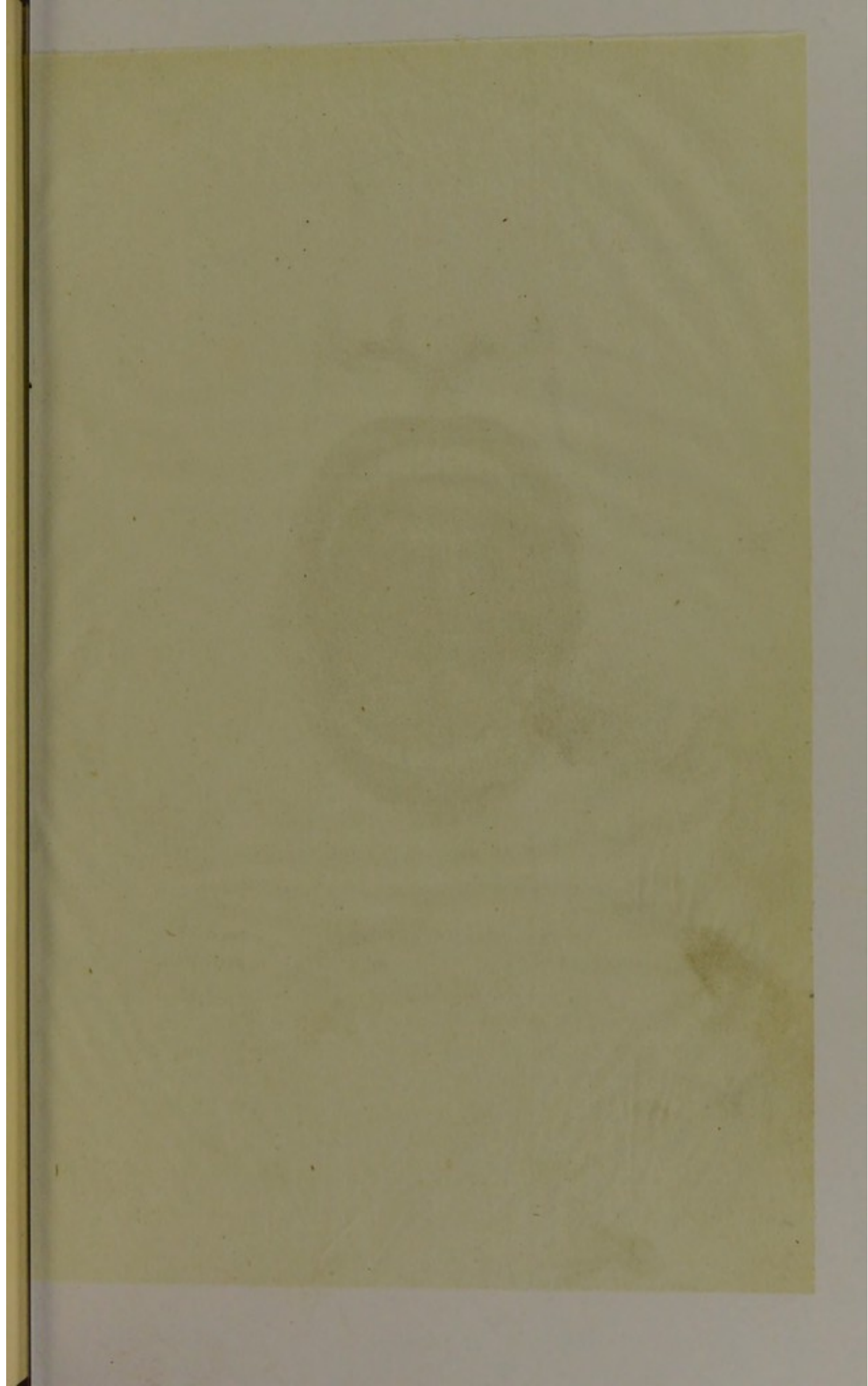
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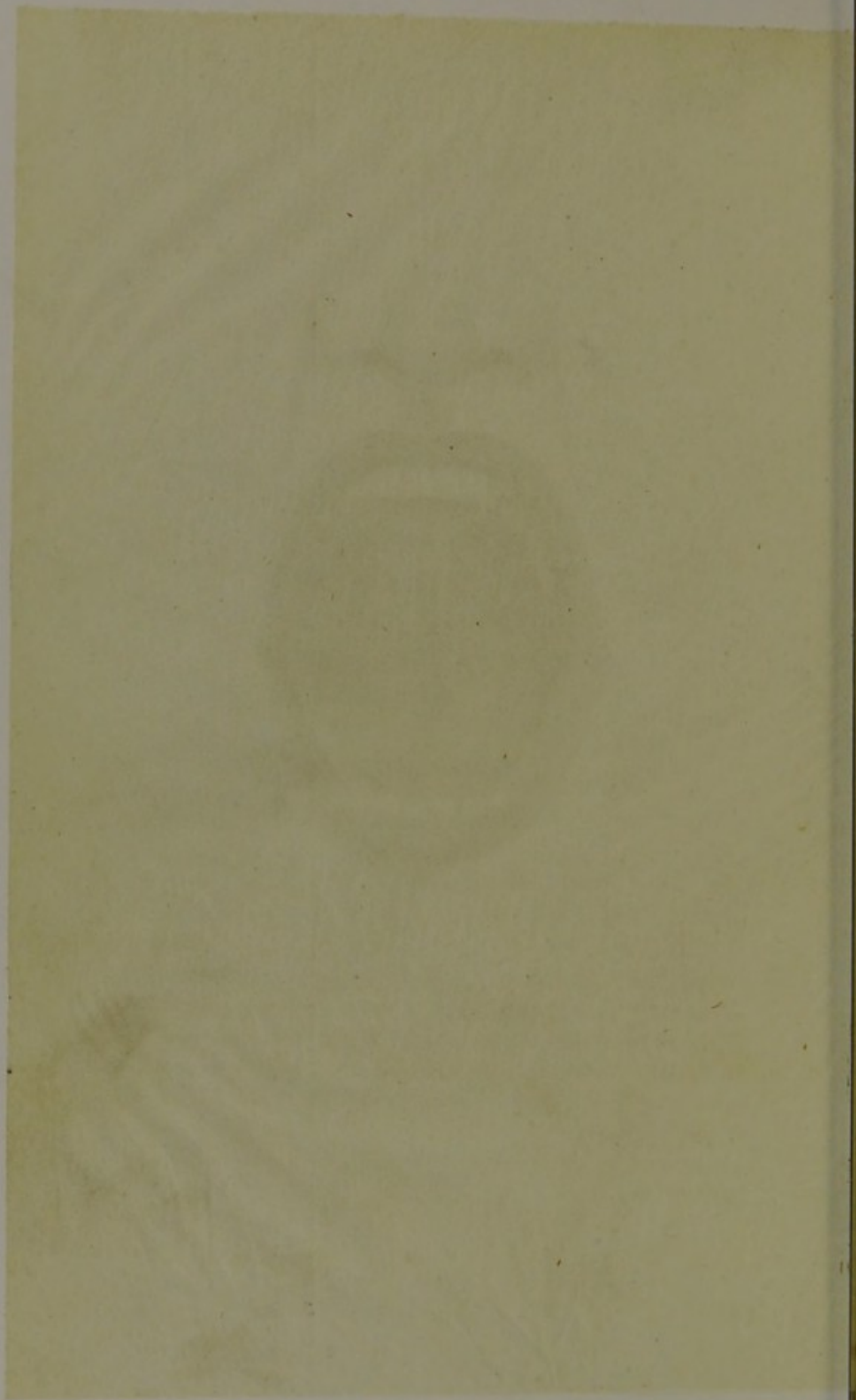


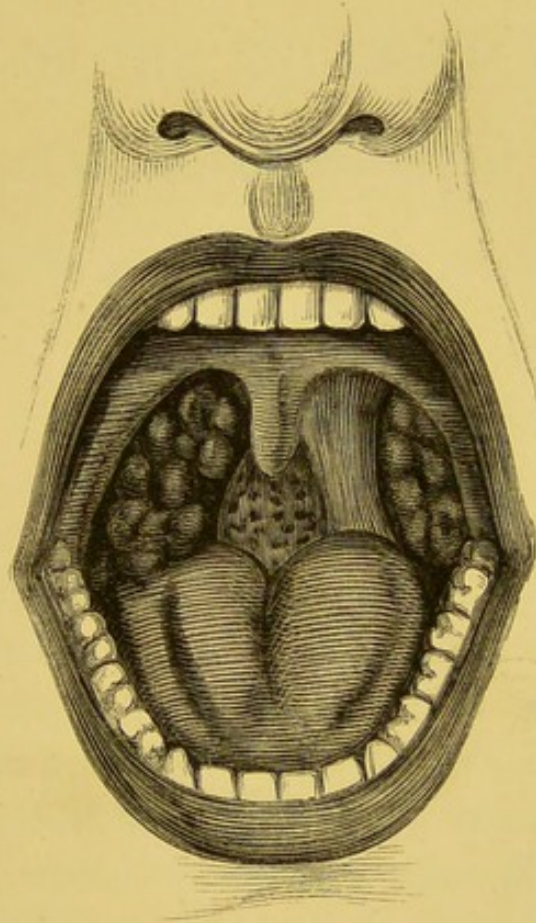


*The above engraving points out the enlarged tonsil, almost closing the pharyngeal opening; it existed for nearly twenty years without affecting audition in the least, or causing any inconvenience, either in speaking or singing.*

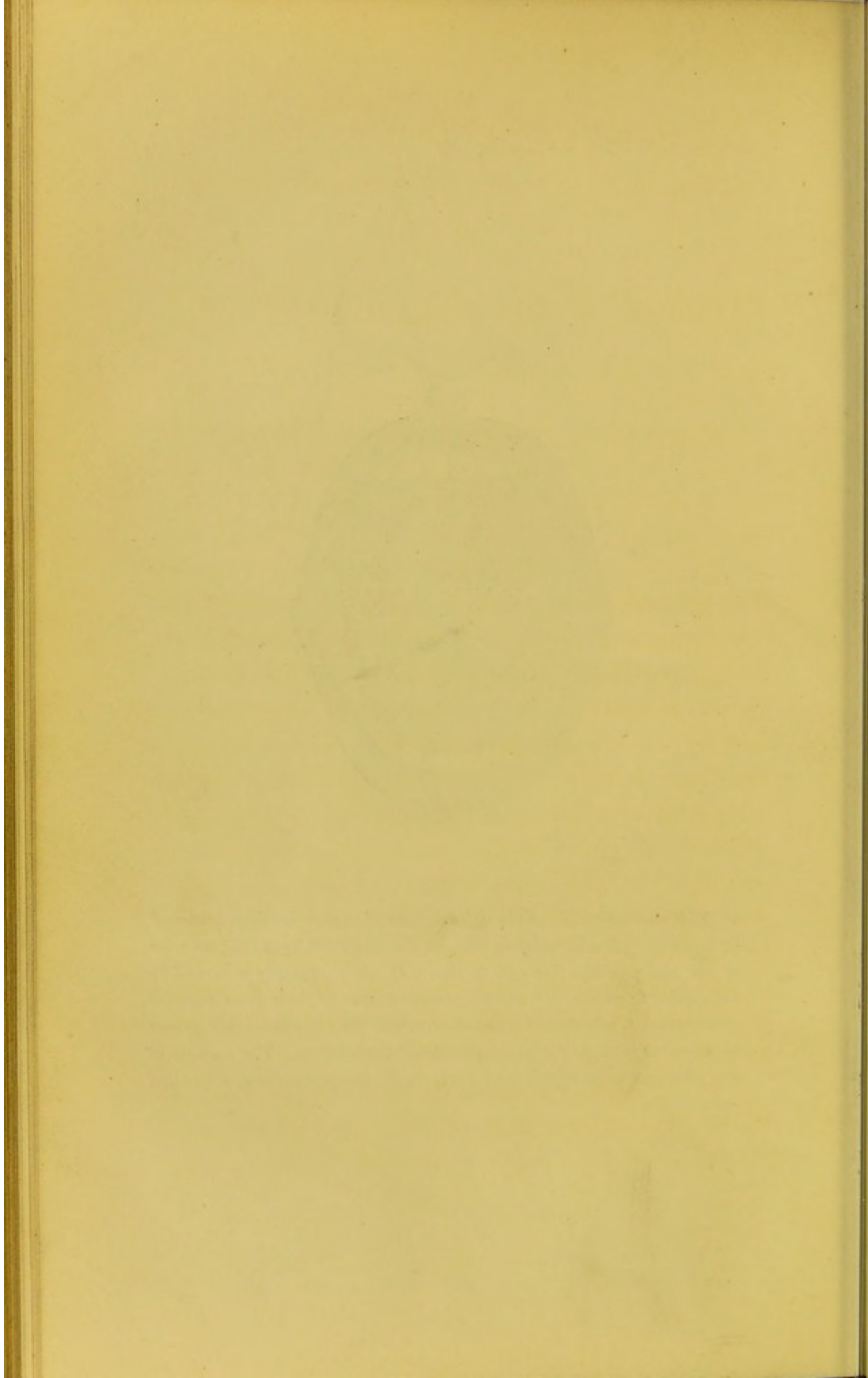








*This engraving shows the enlarged tonsil, which has been removed on one side. It also exhibits how, as the tonsil enlarges, the muscles of the pharynx also increase in size. It has frequently occurred to the author to witness the atrophied appearance of these same muscles after excision, which in a measure accounts for the diminished power of voice, as well as for the difficulty of deglutition. The contour of the pharynx is changed, and presents, in many instances, a vaulted appearance.*



ON  
EXCISION OF THE ENLARGED TONSIL,  
WITH ESPECIAL REFERENCE TO THE  
REMOVAL OR ALLEVIATION OF DEAFNESS,  
ETC.

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THE glandular bodies called tonsils, or amygdalæ, are organs so situated as to render them familiarly known, not merely to the profession, but also to the public generally. Their position and aspect in a healthy and in a diseased condition, are, in a superficial way at least, usually well understood. They are placed in what is technically called the isthmus of the throat (*isthmus faucium*), between the mouth and the bag which anatomists call the pharynx; thus separating the buccal or oral cavity, that is, the mouth, properly so called, from the pharynx.

These glandular bodies may, in general, be readily inspected, and even partially examined, in the living subject.

The common inflammatory sore throat, from which most persons have suffered, more or less, in youth, seldom fails to give to the sufferer a practical

lesson and demonstration, as it were, of the position, if not of the functions, of these glands; the painful character of their acute enlargements, and the mechanical obstructions which, in this enlarged state, they present to deglutition and to articulation, are well understood. Other enlargements of a chronic nature, arising chiefly from constitutional and other causes, are also matters of by no means infrequent occurrence. It is of this chronic enlargement of the tonsil, and the operation practised for its removal, for the relief of deafness, that I am about to speak. This disease is not a new one, nor is the operation for its cure novel in surgery. Obscure in their nature, such enlargements differ widely from those wherein the tonsil is acutely inflamed; they cannot be so readily traced to any special morbid influences, or any exciting cause; they obey their own laws. After having existed for some time, imperceptibly increasing in size, they at length become so large as to seem obstructions to the performance of certain rather important functions, and hence appears to arise a necessity for an operation for their removal; such necessity, however, is but apparent; as these operations are of more than questionable propriety, whether we consider the sufferings of the patient, or the sound discretion of the surgeon who undertakes them. It is, then, to the consideration of the expediency of recurring to these operations without sufficient

reflection, that I now intend to direct my attention. A few preliminary remarks may be deemed, perhaps, not unnecessary before I enter immediately on the subject.

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THE amygdalæ, or tonsils, are two glandular bodies, situated, as I have already said, in the narrow passage or isthmus between the mouth and the musculo-membranous bag, called the pharynx. Leading into this bag there are seven openings—namely, two from the nostrils, one from the mouth; the patent orifices of the Eustachian tubes, leading to the middle ears, form the other two. By one most important orifice, the air we breathe passes from the pharynx into the larynx, and so, by the windpipe, into the lungs; the last, or seventh, is the superior orifice of the gullet. Of the great importance of a cavity (the pharynx) holding such important relations, and connected by contiguous or remote sympathies with many other parts, I need not dwell here to any great length. It is invested, throughout, by a mucous membrane, continuous with that of the nose, mouth, ears, eyes, larynx, lungs, and digestive tube. The morbid conditions of this important section (the pharyngeal) of the great system of the mucous membranes, I purpose discussing in a distinct part of this work, on which I have been for some time engaged. The enlarged tonsil of which I here

treat is but a sequel of a morbid condition of this great membrane, and not, as some have unhappily supposed, a distinct and separate disease, a mechanical affection, if I may so say, remediable only by its removal. This dangerous error has been long acted on, and has proved too often the cause of permanent inconvenience to the patient.

An attentive, and especially an instructed observer, looking into the throat, will readily make out—1, the uvula; 2, the pendulous palate; 3, the isthmus of the fauces, and the tonsils on either side; 4, still farther back, the interior of the pharynx;—all these structures are invested by the mucous membrane I have just spoken of. Towards the base of the tongue may be seen two membranous folds (the pillars or columns of the fauces) descending from the soft palate. These enclose triangular spaces on either side, in which the tonsils are lodged. There are, moreover, musculo-membranous folds; in the anterior fold is placed the constrictor muscle of the fauces; in the posterior fold will be found the palato-pharyngeus; the base of the tongue is below. Thus, these glandular bodies, the tonsils, are surrounded, as it were, on all sides, by muscular organs acting on and compressing them, and giving rise to intense suffering when they happen to be acutely inflamed and enlarged. In chronic enlargements no such suffering happens, and their increase of size, at times, is scarcely known even to the patient.

Immediately, then, behind the isthmus, may be seen the interior of the pharynx, but more especially that portion of it which, extending upwards to the base of the cranium, backwards and downwards along the front of the spinal column, communicates more immediately with the posterior nostrils and the Eustachian tubes. This is the cavity which the illustrious D'Zondi, one of the most practical surgeons of his day, viewed as distinct from the lower portion of the pharynx, being momentarily separated from it during the act of deglutition, by the action chiefly of the palate muscles, and of the palato-pharyngeal muscles. This temporary, and, as it were, momentary division of the bag of the pharynx into two cavities, distinct for the time being, becomes, occasionally, a permanent arrangement, and a result of adhesions of the palate and uvula to the posterior wall of the pharynx. A case of this singular malformation, resulting from disease, in which the person is reduced to the alternative of breathing by the mouth only, came under my notice a few days ago.

John Webb presented himself at the Dispensary, for tinnitus aurium; but having no deafness or perceptible imperfection of his hearing, I was induced to hold a conversation with him for some time. His voice was hollow and full, and on examination, I found all the muscular apparatus of the pharynx completely atrophied, and nothing but an open,



vaulted appearance remained of the inner and back part of the mouth, the uvula only appearing somewhat thicker than natural. He stated that he had had, while in India, a severe attack of inflammation of the liver, for which he was mercurialized freely, and that, having taken cold, he had an attack of inflammation of his throat; this produced an abscess, the discharge from which continued for sixteen years. Change of climate, with some severe acrid gargle, eventually healed the ulceration. Since that period he has complained of tinnitus of his ears; and he has also had, even in the coldest day of winter, a continued perspiration over the entire face, whilst the other parts of his body were cold. This case was seen, from time to time, by many of my friends, and what was peculiarly interesting in it was, that there constantly flowed from the nostrils a thin, watery fluid, like tears, sufficiently acrid to irritate the upper lip, and to keep it always somewhat inflamed; the movements of the nostrils, also synchronous with those of the chest and diaphragm, were also observed to have ceased, clearly indicating that the nares ceased to retain any share in the respiratory function. The same circumstance will also probably account for the constant heat and perspiration which flowed from the face, the heated expired air, which ordinarily escapes by the nares, being more or less partially retained, and in its endeavour to escape producing the heat and

perspiration of the face. It is more than probable I might have been induced to attempt affording the patient some relief in this case by separating the soft palate; but a reference to a case in Mr. John Bell's "Operative Surgery," which in many points bears some analogy to the present, completely dissuaded me from the attempt.

"CASE.—A young gentleman, about fourteen years of age, of a slender and delicate habit of body, born in the West Indies, and being nursed and kept by his father's black servants, was, without the family being informed of it, deeply infected with the yaws, at the tender age of three years. Though cured by the plantation surgeon, and now enjoying the most perfect health, the condition of his throat proves that he must have lived long in a sad condition, and must indeed have come into the surgeon's hands in a desperate stage of the ulceration. His uncle believes that the cure was accomplished by calomel and the decoction of the woods, and that all the ulcerations have been for many years healed. The boy is spirited and resolute, and says, that *to recover the natural, I may say the human, sound of his voice*, he will stand stoutly to any operation I please to perform. The adhesion of the soft palate to the back of the pharynx, by which the posterior opening of the nostrils is closed, may easily be dissected; there can be no hæmorrhage, no danger, little pain. Should this be done?

*Description of the State of the Palate and Pharynx.*—The whole of the throat must have been in a state of complete ulceration; but it had affected more the membranous parts than the glands; for the tonsils are entire and perfect, while the soft palate and pharynx have so adhered, that you can hardly imagine they ever had been separate, or that the appearance is anything but a mal-conformation. The whole circle of the fleshy palate adheres to the back part of the pharynx: and it is not an adhesion, slight or superficial, of the edge merely, but the very substances of the velum pendulum and of the pharynx are so mixed and incorporated, that you could not believe them ever to have been otherwise. If there be any distinction of substances, it is only that which is marked by a firmer and whiter line, running in a semicircular form: the much-thickened and ulcerated flesh of the palate seems by swelling to have been pressed as close upon the back of the pharynx, as if it had been held firm by stitches. There is not the slightest vestige of the openings towards the nostrils; one flat curtain of firm flesh, hard as cartilage, extends from the posterior arch of the palate bones, and declines insensibly into that part of the tube which we call the back of the pharynx, and by its inclination, like a pent-house, makes a perfect and imperforated arch. In the middle of this arch there is a whiter spot, which marks the place where the uvula had been, which

has by ulceration been entirely destroyed. The centre of the arch, where the uvula or pap was originally, has adhered with particular firmness; and from that white spot there runs down in the centre of the back of the pharynx a white ridge or prominent line, or raphe, which feels not merely hard, but absolutely cartilaginous; and on the face of this flat curtain, formed by the adhesion of the palate, and a little towards each side, appear the tonsils; their flat surfaces and excretory ducts turned directly towards you; and as the arches of the palate are comprehended in the adhesion, nothing in any degree resembling the natural structure of the throat is to be distinguished; there appears but one flat plain partition, extremely firm.

“The boy’s swallowing is imperfect, from want of contractility in the cicatrized parts to embrace closely the morsel as it descends from the mouth into the throat. His voice disgusting, because the air and sound are prevented from passing, as in the natural state of the parts, through the nostrils, and circulating among the nasal cells, which give the voice its resonance; but his condition is without a remedy. I am assured of this by reasoning, and by experience; first, the use of the velum is now irrecoverably lost: it serves in its natural state as a valve, moveable, and muscular, which, while we are speaking, directs a due proportion of the air through the nostril; and while we are swallowing, claps so

closely over the posterior openings of the nostrils, as to close the throat above, and prevent the food or drink, when pushed from the mouth into the pharynx, from passing up into the nose; but the part is now so indurated by the ulceration, that its muscles are no longer moveable, the substance of the palate, too, is indurated; the surgeon might, with a knife and long crooked probe, make first a central opening, and then dissect towards either hand, till he had disengaged the whole of the velum; but it could never again be a flexible valve, moved by the contractility of its own muscles: the opening would remain with rigid edges, round or slit-like, according to the manner of healing; all that were divided would retract, leaving a wide opening into the nostrils, but no valve to cover it, the patient would be in the condition of those unfortunate persons, in whom the older surgeons cut off, (as they usually did,) or slit up the soft palate, to make their way to polypi of the nostril. Whatever he did not swallow with great precaution, rather by letting it glide over his throat than forcing it by the usual effort, would rush upwards into his nose; and his voice would resemble that of one who had lost his palate by the venereal disease; when all the air, or much of it, goes out by the nose, there is not enough passing through the mouth to be modulated into distinct sounds: thence it happens that the voice is more guttural when there is too large an opening

towards the nose, than when there is none. I know well what effect will result from such a rigid opening in the palate, not secured by any moveable valve; for I have several times seen such adhesions of the palate to the pharynx, with partial openings, rigid and continually open, such as would remain in this boy after any form of incision; and in those patients every mouthful of food or drink swallowed rashly, went upwards into the nose.

“ I counsel you neither to request nor allow any opening to be made in this adhesion, which so entirely and happily closes the nostrils; had any ignorant surgeon done such an operation, (and it is one into which one might be easily seduced,) he would have been disappointed and shocked at the ill consequences of what he had done so unpremeditatedly. Should you ever be so unwise as to require a surgeon to do an operation, which it is but too easy to perform, be assured that the part can never be closed again; the edges of the incision will heal, the opening will remain, and your nephew will never again swallow comfortably, nor speak intelligibly. I have, in some instances, known many of the above unpleasant consequences follow a free truncation of the uvula, notwithstanding its apparent simplicity and ready mode of relief, in cases of elongation, by operation; I would therefore give a caution, that no more should be removed than is absolutely necessary, looking upon the action as of much import-

ance to the perfect condition of the pharyngeal muscular apparatus, both as to the deglutition and voice."

In these cases, the upper portion of the bag of the pharynx was permanently and completely separated from the lower division, by the adhesion of the pendulous palate and uvula to the posterior wall of the pharynx. Thus an arrangement which, in the healthy state, is merely momentary, though taking place at each act of deglutition, had here become permanent, and breathing was effected only by the mouth. Notwithstanding, the persons so affected did not seem to be much inconvenienced by such abnormal arrangements. Their sense of hearing appeared not to be impaired. From the nostrils there flowed constantly a thin watery fluid, like tears, sufficiently acrid to irritate the upper lip, and to keep it constantly somewhat inflamed. In the case observed by me, the movements of the nostrils, synchronous with those of the chest and diaphragm, had ceased.

But to return to the tonsils.

In consequence of being situated between the mouth and the pharynx, the functions of the tonsils have been thought to be strictly mechanical. To pour out a fluid intended to lubricate the bolus of food in its passage through the isthmus; and further, to prevent the drying up of surfaces, or membranes, over which arid air passes so frequently;—such are

the functions, purely mechanical, assigned to these bodies. But even the discharge of these functions may, it seems, be dispensed with; the trifling consequences attending their removal, supposing it to be complete in so many hundred, or, as rumour has it, so many thousand cases, leading directly to this conclusion: That the tonsils are organs of no importance whatever to the animal economy, any more than the extra growth of hair or nails; that they may be pared, and cut, and shaved off, and burnt, in any way suiting the caprice of the surgeon or the feelings of the patient; and that, in brief, their functions, if any, are amply compensated for by other multifarious glandular bodies taking on their office when removed;—in short, the tonsils have been placed in the same category with the thymus and thyroid gland, the spleen, supra-renal capsules, and many other organs of whose structure we know little, and of whose functions we know still less.

Before I speak of the sympathies of the tonsils, or of the deep relations they have with other far distant organs, I shall venture a few words respecting their anatomical structure.

When the descriptive anatomist has told us that the amygdalæ are two conglomerate glands situated in the triangular cavities already described; that they are each six lines long, three thick, and three broad; that they belong to the cephalic portion of



the alimentary canal—an expression sufficiently correct in its way; that they derive their supply of blood from vessels which do not always originate directly from the main artery of the body; that they are obviously secreting glands, pouring out a fluid serving a mechanical purpose; he has told us but little that is important in respect of these glandular bodies, their uses in the animal economy, their sympathies and relations with near or remote structures; with the adult and præ-adult conditions of the frame. To supply these deficiencies, the chemist apprises us that the fluids they pour out are analogous to, if not identical with, that flowing from other buccal glands, of which fact, however, there is not the slightest certainty. Next comes the microscopic observer. To him we owe the observations, which may or may not be facts, that the tonsils in man and in the mammalia consist of recesses of the mucous tunic (*recessus tunicæ mucosæ*), in which rest conglomerate mucous follicles: that is to say, certain smaller cavities, or little bags, are placed over larger ones, they also terminating in very minute follicles; and this may be distinctly proved by insufflation.

What this adds to our knowledge of the physiological uses or pathological tendencies of these glands I will not pretend to say. But there is still a deeper research to be made into their history, the invention of modern times; their history, namely,

1, during the embryonic and foetal states; 2, the history of their development from the period of birth to extreme old age.

What we know of the first—that is, their embryonic condition, is, that they are situated in the line of direction of the first branchial arches, immediately below the cephalic bulb; that this also is the position of the Eustachian tubes, usually considered as the unclosed extremities of these arches; but the history of their progress from birth to old age has not been clearly traced, whilst the facts derived from comparative anatomy, as in the case of the supra-renal capsules, thyroid and thymus glands, the spleen, and some other organs, lead to no decisive conclusions.

When physiologists have failed in ascertaining the functions of a part by direct observation, they, since Galen's time, have attempted to obtain the knowledge by another mode; they remove the organ from the body, hoping by an indirect and negative method to discover the truth. Whatever may be the function of the part, it ought to cease, say they, on its total removal. This is a rather coarse way of experimenting, but in some instances it has led to sound and correct views; the removal, for example, of the preparatory male organs decides the nature of their function. With reference to other organs the method has entirely failed, and as regards the organs we now speak of—the tonsils—the records of surgery,

read in one way and with one view, (the mechanical,) would lead us to suppose that they can have no special or important function, since their removal leads to no important changes in the economy. Here the doctrines of compensating organs are brought into play; what one organ can do another may; the anterior buccal glands, they say, supply the place of the posterior when these are removed.

But the result of my experience—limited, I admit, but still carefully followed up—is hostile to these views—to some of them, at least, and especially to the one which tells us that the tonsils are organs placed there for mere mechanical purposes, whose absence or removal may therefore be really never felt, or may be supplied by others. To this, my opinion, I was first led by cases sufficiently numerous to warrant the inferences I drew from them. Subsequent reflection on the deeper sympathies of organs has, however, tended to confirm me in the belief—first, that the relations or sympathies of the tonsils are but imperfectly understood; and secondly, that their removal by the surgeon, excepting under extreme and urgent circumstances, is an operation which, notwithstanding the high names connected with it, ought not to be encouraged by the profession. For in medicine, and especially in surgery, it is not what may be done, but what ought to be done; not what is possible in

the way of operation, unattended by any immediate mischief to the patient, but what should be done, due regard being had to his future welfare, health, and happiness.

Anatomy, descriptive and general—Physiology, simply observant and experimental, having thus failed to elucidate the functions of these glands, Pathology is next appealed to; a distinct field of observation, and but slenderly connected with the physiology of the schools—a connexion so slender, indeed, that its very existence has been conscientiously doubted by some of the best observers at all times. Now, this field of observation has taught me that the removal of the tonsils, prior to the age of puberty, in the male, tends gradually to affect, in many instances, several important functions; that it is not without its influence in the weaker sex; whilst in the adult male it enfeebles the voice, interferes with audition, has been observed to affect the nutrition of the frame itself, reacting, no doubt, on this function through those sympathies which probably connect the generative system to the organs of voice, and speech, and deglutition, of which the tonsils form a part. Of the existence of such sympathies, as regards the organs of voice and of speech, I need offer no proofs; they are well known and universally acknowledged; the larynx, with its cartilages and elastic tissues, and muscles and nerves, obeys, in an extraordinary manner, the

development of the generative system in the human economy. Now, this sympathy, be it remembered, together with its great results, relates to structures of a low vitality, cartilages, and fibro-cartilages, and yellow or elastic tissues, generally set down in the ordinary physiology as parts having an extremely low vitality, and exceedingly few sympathies, if any; but a more careful observation refutes probably such opinions, "based on the experimental school of Haller, or, at least, on a misapplication of his doctrines. The development of the larynx is, at puberty, in man and woman, not confined to mere increase of size; it extends to change of form; also the infantile larynx is not merely a small larynx, it has a form peculiar to itself, distinct from that of the adult. Even in woman, the larynx of the adult is not merely the enlarged organ of the child; it has assumed a different shape."

But these important sympathies are not limited to the organs of voice; they extend to those of speech, of audition, of smell, and of taste. They include the facial terminations, if I may so say, of the respiratory and digestive tubes; nor are they confined to the period of puberty; he must have observed ill who supposes so: the phases through which the vestibule of the nostrils and its cartilages pass; the larynx and its accessories, the ear and its appendages, such as the mastoid process and cells, in particular, the mouth, and the tonsils—

these changes or developments are not limited to puberty—they extend throughout life. And here it may not be inappropriate to observe the varying condition of certain organs which, though remote from those I have just mentioned, yet seem, with others, to have direct sympathies with them. Trace, for example, the history of the glands of Cowper in man and in woman; comparatively small, at first, in the child; how they increase with years, to attain their full development only in the adult and healthy state of the body; observe how they decrease as age and infirmities come on, until at length they all but disappear. These glands, too, like the tonsils, have been called *lubricating glands*, in man and in woman; and no doubt they are so, in a certain sense; but that they discharge other and still more important functions must be manifest to all who have attentively studied their anatomy, physiology, and pathology.

“All these organs, then, from their earliest period in the embryo to the latest period of adult life, have a double reference, at least double sympathies, and play a double part. They have a relation to the being as a being, and to the individual, in connexion with those organs which connect him with his species.”

Such being my views, I have looked narrowly in so far as I was able, into the history of “The Operation for the Removal of Enlarged Tonsils,”

in man and in woman. Physicians and surgeons, generally, must be well aware that this operation is not a new one, nor one of recent invention: whoever will consult that invaluable record, "The Memoirs of the French Academy of Surgery," will therein find, that more than a century ago the whole subject, in so far as surgical operation goes, without reference to audition, was well understood. In our own country, Cheselden, Sharpe, and their followers, had done the same: still, all was mechanical; for surgeons had not thought it necessary to trace the results of such operations, to follow out the consequences to the individual: sufficient for them was it, that they had removed the mechanical obstruction, overlooking the more important consideration—namely, the diseased condition of the mucous membrane of the mouth and pharynx, of which the enlarged tonsil is but a consequence, or result. Thus it has happened that so little progress has been made in questions much more important than the operation—viz., What are the consequences of the operation?

Before the profession, then, can give their sanction to the indiscriminate performance of this operation, the doubts I have suggested as to its propriety will first require to be solved—practically. "A complete recovery," after a surgical operation, but too often means, that for a short time afterwards the patient operated on suffered but little, if any,

inconvenience. But, for obvious reasons, this mode of argumentation cannot be admitted in the present case. A very different kind of proof will be required. In this opinion I appeal with confidence to the profession. The experience I have had has led me to the following conclusions:—

1. That the enlarged tonsil, or elongated uvula,\* does not, *per se*, give rise to imperfect hearing—this will appear from cases to be cited presently.

2. That its extirpation does not only not remove deafness, but on some occasions causes it.

3. That in cases wherein the tonsil is enlarged, the disease is in the mucous membrane generally, and that its morbid condition, when remediable, is so only by means of a judiciously-regulated constitutional treatment.

4. That the tonsils are not merely secreting

\* “I altogether deny the connexion of closure of the Eustachian tube with enlargement of the tonsils. I have frequently seen this enlargement, both with and without the least dulness of hearing, but always with the Eustachian tubes perfectly free. I confess that I cannot at all comprehend how swollen tonsils should press together the mouth of the Eustachian tube, and close it against the admission of air, and may assert, that none of the practitioners who have admitted such mechanical efforts have ever satisfactorily investigated, by means of the catheter, the closure of the Eustachian tube in any one single case of the kind. This reproach applies even to Itard; from his very defective method of investigation, he ought not to have been surprised that so frequently NO AMELIORATION OF THE DULNESS OF HEARING OCCURRED IN THOSE CASES IN WHICH HE ATTEMPTED TO CURE IT BY EXCISION OF THE TONSILS.”—KRAMER.



organs, but play a further and most important part in the animal economy, holding as they do most intimate sympathies with important though distant organs.

5. That extirpation of the tonsil in the young has led to pernicious results, such as giving rise to bronchial and pulmonary disease, with other mischiefs to be mentioned in this work, and notwithstanding high authorities in favour of extirpating the tonsils or uvula for the relief of deafness, the operation has almost uniformly proved a failure.

The first proposition is, that the enlarged tonsil, or elongated uvula, does not, *per se*, give rise to imperfect hearing; I annex the following cases in proof:—

CASE.—Mr. —, of Richmond, twenty-three years of age, has had enlarged tonsils from his childhood; suffers no inconvenience, excepting from fatigue, and then the uvula is a little elongated, which, however, is soon remedied by an astringent gargle—he has had no deafness whatever at any period of life, not even in the slightest degree, although from time to time he suffers from cold, which generally affects the parts about the throat.

CASE.—Miss M—, aged sixteen, had glandular enlargement of the neck, her tonsils also were very much enlarged, so much so as to close almost the pharyngeal opening. In this case there was no complaint ever made of any defect in the hearing,

though my investigation on that point was extremely minute.

CASE.—Mrs. D——, aged twenty-five, states that she has never known herself to be otherwise than with enlarged tonsils; she does not remember ever to have suffered any defect in hearing.

CASE.—Mr. P——, aged twenty-nine, consulted me for some glandular enlargement of the neck. The tonsil on the left side was enlarged considerably, and at the same time on that side the hearing was perfect; on the right side, however, there was no increase of size in the tonsil, and yet his hearing was there very imperfect.

To the above cases I could add several others which have fallen under my own observation, and have occurred in my own practice. They in fact may be noticed to a great extent both at public schools and in private practice. Cases of this kind are of frequent occurrence.

The *Second* proposition, as already laid down, is, that “tonsillar excision not only does not remove deafness, but may, and frequently does occasion it;” I adduce the following cases in support of this opinion:—

CASE.—A gentleman of good constitution, whose voice became a little husky and thick after singing, or much talking, and whose tonsils had been habitually enlarged from his boyhood, without his having experienced any deficiency whatever with

respect to hearing, was advised to have them removed. This was done most effectually. His voice soon after became altered both in tone and strength, and he has gradually become deaf on the left side, whilst on the right he suffers from continued tinnitus; and on any cold or change of weather he suffers both from bronchial irritation and cough.

CASE.—Master W——, aged twelve, had his tonsils removed for stammering. He had no sensible defect in his hearing prior to this operation; but in two months after, a perceptible impairment was observed in this function; and although a variety of treatment was adopted, with reference to the Eustachian passages, which were supposed to have been obstructed, and other constitutional means were also resorted to, he has not derived the least benefit with respect to his speech, but his hearing remains impaired up to the present time.

CASE.—Mr. C——, aged thirty, had his tonsils removed for the relief of a very distressing impediment of speech; three days after which his hearing became perceptibly deteriorated—his voice has also been much altered for the worse: this was peculiarly injurious to him, as he was by profession a singer. This case occurred seven years back; and in this instance time has not been serviceable in producing any improvement or alleviation.

The third proposition, as already stated, is as

follows: "that in cases wherein the tonsil is enlarged, the disease is in the mucous membrane generally, and that its morbid condition, when remediable, is so only by means of a judiciously-regulated constitutional treatment." The following cases illustrate this proposition:

CASE.—Miss Jane W——, aged eleven, had enlarged tonsils, supposed to have followed an attack of scarlet fever, when she was three years of age; her speech was observed to be somewhat thickened as she grew older. For the relief of this defect it was deemed advisable to have the tonsils removed; since the excision, she has been observed to be in delicate health from time to time, although previously to that she had scarcely ever complained.

CASE.—A sister of the above child, at the age of nine, without having had eruptive disease, had her tonsils so much swollen as well nigh to close the opening. Having the result of the above case before me, and the disadvantages entailed on the child by operation, I determined on postponing any relief by attempting it, and on putting her on medical and constitutional treatment, consisting of very small but repeated doses of the bichloride of mercury, with quinine, and an external application of colchicum. This practice was pursued for a period of nearly six months, and with a marked diminution in the size of the glands, as also with considerable benefit to her general health. Here

the advantage of attending to the health in the first instance, and not running at once to appeal for aid to the knife of the operator, is most striking. The elder sister, immediately on the enlargement of the tonsils being observed, was brought to an operation without any attempt having been made at constitutional treatment. Cases occur, no doubt, where the tonsils have been for a long time neglected, and serious mischiefs have resulted to the general health, as well as to the growth of the child. What I say here is, that such long-continued neglect is just as bad in its effects, and is as much condemned by me, as the indiscriminate appeal to the knife. Instead of such remissness, the health calls loudly for the application of remedial means to the constitution of the patient; the fact is, enlarged tonsils are neither more nor less than a constitutional disease affecting the glands of the mucous membrane, and may with good reason be classed under the head of strumous affections; it may even be observed, that the class of patients in whom they occur are precisely those in whom unequivocal, unmistakable marks of the strumous diathesis may be observed affecting other parts of the body; would it not be strange that an operation should be proposed for the removal of glands affected for scrofulous enlargement in other parts of the body? I may be told the tonsils are glands, whose enlargement, from their particular position, may put the life of the

patient into jeopardy, by interfering with the function of respiration, and that this circumstance, in imminent cases, may necessitate excision. To this I beg to reply—1st, that after a rather considerable experience, which has extended over fifteen or sixteen years, I never met a case where, in tonsillar enlargement, the danger to life was so imminent as to render excision necessary; nor, 2ndly, even admitting such a case to occur, as that enlargement of the tonsils should, by the obstruction presented to the respiration, occasion any danger to life; the cause of the danger being decidedly of a mechanical nature, relief may not be had by the removal of only a portion of the gland, and on one side only. In truth, the advocates of the operation of excising the tonsils seem to me to look no farther than the throat itself; they seem to think that the presence or absence of these two bits of flesh is an affair of perfect indifference; totally forgetting, or perhaps never having known, the important place these bodies hold in the animal economy; the close and intimate sympathies which they have with other and distant organs in the body. These sympathies are well known to, and fully admitted by, some of the best physiologists of the present time. Dr. Laycock, in his interesting work "On the Nervous Diseases of Women," when considering the relations of the glandular tissues to the organs of generation, says, § 64, "The glandular tissues are those remaining to be

noticed, together with others situate about the throat—viz., the salivary glands, and thyroid body, the tonsils, uvula, pharynx, Eustachian tube, &c. . . . The connexion between them and the sexual organs in life is less strongly marked. . . . Pathological phenomena are those which are most suited to the purpose. . . . (§ 72.) The uvula and tonsils are much more frequently enlarged in women than in men, and, like the parotid and mammæ, are attacked more frequently by scirrhus on the cessation of the generative nisus. . . . In male camels the uvula is swollen during the rutting season, and protrudes from the mouth like a bladder.” (P. 265, *ibid.*) “Hypertrophy of the tonsils—a very common annoyance of the hysterical female—the left suffers oftener. The hypertrophy is usually similar to that of the thyroid body, mammæ, and uterus, consisting simply in enlargement of its proper structure.” In order more clearly to point out the close connexion and direct sympathies between these bodies and the reproductive organs, I append the following cases.

CASE.—A young lady, about eighteen years of age, had the tonsils removed for apparent obstruction, as well as for some thickness of the voice: she was of a ruddy complexion, and the mammæ were well developed. A few days after the operation, her health became deranged; her bosom sunk, and great disturbance was complained of in the other functions. Here there can be no doubt of the close

connexion between the mammary gland and the tonsils.

CASE.—My friend Mr. Hunt detailed to me the particulars of the case of a young lady, whose health sympathized in a similar way with the excision of the tonsils.

CASE.—C. G., aged twenty, consulted me for some defect of hearing; but states that her tonsils had been removed on both sides nine months previously by the late Mr. Liston. She states, that for two or three days her hearing was in some measure benefited, but the improvement disappeared after that period. From that time her voice has become lowered in tone; she suffers much from thirst, or any exertion of voice; dryness in the back of the throat; considerable difficulty, as well as great irritation, in swallowing after the slightest conversation. Over the posterior pharynx is observed a follicular enlargement, and the mucous membrane raised in patches, whilst the intervening spaces are glassy and shining. She states also, that at each catamenial period the throat is observed to be swollen, and if it be suspended beyond the time, a discharge of blood issues from each side on which the tonsils were removed. This case being singular, as well as interesting, I had a drawing of it made.

CASE.—A. B., a boy, sixteen years of age, I had the opportunity of seeing in company with a professional friend. The following facts I learned from



him:—He had been under treatment for enlarged tonsils for nearly twelve months; they were painted from time to time with tincture of iodine; no other local application was used. He took internally quinine and the mineral acids. It was observed after two months' treatment that the left tonsil diminished in size, whilst that on the right side was considerably enlarged, and the testis on the same side became perfectly absorbed.

CASE.—A young man, twenty-five years of age, with the largest parotid enlargement I ever saw, accompanied with chronic enlargement of the tonsils on both sides, states, that during any inflammatory action in the parotid tumor, he has always excessive pain in the testis of that side, and the tonsils are observed at the same time to swell considerably. The indistinct and defective history which I was enabled to elicit from this person (he not being able to state distinctly whether the tonsils enlarged first, or they and the parotid went on enlarging simultaneously) obliges me to acknowledge that this case is not so decisive as I could wish; but I am inclined to think that it bears out the pathological inference.

With respect to the fifth proposition, viz., that extirpation of the tonsil in the young has led to pernicious results, such as giving rise to bronchial and pulmonary irritation, etc., etc., I must here observe, that I have taken the opportunity of examin-

ing a great number of children belonging to school-houses, and others of the better order of life, in whom the tonsils had been removed for apparent obstructions to the respiration; and the result of my observation and experience is, that excision of the tonsils has produced considerable disturbance in the pulmonary apparatus, both in the mucous membrane of the bronchi, and in the parenchyma of the lung itself.

In support of this proposition, I beg to mention that I had the opportunity of witnessing, and occasionally attending, the two following cases:—Master W——, age nine, with glandular enlargement of the neck, and very enlarged tonsils, with the exception of some thickening in his speech was otherwise in tolerable health: the tonsils were removed on both sides, not only from the hope of its affording relief to his speech, but also with the view of thereby effecting some counteraction to the mischief progressing in the cervical glands. It was remarkable, in a fortnight, the change which took place in this boy's general health; from that time to the present he has never been free from cough on the slightest exposure to cold.

Miss W——, a sister of the former patient, twelve years old, enjoyed tolerably good health, with the exception only of enlarged tonsils. In consequence of a defect in her speech, they were removed. The results of the operation were observed to be pretty

similar to those in the case of her brother. I deem it right to state that these children never had coughs before, although exposed to a considerable walk every day in their way to school, without any reference to the state of the weather.

I had the opportunity of examining eight cases in succession at a public establishment, wherein the tonsils had been removed—their respective ages averaging from ten to fourteen. The results were nearly similar to those of the two cases above cited.

It will be remembered, that in what I have to say against the indiscriminate excision of the tonsils, I confine my remarks exclusively to the effects of such an operation on the function of hearing. I do not mean to say that there may not be occasions wherein such operation may not be necessary; with that question I have no concern. Such excision is by no means calculated to afford any relief to defective audition; nay, more; it is more likely to prove injurious in many cases than serviceable.

The same experience has satisfied me that the removal of the tonsils gives rise occasionally to deafness; that it enfeebles the frame, injures the constitution, affects the system in general, and alters the nutrition of the body. It is no reason, but rather the contrary, that because the tonsils may readily be removed, the operation should be performed on every frivolous occasion; and, finally,

it is my belief that the evils I speak of would long since have become manifest, but for the generally imperfect nature of the operation, by which the base or radical of the gland is in reality left untouched.

These facts and reflections I submit, with great deference, to the profession, not doubting that they will receive at their hands a most attentive consideration. He must be a young surgeon who has not witnessed an operating mania; he must be a young physician who has not felt the pressure from without of a new and fashionable drug. Some thousand operations have been performed on man and woman, the greater number, seemingly, without a reason or excuse: the profession is entitled surely to be made acquainted with the results—results which, I fear, when known, will be found to be, though remote, not the less melancholy.

The connexion between the general system and the neck and throat has been long known, as well as their reciprocating sympathies. It has often formed the subject, not of controversy, but of remark. The lungs and thorax, generally, also sympathize with the same. Physicians have ever been accused by non-professional persons of negligence in not attending to this most curious subject of inquiry.

Some have thought the sympathies between the sexual organs, and the glandular and other organs situated around or in the mouth and throat, to be less strongly marked. I do not myself entertain

this opinion. In the epidemic disease affecting the parotid, the largest of the salivary glands, the sympathy between the affected organ and the sexual system is obvious; they swell alternately, showing reciprocating sympathies; so, also, do the mammæ and parotids in woman, when affected by the epidemic I now speak of, and usually called the mumps. A case is recorded of an abscess forming simultaneously in the left parotid and left testis; and instances are by no means infrequent where an exuberant secretion of some glands is occasioned by a diminution in the secretion of others. These sympathies are not confined to the salivary glands, properly so called; they extend also to the tonsils, nostrils, and mucous membrane of the pharynx, of which too many lamentable proofs are daily seen by those entrusted with the care of persons suffering from the secondary effects of morbid poisons.

It were easy for me to extend these proofs by an appeal to the writings of Meckel and other anatomists.

“How often do we see inflammations of one side of the Schneiderian membrane, which often pass rapidly to the other; and so also of the tonsils, these changing by metastasis to other more distant parts of the glandular system. This can be accounted for by the seemingly similar tissue having the same structure and other properties. In all, I believe that the influence which determines the situation

occupied by the diseased process after metastasis is one conveyed from the part first affected through its nerves, which are in a state of morbid organic excitement, to other functions, whose connexion with them is not quite so apparent. To this fact must be referred the metastatic affections of the eyes, tonsils, testes, and probably some cases of gout and rheumatism."\*

We conclude, then, from all that has preceded, that the tonsils are of considerable importance, not only as giving tone to the voice, but also as being organs subservient to deglutition by their lubricating agency. If this attempt to point out the real functions of these organs be not unsuccessful, it will at all events be attended with this advantage to the profession, as well as the public generally, that it will oblige persons duly to reflect, ere they venture to remove from the body, parts which are shown to be so necessary in the animal economy.

#### MUCOUS MEMBRANE.

Before we can enter with advantage into the present inquiry, so as fully to understand the occurrence and extension of the particular morbid action now under consideration, I deem it right to give a brief outline of that part of the mucous membrane with which we are now engaged, as also

\* Paget.

of its leading sympathies—as well as of the muscular arrangement of the pharynx, since many cases of disease may be explained and readily accounted for by bearing in mind the nature of the several structures of the parts affected.

This membrane derives its name from the fluid with which it is habitually lubricated. It lines all those cavities of the body which communicate with the external integuments. Bichat divided it into two great portions—*scil.*, the gastro-pulmonary, and the genito-urinary. The former—that division with which alone we are concerned at present—commences at the eyelids, nose, and lips; that part going to the eyes communicating with the nose by the lacrymal canal, through which the tears flow. This same membrane also enters the cavity of the nostrils, forming the pituitary membrane, and, entering the apertures of the Eustachian tubes, lines the internal surface of the membrana tympani, as also the cavity of the tympanum. It then extends over the nostrils, lining the septum narium, and having entered the several sinuses in this direction, it becomes again lost in the external skin about the nostrils. But before this takes place, it is continued into the nasal duct with its sac and the lacrymal ducts; and through the puncta lacrymalia it is once more united with the common integuments. Here we may suppose the tunica conjunctiva to commence, which not only covers the anterior surface of the eye-ball, but is

continued through the excretory ducts, even to the substance of the lacrymal glands. Again, commencing at the external integuments of the lips, with which we may for a moment suppose it to be lost, this same membrane enters the mouth, affords a covering to the internal surface of the cheeks, and to the salivary glands, whose ducts it traverses, as also to the tongue; it then continues its course posteriorly. Behind the soft palate the mucous membrane from the mouth and nostrils becomes continuous, and from the throat downwards it divides into two portions—the one to line the air-tubes, the other to line the entire alimentary canal.

Observing the continuations of this membrane, and considering the manner after which the nerves, blood-vessels, lymphatics, &c., are distributed to it, we cannot but admit the existence of a principle of sympathy, by which the affections of one organ are transmitted to another; the advantage to be derived from this source in the employment of remedies will be readily recognised. On this point Müller says: “A remarkable sympathy is observed to exist between the mucous membranes: thus their diseases, particularly the mucous discharges and the catarrhal affections, have a great tendency to spread in them. By virtue of this sympathy, the state of one part of these membranes may be ascertained by examining another part, so that the state



of the mucous membrane of the tongue indicates the condition of that of the stomach and intestinal canal. All the mucous membranes have, likewise, an extraordinary connexion with the respiratory movements; thus, irritation of the mucous membrane of the nose produces sneezing; irritation in the pharynx, œsophagus, stomach, or intestines, excites the concurrence of the respiratory movements; vomiting, or violent irritation of the rectum, bladder, or uterus, gives rise to a concurrent action of the respiratory muscles, so as to effect the involuntary expulsion of the fæces, urine, or fœtus;—irritation of the mucous membrane of the larynx, trachea, or lungs, or even itching from irritation of the Eustachian tube, excites coughing.”

The mucous membrane, like the skin, is composed of three layers; the first, the epithelium, the cuticle of the membrane; the second layer is the *proper mucous*, or papillary layer, analogous likewise to the papillary layer of the skin. This is the surface which secretes and produces the epithelium. The remaining layer, the fibrous or submucous, similar to the corium of the skin, is intended to afford support to the papillary layer.

In the loose cellular tissue connecting the two latter layers, are placed the glands or follicles, which are peculiar to the mucous membrane. These glands are of two kinds, simple and compound. Henlé thus describes the simple follicles:—“In almost

every mucous membrane, even in those which are destitute of glands, there exist other organs, apparently connected with the secreting action of the membrane. They are round or oval closed cells, visible even with the naked eye, and sometimes quite transparent, but at other times filled with mucous globules." The compound follicles, or glands, on the other hand, are thus described:—"The substances of these glands consist of a mass of round or oval completely closed cells, of different sizes, and containing some granular matter, and others perfectly-formed mucous globules. A number of these cells united by cellular tissue, and perhaps, also, by a structureless membrane, form an acinus, and, as such, are seated upon a branch of the excretory duct, into which the mucous globules, and other matter contained in the cells, are from time to time poured, in consequence either of the membrane of the cells bursting, or of its becoming dissolved at the part where it is connected with the duct."

These follicles are much more abundant in some parts of the mucous membrane of the air-passages and œsophagus; thus, the *tonsils* almost entirely consist of mucous follicles united together by cellular tissue.

If the mouth be opened, we get a view of a membranous curtain, composed of a fold of mucous membrane, from the centre of which hangs the conical body called the uvula. The curtain itself,

or, as it is sometimes called, the soft palate, *velum pendulum palati*, separates the mouth from the throat.

This curtain is first attached to the bones of the palate; it then passes outwards, and consists in reality of two folds of the mucous membrane; these constitute the pillars or arches of the palate. The anterior pillars are continued down to the sides of the tongue, whilst the posterior pass downwards and backwards into the pharynx. In the angular space between the anterior and posterior pillars of the soft palate, lie the tonsils. The structure of these glandular bodies has been already described.

MORBID ALTERATIONS IN THE CONDITION OF THE  
MUCOUS MEMBRANE LINING THE MOUTH AND  
THROAT.

THE mucous membrane which lines the throat, when in its normal or healthy state, is of a slightly red, or pale rose colour; but when this membrane becomes the seat of inflammation, its colour becomes altered, as it then passes from the naturally healthy hue to the deep scarlet, and eventually to a purple or violet colour, according to the nature, form, and intensity of the inflammation. It may be observed here, that inflammation may attack any part of the structure of the mucous membrane separately; either the mucous membrane itself, or the mucous follicles, or, finally, the subjacent tissues. Inflammation of the mucous membrane itself is, generally speaking, spreading and diffusive; whilst inflammation of the mucous follicles, on the contrary, is circumscribed in its action. It sometimes happens, in the case of inflammation of the

mucous surface, that the follicles may also take on the inflammatory process, and in this case, after the superficial inflammation has abated, it still may remain in the chronic form in the follicles.

After inflammation has continued for some time in a mucous membrane, the lesion most frequently to be observed in it is a morbid thickening of the part affected; its surface also often presents a granular appearance. To this lesion I shall find it necessary to direct attention, when I come to consider that form of deafness, for the cure of which excision of the tonsil has been recommended.

I have now endeavoured to give such a description of the distribution of the mucous membrane of the mouth and throat, as may suffice to make it clear how far the function of hearing may be interfered with by disease of this membrane; I have traced it in its various divisions and continuations through the nares, the various sinuses, and the Eustachian tube; have tried to make clear the various sympathies, contiguous and remote, with different other parts of the body; I have also exhibited in sufficient detail the chief lesions produced in the mucous membrane by inflammation, both acute and chronic. I shall now endeavour to point out the lesions of this structure most likely to affect the organ of hearing, and the manner in which this effect is produced.

As has been already said, we have seen that, like

other membranes of the body, the mucous membrane of the mouth and throat is liable to various degrees and kinds of inflammation, both acute and chronic, common and specific; on closer investigation, we also find that inflammation of this membrane is further modified, partly by its various and extensive sympathies with other organs, and partly by constitutional causes. Scrofula, rheumatism, and several skin diseases; the exanthemata, when they become epidemic, as scarlatina, measles, and particularly influenza and small-pox; all affect it more or less, and are observed occasionally to give rise to severe and permanent disease, with the function of hearing much impaired, and not infrequently with total destruction of the organ. Every practical surgeon is well aware of the effects produced by the morbid poisons on this membrane, when they have deeply tainted the constitution, in consequence, no doubt, of sympathy.

#### ACUTE INFLAMMATION OF THE MUCOUS MEMBRANE OF THE THROAT.

In the hope of rendering what I have to say on this subject the more easily comprehended, I shall commence by noticing the various species and localities of inflammation of the throat, according as it presents itself in either the acute or chronic form,—the latter, more particularly, as being that which

has more especial reference to the various morbid conditions of the ear. Acute inflammation of this structure has passed indifferently under the various designations of *cynanche*, *paracynanche*, *angina*, whilst English writers have given it the name of *quinsy*.

*Pharyngitis*.—This inflammation may have its seat either in the mucous membrane covering the isthmus faucium, the tonsils, and velum, or in the pharynx alone. In the former case, the symptoms are, in general, dryness of the throat, with repeated and painful attempts to swallow. The inflammation has sometimes extended towards the Eustachian passages, in the usual seizures of scarlatina and cynanche; rarely it is otherwise diagnosed, by the excessive pain, and weight, and hissing in the ear, increased by noise and mastication. Imperfect hearing is one of the early and well-marked consequences—the patient cannot obtain the least respite from pain; there is sometimes partial delirium. This seldom continues above twenty-four hours before suppuration shows itself at the external ear. It is at this time we may expect much from a well-directed attention to the throat. We know that the inflammation has extended to the Schneiderian membrane, by the supervention of a sensation of dryness of the nostrils, with frequent sneezing, preventing the patient from breathing through the nose, and obliging him to keep the mouth open during sleep. The

supervention of cough and hoarseness announces to us that the inflammation has extended to the glottis and larynx. It is this condition that we have so much to contend with in the chronic form, and which, I believe, is the cause most frequently producing relaxed palate and uvula. Examination of the throat will present to us the membrane covering the velum, uvula, and tonsils, red and swollen, great vascular congestion, intense and general redness, with excessive tumefaction of the back part of the pharynx, and not infrequently combined with enlarged tonsil on one or both sides. The inflammation, if not soon checked, extends to the middle ear, causing agonizing pain, both in the ear and head, on one or both sides; in this condition of the case we observe difficulty of swallowing, and of course all the symptoms of fever.

Pharyngitis of this form sometimes terminates in a few days by spontaneous resolution, or by appropriate antiphlogistic treatment;—in severe cases, no doubt, suppuration sometimes takes place, and an abscess forms either in the uvula or velum. This occurrence will be detected by introducing a finger, when the sensation of a tumour or of fluctuation will often indicate that matter has formed. This is, in general, a mild disease; it is, however, sometimes troublesome from its liability to return, in constitutions marked by the strumous diathesis, from very slight causes, such as exposure to cold,



or sudden variations of temperature. When this disease becomes chronic, as it more frequently does, it is generally termed relaxed sore-throat; it is in this case easily brought on. The patient is then annoyed by difficulty in swallowing, noises in the head, impaired hearing, in consequence no doubt of the extension of the diseased action to the Eustachian passages and middle ear, as well as by a dryness in the throat. When the disease is seated in the posterior pharynx, as in the superior or inferior part, pretty much the same symptoms are found to exist as those just described. This form generally terminates in resolution, though an abscess has been found to form in the lower part of the pharynx, and to carry off the patient by its pressure on the glottis.

When the disease is slight, the remedies for common catarrh will be found amply sufficient for its removal. When, however, it is more severe, it will be necessary to resort to depletion; we must apply leeches freely, either below the jaw or behind the ears, and adopt other depleting measures. Fomentations will also be found of great benefit. There is a condition of this membrane which is left frequently after an attack of pharyngitis, in which it is observed to be raised in patches resembling jelly, and excessively red, interspersed with a follicular enlargement. This is more often attended with deranged general health and impaired hearing, on one

or both sides, and is never effectually remedied by any other plan than change of air, or a residence at the sea-side particularly; the throat gargled occasionally with warm and cold water will also contribute much to produce resolution. Should the disease assume the chronic form, the application of blisters should be resorted to from time to time. When an abscess forms, it should be early evacuated. If the abscess form low down in the pharynx, as occasionally is seen, in order to obviate the danger of fatal consequences from pressure on the glottis, it may be necessary to make an opening into the larynx.

The ordinary and milder form of this disease—viz., the chronic inflammation of the pharynx, and its consequences, namely, thickening of the mucous membrane, and follicular enlargement, with increased size of the tonsils and elongation of the uvula, shall now engage my attention. These morbid results are observed to follow the eruptive diseases, and particularly in individuals of a strumous habit of body. Cases of this description occur, I am well aware, more frequently in children, but it occasionally attacks also the adult age, and is rarely observed without a simultaneous affection of the Eustachian tube and middle ear, either leaving a thickening of the lining membrane, or terminating in abscess.

I therefore urge the importance of an early ex-

amination of the part, as most likely to prevent much mischief, and probably in many cases its destruction. This view of the progress of disease in producing disorganization in these structures has not, in many cases, attracted sufficient attention from modern writers on ear diseases; and it not infrequently happens that our first notice is directed to the external ear when the mischief has commenced in the throat, and which might, by timely treatment directed to that part, have been avoided.

The leading symptoms after such investigation are too well known to require a minute description; but I may remark that any pain or imperfection in the condition cannot be too early attended to by the practitioner.

Inflammation of the mucous membrane lining the Eustachian tube has been described by authors; but their account, in reference to treatment, in my opinion, is far too general, and but little adapted to prevent the mischief extending. We must recollect, however, that without an early attention be directed to this part of the body, we are often called upon to treat an incurable organ. This was formerly of more frequent occurrence than it is at present, principally from the fact of the many observations which have been made and published upon the subject generally of late years, and because it is not so much the custom for persons labouring under diseases of the ear to resort to practitioners but little

acquainted with them; add to this the fact of the surgeon being in general better acquainted with that department of surgery; nor is the medical practitioner so much accustomed in the present day to recommend patients to the care of individuals not educated to the profession.

Some of these affections will be found acute, requiring the most energetic and prompt treatment, although a more chronic form is frequently presented to our notice, particularly after the eruptive fevers. I shall endeavour to point out the necessity of entrusting these cases to none but regularly educated practitioners, as that is the most likely way to prevent these distressing consequences, as also to ensure the safety of the patient's life, many requiring the most active treatment; and it is not sufficient for persons who have merely paid attention to aural diseases to console themselves or delude their patients by imagining that when dangerous symptoms set in they can call for medical aid; which, I regret to say, is the case far more frequently than is supposed, and that often when it is too late. How is it that such individuals can be alive to other symptomatic actions in progress during the attack on the ear, whether near or distant? the treatment of the disease attacking this organ in many instances requiring the same well-directed attention as other organs; this exhibits in a marked degree the necessity for well-educated

medical men undertaking these important affections, which were and are too frequently left in the hands of the unprincipled charlatans who have disgraced this and other countries.

Since so little has been done in diseases of this class, I thought it might be useful to direct the attention of the practitioner to the subject. I am yet further disposed to do so by the consideration of their pathology being obscure, and the urgent necessity there is for early medical attention. The cases I have selected for the purposes of illustration are appended to the end of this Treatise; they will exhibit the origin, progress, various forms, effects, and the best mode of treatment of these diseased actions, as well as their relations to other parts of the economy, and their dependence on the constitution of the patient.

The consequences to which these changes lead more remotely are the enlarged tonsil, the thickening of the membrane, relaxation of the posterior fauces, and often partial obstruction, from extension by interstitial deposition, and opacity of the membrana tympani. The prognosis under such circumstances, more especially if attention be not directed to this part, must be very cheerless, the internal machinery being considerably interfered with through the extension of the morbid action. When the inflammation has extended to the ear in so short a space of time, irreparable mischief is often done to the organ

before assistance is afforded; but it is generally to the more chronic condition of this inflammation that our attention is more frequently called, and our prognosis of course is invariably governed by the condition of the membrana tympani and throat, whether they have been left intact, or have been much injured by interstitial deposition. The inflammation is not equally violent in all cases, and of course our views as to its termination will be guided by the phenomena of mildness or severity which present themselves.

Having said thus much of the acute form, and the necessity for an early attention to the part affected in the course of the disease, I will just advert to the chronic stage—that stage, forsooth, where we are more frequently called upon for advice. This of course will comprehend mere sequelæ—viz., the enlarged tonsil, elongated uvula, the relaxed velum, and the granular condition of the mucous membrane of the posterior fauces, which sometimes extends up the Eustachian passage to the tympanum and its lining. I now allude to young persons, and not to cases where our patient's constitution is known to be affected either with gout, rheumatism, or the like. With respect to treatment, I may say, the only chance of arresting the progress of this disorder, and preserving the ear from its destructive influences, is by the application of leeches from time to time, under the jaw, behind the ear, and to the

throat, which are to be repeated at short intervals. Should the symptoms not yield, we must combine with the leeching febrifuge medicines, and particularly the ant. tart., in small doses; this treatment I have known succeed, and the impairment of the organ prevented in many cases, notwithstanding the appearances and threatening suppuration. The slighter symptoms which may show themselves may be subdued by means of local depletion and small doses of ant. tart. only; but I should scarcely ever feel myself safe in the treatment of such cases without abstracting blood locally, whether the affection was produced by the ordinary cynanche, or occurred as a sequela of the eruptive diseases. If ulceration is established, or suppuration has set in, it will be of no use to pursue this active treatment; although more moderate depletion may become necessary, and an early attention should be directed to any part of the throat where we may expect a purulent deposit; this, when formed, should be at once evacuated, and its extension to the middle ear prevented.

I do not, of course, feel myself warranted in recommending blisters in the acute stage, although in the more chronic form of this disease, or when the tonsil is enlarged, a blister may be applied on each side of the throat with great benefit, and the part dressed with an ointment composed of lard and colchicum. The ordinary local applications are only

to be considered as means of lessening suffering, and thus contributing to the comfort of the patient, and not as checking the violence of the disease. They may be used either warm or cold, according as it may be most agreeable to the patient's feelings. I have found them in the early stage of the disease more beneficial when cold, inasmuch as they prevent in a great degree the progress of the suppuration. Although we may succeed in checking inflammatory action by the means now specified, its effects are not immediately removed in reference to the absorbent glands of the neck, which are almost always involved under these circumstances. Some time is required often for the restoration of the healthy condition of this membrane, and for the removal of the morbid consequences ; the swelling of the side of the pharynx, and the enlarged tonsil remain for some considerable time, and it is not until a more generous diet and probably change of air be adopted, that we find the case permanently relieved.

In the chronic state we may expect much from local treatment—viz. the external application of colchicum; nor do I know of any means more beneficial than this in cases of the kind. As I have considered this morbid condition as very much resembling that of rheumatism in its chronic form, I have administered the guaiacum with great relief, and more particularly I have found benefit in the



application of nitrate of silver in solution to the posterior part of the throat, and internally the quinine combined with the guaiacum.

It is in this form of the disease we are ordinarily appealed to with respect to the enlarged tonsil, and in young people particularly; the speech appears for a time to be thick and, as it were, heavy, and there exists a troublesome nasal catarrh, in which cases we are often tempted to resort to extirpation of the tonsil. And here I beg to repeat, that the evil to be remedied is by no means alleviated by this proceeding; for my experience has, after duly reflecting upon those cases which have fallen under my observation, satisfied me, that after extirpation another action is set up, the nature of which will be alluded to presently. In spite of the confidence which one is inclined to repose in the practice of this operation, I cannot help thinking that it has been too often resorted to, while the relief expected from it may be attained by the measures already suggested. It is not the temporary relief to which we should look forward, but the preservation of organs over which these glands appear to exercise considerable influence. These are not theoretical grounds, but grounds based on long observation—as also on the consideration of the consequences which we see to result. In some of the instances which have come under my observation, the removal of the gland has benefited the patient merely for a few days, the inconvenience

returning often with equal violence, much to the disappointment of the surgeon.

## DISEASES OF THE TONSILS.

Inflammation may attack the clusters of follicles in the pharynx, which, being connected with cellular tissue, form the tonsils. The symptoms of this inflammation are, a sensation of dryness, heat and pain in that part, with pain in swallowing. The ordinary secretion which lubricates the throat being suspended, will account for the sense of dryness in that part: subsequently, however, the secretion is augmented. The inflammation which at first attacks the tonsils, extends also to the uvula and palate; the former of which becomes elongated, and irritates the epiglottis. Deglutition is painful when both tonsils are swollen.\* Sometimes the tonsillary inflammation extends along the Eustachian tube, and causes pain in the ear, and deafness; difficulty of breathing may also be produced by the pressure of the tonsil on the windpipe; this dyspnoea may also be accompanied by some change in the sound of the voice. To these local symptoms are added

\* In inflammation of the amygdalæ, the pain which some patients complain of in the interior of the ear, more especially at the time of yawning, the crepitation which they experience there, and the partial deafness associated with these phenomena, incline one to suspect that the inflammation then extends to the Eustachian tube.

those of inflammatory fever, pulse accelerated, full or hard, heat of skin, headache, and great thirst.

This inflammation may terminate either in resolution or in suppuration. When purulent matter forms in the tonsils, it is announced by the pain of the early or acute stage gradually becoming more dull, whilst the difficulty of breathing and of swallowing is increased by reason of the increased tumefaction of the tonsils. An examination of the throat with the finger will detect the existence of matter by the evidence of fluctuation in the tonsil, or by the pointing of the abscess. This abscess may burst either during sleep, or whilst coughing. The pus is always fetid.

The course of the inflammation is not always the same in both tonsils; there may be an abscess in both, but in general it is only in one. It has been frequently observed that though, in general, the tonsils resume their natural size, these bodies, after being inflamed, remain for a long time enlarged, accompanied with chronic inflammation of the investing mucous membrane, and relaxation of the velum and uvula.

Tonsillitis very rarely terminates in gangrene.

*Treatment.*—Bloodletting to be proportioned to the intensity of the symptoms. When the case is a mild one, the local abstraction of blood will suffice—in all cases, it may be stated that the local symptoms are much relieved by the application of leeches

under the jaw, or by cupping behind the ears, or on the back of the neck. Scarifying the tonsils has also been found serviceable.\* After the abstraction of blood, purgation by the common cathartics must be resorted to. We should administer the common saline remedies. With respect to local treatment, I should recommend the external application of colchicum, either with soap liniment, or singly, as most likely to offer relief. Should these measures fail in producing resolution, it may be found necessary to promote suppuration; this is to be effected by the application of hot poultices, and the vapour of warm water.

In angina tonsillaris, Velpeau has used alum as a local application during the first stages of the disease. He found it, indeed, beneficial at any period before suppuration has been established. The alum is to be applied in the form of powder,

\* "When any of the exanthemata, or any other disease, induces sore throat in persons of a strumous habit, we may depend on having enlargement of the tonsils. This is of more frequent occurrence in children than in adults; I would by all means recommend early attention to the circumstance, as in the event of these glands becoming much enlarged, considerable inconvenience and sometimes danger may be occasioned to the patient, in case cold, inducing sore throat, should come on. In such cases, the tonsils on a sudden take on a great increase of size, so much so as to cause considerable alarm."—*Andr.*

Whether Andral is correct in considering the chronically-enlarged tonsil as the irritating cause of the sore throat in the first instance, as he states in a passage presently to be cited, I shall leave to others to determine.

by means of the finger, to the fauces and parts inflamed. After its employment, Velpeau tells us that the symptoms are stopped as if by enchantment, the redness and swollen state of the inflamed parts subside, and convalescence soon returns. I have for some time discontinued the method of treating anginose affections with alum, having so often found it to fail; there have, however, occurred to me instances in which I have experienced great benefit from this practice.

*Hypertrophy of the Tonsils.*—In some instances this may be congenital; sometimes it seems to be hereditary, and is often associated with traces of the scrofulous diathesis;\* we have above alluded to the fact of its being the result of repeated attacks of inflammation. When it is the result of inflammation, it is in general accompanied with induration. This is a troublesome affection, by its impeding deglutition, and sometimes interfering with the respiration.

\* “Hypertrophy of the tonsils may exist unattended by induration: it is frequently accidental, but is sometimes congenital. It generally becomes a permanent cause of irritation to the neighbouring mucous membrane, producing frequent sore throats. Here, then, is an instance of the development of a tissue beneath a mucous membrane being a cause instead of an effect of an acute or chronic irritation of that membrane. It is, perhaps, also worthy of remark, that in many persons whose tonsils thus present an excess of development, (a disposition known to be hereditary,) we likewise observe a bad conformation of the thorax, and other characters of the scrofulous diathesis.”—*Andral's Path. Anat.* v. ii.

I have for some time been in the habit of using the cod-liver oil in strumous enlargements of the tonsils, and with excellent effect. My experience of this medicine warrants me in saying that it is capable, more than any other medicine, with which I am acquainted, of reducing to their normal size tonsils that were enlarged from a very early period of life. I generally employ at the same time the external application to the throat of tincture of colchicum (wine of the seeds) combined with soap liniment, night and morning. In cases where this mode of treatment failed, I have seen much benefit derived from the use of the tincture of guaiacum taken internally twice a day.

*Disease of the Follicles of the Tonsils.*—We occasionally find the follicles themselves (independently of the cellular tissue in which they are embedded) as well as their lacunæ or orifices, and the fluid contained in their cavities, liable to morbid alteration. The follicles here are prone to the same changes as those of mucous membranes in other parts—viz., inflammation, enlargement, &c. The fluid secreted by them may be changed into pus, or into a concrete substance, like tuberculous matter, or into a calcareous concretion.

On the pathological anatomy of the diseased tonsil, Andral thus says: “Of the numerous follicles that open on the surface of the stomatopharyngean mucous membrane, those whose assem-

blage forms the tonsils are subject to several morbid alterations that deserve a particular description. The seat of these alterations is sometimes in the cellular tissue situated between the follicles, which may either be simply congested, secrete pus, or become indurated and enlarged, thus producing the so-called scirrhus state of the tonsils. At other times it is the follicles themselves, as well as the lacunæ into which they open, that are altered either in the texture of their parietes, or in the fluid contained in their cavities. Their parietes, like those of every other follicle, are found, according to the case, either in a state of simple hyperæmia, or of hypertrophy, induration, or softening. The fluid naturally secreted by them may be modified in its quality, so as to become either pus or a concrete friable substance, like tubercle, or one still more solid, of sufficient consistence to be termed a *calculous concretion*, and varying in size from the bulk of a grain of millet to that of a kidney-bean.”\*

\* The composition of tonsillary calculi has not received much attention on the part of writers; those of which Monro gave the analysis were of a white colour, internally opaque, with a yellowish tint in the centre, and slightly grey at the circumference; their section presented some concentric layers of a more brilliant white colour than the rest, but without any central nucleus: examined with the lens, they appeared formed by the agglomeration of a great number of small grains; their analysis yielded a white substance floating on water, and had the qualities of coagulable albumen, phosphate, and carbonate of lime.

Having now come to the consideration of the tonsil in a state of chronic enlargement, I beg leave to state that I have been long satisfied that we should look upon such instances as the result of constitutional debility—very closely resembling those enlargements and infarctions of the cervical glands, as well as the glands of other parts of the system, so frequently observable in persons presenting the scrofulous habit; still, notwithstanding the prevalence of scrofula, and the great opportunity of observing the various and protean forms under which this many-headed monster is seen, we do not possess anything like a clear and succinct detail of the special conditions under which such enlargements occur, nor of the methods of treatment respectively suited to them.

Although we may have checked the immediate attack of inflammation, we have now very frequently a very troublesome chronic tubercular condition of the mucous membrane as a sequela; and it is to this condition that I am more particularly anxious to direct attention—a condition, in fact, so ably described by Dr. Greene, that with him I shall take leave to give the name of follicular enlargement to this state of the membrane. I believe it is this condition and the habit of body accompanying it, that so often terminates in enlargement of the tonsil and elongation of the uvula—more particularly in children after the eruptive diseases; and which by its exten-



sion to the Eustachian passage and tympanum, not only produces dulness of hearing, but sometimes the destruction of the organ itself.

This morbid action of the mucous membrane I have traced in some cases, by dissection, to the middle ear, producing the granular appearance throughout the membranous expansion. In the case of James South, who was admitted a patient at the Infirmary two years since, and whom I had the opportunity of inspecting *post mortem*, the disease not only affected the respiratory apparatus, but extended to the brain, and was attended with all the symptoms of tubercular meningitis. When first applying to the Infirmary for Deafness, he had enlarged tonsils and elongated uvula, with a copious distribution of the follicles over the membrane, and thickened nasal discharge, with impaired condition of both sides. The boy I had the opportunity of seeing from time to time, and therefore could ascertain the progress of the morbid action. As I had but little expectation of relieving him by any surgical assistance, he was forthwith placed on a constitutional mode of treatment; but little was effected, either as to the pains or the disease; the headache which accompanied the attack was so intense that but little hope could be expected from remedial means. It was often associated with vomiting, which occurred at frequent intervals. As the progress of this case was interesting, I was

anxious to investigate the appearances, and I found the follicular deposit extensively distributed, not only over the middle ear, but to the membranous expansion of the cranium and brain. This condition, in large cities, is not at all infrequent, and I have many such constantly under observation. I think it obvious, in this case, that any operation on the throat, either as regards the tonsils or uvula, would have been useless, although the difficulty in swallowing and the nasal discharge strongly pointed to such mode of treatment; and as I had also the advantage of seeing, at the same time, two cases wherein the tonsils had been extirpated, but with no relief, the symptoms pretty much resembling the former case, it was not likely such practice could avail in this. After a tolerable experience in the every-day results of excising the tonsils or uvula for the temporary relief of deafness, I have satisfied myself that but little, if anything, is to be expected from it.

In the quotations I am about to make from Dr. Greene's work, it will at once appear that the condition of the mucous membrane of the mouth and pharynx which almost invariably accompanies tonsillary enlargement, closely resembles the state of the same membrane, so graphically described by him as manifesting itself in those who show in other forms unmistakable signs of the strumous diathesis. In some cases where the scrofulous manifestation is

but slight, or almost null, every observant individual has often been made sensible of a morbid alteration in the secretions of the mucous membrane of the mouth, fauces, and throat, when he has been compelled to breathe, even for a short period, the pent-up and vitiated air of a crowded room. When we reflect on the extensive mucous surface of the respiratory apparatus thus deleteriously acted upon, and that, without a perfect performance of the functions of this membrane, those important alterations in the blood, so essential to the health of the individual, cannot be properly effected, we wonder that, under these circumstances, changes still more pernicious than those ordinarily observed, are not more frequently produced.

I have examined to some extent, the structure and physiology of the numerous glandulæ, or mucous follicles, which are found scattered along the whole extent of the lining membrane of the respiratory tubes. These glandular bodies are themselves the primary seat of important structural changes. That peculiar affection of the throat which, under the appellations of "Bronchitis," "Chronic Laryngitis," "Clergymen's Sore Throat," &c., has occurred, especially during the last ten or fifteen years, so frequently among public speakers and others, consist primarily and essentially, as I shall be able, I think, to demonstrate, *in a diseased condition of the glandular follicles of the mucous membrane of the*

*throat, larynx, and trachea.* Commencing, generally, in the mucous follicles of the isthmus of the fauces, and of the upper portion of the pharyngeal membrane, the disease may be extended, until the glandulæ of the epiglottis, larynx, and trachea, and sometimes those of the œsophageal membrane, are extensively involved in the diseased action.

The structural changes to which the mucous follicles of the throat and air-passages are liable, are *Inflammation*, which may result in *Ulceration*, *Hypertrophy*, *Induration*, or in a *Deposition of tuberculous matter in the follicles themselves*, attended, in most of these conditions, by a greatly increased, and vitiated mucous secretion.

The disease of the mucous glandulæ may be *primary*, and *uncomplicated*, and be limited, entirely, to the fauces and pharyngo-laryngeal membrane; or, it may be *complicated* with *hypertrophy and induration of the tonsils*, and with *elongation of the uvula*. It may accompany, or be consecutive to, other affections of the air-passages, and co-exist with *Laryngitis*, *Bronchitis*, or with *Pulmonary Phthisis*.

*Description of Follicular Disease of the Air-passages.*—This peculiar malady consists essentially, in its formative stage, of an inflammation of the mucous glandulæ, which is sub-acute in its character, and which may result, as above stated, in hypertrophy, ulceration, or induration of these

glandulæ, or in a deposition of tuberculous matter into the substance of the follicles themselves.

In all cases of sub-acute inflammation of the mucous follicles, the tendency of the morbid action is to terminate, ultimately, in ulceration; although, as we have seen, these glands may remain, in a state of hypertrophy or induration, in some instances, for years, before this form of structural lesion shall occur. Ulcerations of the follicles of the air-tubes differ essentially in their appearances from those ulcerations of the mucous membrane, which are the frequent consequence of inflammation of that tissue. In the latter, when the result of chronic inflammation, the ulcer commences by destroying the epithelium, and then, extending its circumference and depth, penetrates the mucous tissue, and appears in the form of a superficial ulceration, with irregular edges, and a rough, sloughy base.

*Causes of Follicular Disease of the Air-passages.*  
—It is customary with writers to arrange the causes of disease ordinarily under three separate heads;—the proximate, the predisposing, and the exciting.

In a former chapter I have stated that the disease which we have been considering, consists, primarily and essentially, in a morbid condition of the glandular follicles of the aërial mucous membrane. Understanding the term, proximate cause, to be synonymous with the disease itself, I shall refer the

causes of follicular inflammation to two distinct heads only,—the remote or predisposing, and the immediate, or exciting.

*Hereditary Tendency.*—One of the most important among the remote causes of this affection, is a constitutional predisposition. That there exists in some families an hereditary tendency to follicular disease, is a well-established fact.

The presence of a strumous diathesis, awakened by any means in individuals who were born without any hereditary tendency to disease, may prove a remote cause of this affection. All those influences, in short, which tend to induce a cachectic state of the system, predispose the individual to follicular disease; and among these influences, no one stands more prominent than that of impure air;—such an air, for example, as clergymen, teachers, lecturers, and other public speakers, are frequently compelled to breathe in crowded and ill-ventilated churches, lecture-rooms, &c., which we know to be not unfrequently the case. The absence of manifestation by no means proves that the individual has not the principle of scrofula implanted in his constitution.

On this point Mr. Vincent observes: “A material point of the inquiry into the natural history of scrofula, must be that of estimating the influence of its manifestations on the system. I think the prosecution of such an inquiry will not lead to the

conclusion, that this complaint so far encroaches upon the powers that sustain life as to be intrinsically fatal. We frequently see persons who, when young, had suffered from scrofulous affections, and who, having passed over the impressions the complaint had made, have afterwards enjoyed a fair share of health, and lived in comfort to a good old age. The fact is, that great manifestations of the scrofulous constitution may go on, and yet the ordinary process of health be little disturbed, the powers but little impaired, and the functions of life very little interfered with.

As the local affections are found in such a variety of situations, we are not aware that the mere disease, when seated in parts not essential to the maintenance of the vital functions, ever is destructive to the actual existence of life; or at least it must go on to derange the structures on which it is implanted to such a degree, that from any other cause the same series of affections would place the constitution, by the great disturbance they create, in imminent peril. Tubercles, if not in such number or degree as seriously to interfere with the functions of the lungs, do not necessarily endanger life; and we find that scrofulous disease of joints does not influence the system so injuriously as to derange the functions of life, until it has proceeded so far as to destroy the essential structures of the part.

In seeking some of the conditions which the series

of local affections of scrofula seem to point out, I have insisted that one of these is the liability to change of seat; and it may well be suggested by an inquirer, whether this change of locality may be effected by artificial means, and the local disease be removed from one affected part to another of less importance. An investigation that could lead to an affirmative result on this point must be of interest to the surgeon. We have instances of the translation from a greater to a less state of disease in some of the joints, particularly in scrofula, which cannot be set down, in reference to its manifestations, as a persisting disease. We see persons of advanced age who have had scrofula in their youth, and are then quite free of any appearance of its existence; and I believe we never see the local disease going on in very old patients. It is a state that unfolds its character in early life, and languishes as the period of existence declines. If this view of the subject be correct, the surgeon has the greatest responsibility thrown upon him in the management of scrofulous complaints, by having recourse to operations on account of them, which should only be resorted to when the life of the patient is in danger.

It has been asserted, and the opinion seems to have obtained some influence over the minds of practitioners, that scrofula is a mere state of weakness of constitution; but if we are to measure weakness by the want of energy of the mental



powers, by the languid state of the circulation, or the absence of muscular strength, or by the weak powers of the stomach, and therefore deficiency in the means of receiving nourishment in the individual, we do not find that in any of these conditions the scrofulous subject is in a state inferior to a large class of individuals who are set down as being healthy. We do not find that the pulse varies in any degree proportionate with the local scrofulous disturbance, nor does the mischief going on in the parts disclose any influence over the natural functions of the body, that necessarily proves that weakness is a feature to be delineated in the portrait of scrofula.

There is a condition under which scrofula exists, that must have attracted the notice of observers, and which is of the utmost importance in its practical bearing, as it affords a valuable principle in the treatment of the complaint. I allude to the tendency which there is in scrofula of varying its local manifestations. And this change from one spot to another will even take place several times before any alteration of the structure takes place in a particular part. It would almost appear to be fugitive in its attacks before it settled down to one part.

These local affections, which may all be placed in the class of scrofulous disease, would abide a limited time, although not exactly in the order in which I

have placed them, and afterwards recede, another local expression making its appearance, and proving that the activity of scrofulous manifestations was not subdued, and that if the state of disease did not permanently fix its locality, yet it preserved its active energies to infringe on the natural state of healthy structures. These cases appear to me to prove that it is one of the laws of scrofula to be changeable in the parts it fixes upon as the seat of its local expression; and that it will have scope to exercise its energies.

If the local affection has so far advanced as to produce an absolute alteration in the structure, it then seems as if it had scope enough for its excited energies, and becomes stationary until its course is run out. And as all the processes of life are not infringed upon by this superadded derangement, and it, as it were, exists under an associated arrangement with all the natural functions, so it is well for the patient if this local manifestation does not attack parts that are essential to existence. When the excitability of the complaint has been roused into action, it will display its character until it is subdued, either by the change which years may cause in the constitution, or by the fulfilment of that period which limits its power, a period which it is not unreasonable to attribute to it. We find that if the constitution be relieved from one local affection by an operation, or the erroneous

interference of surgery, this effort to go into action will quickly seize upon another seat to exercise its persisting power. I have no hesitation in saying that the removal of scrofulous limbs, when the patient has appetite and sleeps well, is far from maintaining the scientific character of the profession. I have been impressed with the greatest regret at so often being unable to persuade mothers who have consulted me for inflamed cervical glands in the persons of their daughters, that if an evil is to be attached to them in some form of this complaint, they should be contented that a daughter may be preserved to them at the expense of some disfigurement in the neck of the young lady. *And I regard it as a fact, that by the complaint fixing in these parts, there is a reasonable assurance that the lungs may continue free from disease.* It has happened to me to know a family of young ladies, where one, in whom the glands of the neck suppurated, remained afterwards in good health, whilst the sister (who was free from this symptom) died of phthisis.

This condition is daily seen at school-houses, cases in which, when the external action of the glands had subsided, the patients became invariably attacked with internal disease, more especially that of the lungs, and it has been my practice of late years to disregard all local attention to the part affected, and to direct all my care to the improvement of the constitution.

As the absorbent glands, particularly those of the neck, seem to be when inflamed the safeguard of the lungs, so I believe this sanitary influence is more apparent when they are in an active than in an indolent state. It must be a common observation that there is very great variety in the degree of activity with which the suppurative process advances in these glands; and probably the lungs are under less security when the glands are slightly inflamed than when the peculiar scrofulous influence is active and energetic. Indeed, it is consonant to what has been before noticed, that the mutability of its seat is most common when its local manifestations encroach but slightly on the natural structures of the parts in which it fixes.

As we assume that all scrofulous complaints are but an expression of that state of constitution which we understand by the term scrofula, so it must of course be true that the condition of scrofula being supposed to exist, the manifestations of this state may be brought out by contingent circumstances, as well as by spontaneous evolution.

The scrofulous affection which indicates most decidedly the limitations under which the manifestations of the complaint exist, is the enlargement of the tonsils. These cases are more common in the female than in the other sex, and are rarely found after thirty years of age of any troublesome size, however large and embarrassing they may have

been at more early periods, particularly in that of childhood. I have seen very many exceedingly enlarged tonsils, producing the greatest annoyance in patients at fifteen or twenty years of age, which have gradually shrunk or assumed the natural size by the time that the subject had arrived at the age of thirty. *If we consider the great utility of these glands in secreting a mucus of a peculiarly lubricating kind, so valuable in the economy of deglutition, I cannot regard it as good practice to remove these parts so unsparingly as I have known to be often done.*

There appears to me great caution always required in the management of absorbent glands when inflamed, or in a state of irritation; but this discretion is still more necessary to be observed when the affection is a manifestation of scrofula, although a remarkable difference exists between the scrofulous affection and the inflamed state of glands from other sources of excitement. The absorbent glands inflamed from ordinary causes have, except in very robust persons, a most depressing effect upon the powers of the constitution; whereas the scrofulous attack seems to call forth no sympathetic and lowering state. But they sympathize most readily with the slightest irritation of the surface in their neighbourhood. If anything more particularly can excite absorbent glands, it is irritation of the skin. The surgeon does not find in his operations, where

the integument is fairly cut through, that the absorbent glands are irritated; but he knows full well how much and how readily they are irritated by a slight abrasion of the cuticle."\*

Having now traced the mucous membrane through its various ramifications, scil. as affording a covering to the velum pendulum palati, as also to the tonsils and uvula, and then its distribution to the pharynx, its entrance into the Eustachian passage, its giving a lining to the tympanum, the membrana tympani, etc.; having touched also on the various appearances which this membrane presents when diseased, we now come back to the tonsils, and consider more particularly what line of treatment is to be adopted when these bodies have become the seat of disease, more especially that of enlargement, and what there is in either their structure or in their pathology which can call for any particular mode of treatment different from the treatment indicated in affections of other glandular bodies. Dissection shows us that, in chronic enlargements of these bodies, the direction they take is downwards and forwards, and consequently, from the considerable distance they are removed from the aperture of the Eustachian tube, it is impossible they should offer any obstruction to the ingress of air into that tube, and it therefore follows that enlargement of these bodies can *per se* have no

\* Vincent.

relation whatsoever to impaired audition. What advantage is gained, therefore, by removing the enlarged tonsil? Do we thereby increase the facility of entering the Eustachian passage? My experience induces me to think not. We have in another part of the work adduced Kramer's testimony on this important question, where he denies most positively that enlargement of the tonsils can interfere in the remotest degree with the function of hearing.\* I am enabled to say, from my own practice in the Dispensary, that no greater disappointment can or will be felt, than by the surgeon who undertakes the apparently trivial and easy operation of removing the tonsils, in the hope of relieving deafness. As I have already stated, these glands bear no relation whatever to the aperture of the Eustachian tube, and their enlargement serves but to place them at a still greater distance from such aperture. With respect to the line of treatment which I would recommend in cases of enlarged tonsil, whether such tonsil be hypertrophied or indurated, I would in the first instance administer the bichloride of mercury in small and divided doses, combined with tincture of rhubarb and of bark, to be taken at bed-time; I also advise tincture of colchicum (the wine of the seeds) internally; enjoining at the same time an external application of the colchicum, combined with soap liniment, to be rubbed on the

\* See page 21.

neck. There are cases, as already stated, of tonsillar enlargement in which much benefit has been derived from the internal use of cod-liver oil. This treatment, however, seems more particularly adapted to cases where a decided scrofulous character predominates. This condition, I think, prevails more in children under puberty, and in whom the health is very much below the ordinary standard.

No single remedy can be relied upon, nor do I hold out any specific power in colchicum as a panacea; but of all those medicines that have been recommended for the discussion of these troublesome glandular affections in a chronic state, I think it will be found the best. But as the change of the constitution is to be promoted, I have found also a change in the remedy sometimes necessary, the habit approaching very much that of the scrofulous diathesis; of course all means adapted to amend that condition should be employed.

I have long since thought, from many specimens of these diseased tonsils which I have examined after extirpation, having had also the opportunity of investigating their history, that their contents resemble very much those concretions found in the joints of gouty and rheumatic patients, and hence it occurred to me that these concretions might be amenable to the same mode of medical treatment, and the control of the same medicine, viz., *Colchicum*, as the gouty concretions themselves. Expe-



rience has fully borne me out; for in the public establishment with which I am connected, very many opportunities occur which verify the correctness of this my opinion.

Enlargement of the tonsils is sometimes accompanied with enlargement of the sublingual and parotid glands, as well as of several glands about the angles of the jaw. I have in the course of this work cited (see p. 32, *et seq.*) a case in which the tonsils were removed with the expectation of giving an impetus to their absorption. The tonsils, however, sometimes grow to an enormous size, and are sometimes found, on a *post mortem* examination, to contain a gelatinous substance, thick, ropy, and sometimes mixed with white concretions; they appear to occasion no pain, nor inflammation, if left untouched. I have seen such tonsils extirpated without any advantage—on the contrary, with marked disturbance of the entire system.

These cases are presented to my notice continually, both in the adult and child; and among them I can scarcely recollect one where the tonsils were extirpated, in which the inconvenience of the patient was not greatly increased, and the disease itself much aggravated; in these cases, I have but little hesitation in saying, that had the constitutional means recommended by me in the course of this work been adopted and persevered in, not only would the enlargement of the tonsils have been

discussed, but the deafness itself alleviated, if not entirely removed. Such errors are so commonly and so heedlessly committed, that they may be considered to have become contagious; there are persons who are urged almost instinctively to follow the beaten track, more especially when such track has been chalked out by those endowed with weight and a sort of authority. I beg leave to address these remarks more especially to those who may not have had the opportunity of witnessing the results of such treatment. This is a point of practice which I do not believe has ever been clearly pointed out.

By the bye, another defect for which removal of these bodies has been most strangely and unaccountably suggested is defective utterance. Now, how such an expedient for removing that painful and distressing condition could enter into the head of any one, I cannot conceive. That removal of these bodies will produce a modification of the voice, I have abundant proof; but what it can have to do with articulate speech, I am wholly at a loss to see. I have at present under treatment several patients whose voice has been materially injured by this operation, and whose blind credulity led them to expect much from it. In so painful and distressing an affection, one cannot be surprised that any measure holding out a hope of such speedy relief should be eagerly grasped at. When the gland,

which in these cases is enormously increased, is *freely removed*, the discomfort occasioned to the patient by the loss of its normal secretion, the difficulty of deglutition, arising, perhaps, from the atrophied condition of the pharyngeal muscles, the deterioration of the voice probably from the same cause, the interruption, too, occasioned to the normal conduction of nervous power to the part—all decide me in preferring to recommend a patient to trust to the tedious and lengthy process of submitting to a rational and well-regulated mode of treatment, rather than submit to an operation, the result of which is, to say the least, so very equivocal and uncertain.

I trust in what I have now said I shall not be charged either with an affectation of novelty or with a wish to throw into the shade those who may hitherto have abetted excision. The very great frequency of this operation is what I would most eagerly deprecate. The instances of individuals who have submitted to it, complaining of great discomfort, as resulting therefrom, are numerous beyond belief. Once, again, I would refer to the important sympathies subsisting between these glands and distant organs, and referring to the pathological nature of the enlargement of the gland, and to the class of disease to which such enlargement belongs, I would sincerely recommend an appeal to be made to the same remedial treatment

here as is employed, and so successfully employed, in affections of the same class. *En passant*, I wish here to observe, that simultaneously with this enlargement of the tonsils we frequently find follicular enlargement of the entire mucous membrane in the neighbourhood—nay, this same follicular enlargement extending even to the Eustachian tube itself—all plainly showing that the deafness which accompanies tonsillary enlargement, and which is erroneously considered as a consequence of such enlargement, is but part and parcel of the same diathesis which produces the follicular disease, and consequently demanding the same mode of treatment—viz., constitutional.

Mr. Vincent appositely expresses himself on this subject:—"I am convinced of the salutary effect of sea-air upon scrofulous diseases. I think it will be allowed that there is a striking difference in the ordinary effects of this air over that of inland places, as I know the careless exposure to it does not bring the train of complaints which are included in what are called colds. I attribute the great benefit which the sea-side produces in cases of scrofula, to the saline particles with which the atmosphere is charged, and with which the surface must be continually in contact, producing a healthy stimulus to the body; at all events, the influence of the sea-air over scrofulous complaints is most unequivocal.

We find, also, that slight hurts, such as bruises

and excoriations, will heal much more readily at the sea-side than elsewhere. It must, however, be borne in mind that one summer's residence at the sea-side does not often prove the value of the remedy, and that it may be requisite to pass two or three seasons in this manner before the patient derives permanent benefit. The influence of sea-water has also a striking effect; by altering and improving the condition of the surface of the body, it adds vigour to the circulation of the skin, and renders it more than usually sleek. I must not omit the hard brush as a very useful auxiliary in the adoption of means for relieving scrofulous complaints, as it is a remedy well calculated to keep up a healthy state of the surface of the body. The surgeon, in inspecting, as he is called to do, patients in all classes of society, cannot fail to observe the advantage the hard-working poor, when not worn down by sickness, have over the rich: we find their skin, when clean, smooth and healthy. When we view the various circumstances arising out of the state of the atmosphere injurious to health, and see a large class of mankind, such as labourers in the fields, soldiers, and sailors, who often carry on their occupations exposed to all the variations of the weather; and compare this scene with the great care the well clad and luxurious take to guard against the slightest catarrhal complaint, we must feel that if the positive nature of the classes do not differ, there must

be some counteracting causes to protect the lower orders. It is in this very labour that they possess a safeguard for the protection of their health; for the great friction of the skin which the clothes of workmen produce on the surface of the body insures to them the power of resisting many of the deleterious influences of cold and wet. The hard-working man, if he avoids irregularities in living, may, with all his privations, enjoy a good share of health and long life. I think the use of the brush is very contributory to the preservation of health, and that it has a singular efficacy when employed in scrofula.”\*

#### SCROFULOUS SORE-THROAT.

In the 26th volume of the “Dublin Journal of Medical Science,” Mr. Hamilton, among his cases of hospital practice, states, that he observed of late several cases of sore throat, which, judging from their particular characters, their long duration, and

\* “It is now well known to all experienced and scientific physicians, that chronic functional diseases of long standing can only be thoroughly cured by such general and comprehensive means as act on the whole system, and for a certain period of time influencing the nutrition in its source, not merely by the supply of wholesome elements, but by keeping the nutrient function active and vigorous over the entire fabric, by an agreeable distribution of blood and nervous influence, and consequent energetic action of all the secreting organs.”—DR. FORBES’S *Physician’s Holiday*.

their resistance to treatment, seemed to constitute a form of this disease but little understood. According to him, this affection is connected with the scrofulous diathesis, and presents itself under two forms, which may be isolated or combined, the *mild form* and the *severe form*. In the former there is a sensation of pain and dryness in the throat; every morning, when the patient gets up, he detaches with difficulty, and spits up crusts of bloody mucus. The posterior part of the pharynx is covered with a greenish slimy matter, and when this coating is removed, the mucous membrane is observed to be of a dark-red colour, and granulated on its surface. If the symptoms are of long duration, or more intense, an ulcer is discovered more or less extensive, (the lower edge of which often cannot be perceived even by depressing the tongue very much) with irregular edges, not deep-seated and uneven, covered here and there with granulations, and covered over with a slimy, muco-purulent matter, of a greenish yellow colour. This affection does not always produce any pain, but it is often coincident with disturbances of the constitution, a yellow colour of the skin, general emaciation, and acceleration of the pulse. We find it sometimes coincident with phthisis pulmonalis. The ulceration is not always confined to the back part of the pharynx; it may extend to the pillars of the soft palate, to one or two tonsils, but more frequently only to one.

In the *severe form*, whether the preceding symptoms are observed, or the pharynx presents no alteration, the ulceration is deeper, and attacks the soft palate, a part of which it destroys, the uvula for instance. In one case, where the disease was of six months standing, the posterior part of the pharynx was covered with a greenish slimy matter; there was a wide, deep, irregular ulceration, which had destroyed a part of the soft palate, and of the palatine vault: the little finger passed freely through this opening. The quality of the voice was much less altered than one would have supposed; but the uvula, which was detached and hanging in the throat, was constantly exciting cough; and when the patient attempted to swallow, fluids passed into the nasal fossæ. In general, this severe form does not give rise to much pain; there may, however, be a great deal of it, for instance, very acute pain towards the ear, when the inflammation extends along the Eustachian tube. There is also another symptom which sometimes shows itself; and that is a very great sensibility of the skin of the cranium; this sensibility has its seat in the vertex and occiput, and is produced on passing the comb through the hair.

I have been at some pains in collecting evidence in respect to this hypertrophical condition of the tonsils; some, I have found, dated from childhood, and had existed for years, and had never been



accompanied by induration. It is this peculiarity of structure which so often gives rise to the impaired hearing on any seizure of cold, and for which they have been so unceremoniously removed. It is not uncommon, however, to find some, from chronic inflammation excited in them, for a time become indurated, a condition very much resembling scirrhus in its hardness, but, when removed and examined, generally found filled with phosphatic concretion. This degeneration, in fact, I believe, to be very rare, as I cannot find a specimen of such altered structure in any collections I have examined, which, as I have before hinted, is very much under the controlling power of colchicum, which not only reduces their size, but in a great measure remedies the altered condition of the mucous membrane of the throat.

Having alluded to the tonsil and uvula as a part only of a diseased condition of the mucous membrane, and having shown the inutility of its extirpation, I will just observe, that it is sometimes excised with the view of enlarging the entrance to the Eustachian passage; now this, I think, is shown not to be the case either as to the position of the Eustachian tube, or, in fact, as to the growth of the diseased tonsil; and the only cause I can at present see giving us the slightest uneasiness as to a complete closure, is from ossification, the next from sloughing and

ulceration of that part crossing the entrance of the tube; the closure in the more ordinary cases is but temporary, from simple swelling of the lining membrane, and by far better treated constitutionally than by instrumental means.

What advantage do we gain from the removal of the enlarged tonsil? Do we thereby increase the facilities of entering the Eustachian passage? and, if so, what benefit can be expected from catheterizing a tube which is already the seat of a diseased action. Cases are continually brought under my cognizance in which the catheter has been used for more than six months, two and three times a week, without any good effect. Some of these individuals subsequently came under my observation, and were very considerably relieved from having a course of constitutional treatment adopted, instead of that which had been previously practised, viz., that which was purely mechanical. I am free to confess the difficulty attending the treatment of these cases, and the slow progress made towards a cure; but after having investigated with much care the nature of this deafness, which it has been so much the custom to attribute to mechanical obstruction of the Eustachian tubes, dissection has shown us that such obstruction by no means exists merely in that part of the tube which the catheter enters, but is more fully developed throughout the middle ear. Cases are

not wanting where this condition of parts can be shown which have been accompanied by chronic enlargement of the tonsil.

We scarcely pass a person in whom some of the changes alluded to as occurring in the uvula, do not present to our notice the œdematous condition after catarrhal affections and elongation, but in whom, however inconvenient this may appear, the smallest portion only requires removal; total truncation I have seen causes all the distressing effects before observed, and occasions great inconvenience by the food irritating the posterior nares.

The great objection I have found in many cases to excision of these enlarged glands is its embarrassing nature, as well as the occasional difficulty of performing the operation, particularly in young people; and in irritable states of the throat it, as I have before observed, predisposes the patient, if young, to bronchial irritation and cough, on the least variation of temperature. These results were noticed by Laennec, and I find observations very like to them made by Rokitansky — viz., that glandular swellings or any stoppage to the free aëration of blood was a preventive of tubercular deposit; this I have seen so often arise in school houses, where external glandular diseased action had been actively treated with the view of cure, that I have of late followed very much the view laid down by Dr. Vincent—viz., that while

the external glands were enlarged and active, we might feel satisfied that the internal action was at rest; it would therefore appear that much caution was required ere we exposed the patients to such operations; in fact, they may almost be said to be a safety-valve to other progressive actions on the lungs.

This inflammatory action or granular condition of the mucous membrane of the pharynx may be subacute in its character, or it may become more active, and, as a general rule, always accompanied with impaired hearing, according to its gravity, but often in its most acute form there is only a little hoarseness, and the other concomitants of a common sore throat, but with less of that pricking pain, less fulness of the tonsils, less stiffness of the jaws, and less feverishness of the general system than usually accompany common inflammatory sore throat. The fauces, however, with the velum, the root of the tongue, and back part of the pharynx, are both red and swollen, the mucous follicles enlarged, and the secretion from them thin and scanty. Sometimes with the diminution of the secretion it is more frothy and adhesive than usual, producing a feeling which excites the patient to be continually hawking it up. This active stage of the malady is often confounded with common inflammatory sore throat, and the patient will refer to this or that occasion as having given him the cold which he supposes has produced it.

After this state has continued for a longer or shorter time, the inflammatory action will either cease or assume a chronic form, lingering about the mucous follicles, and the type which the malady will take will greatly depend upon the state of the digestive organs and the general healthiness of the system. If the health be tolerably good, or the dyspepsia from which the patient suffers be of a mild character, there will only result from this previous state of inflammation slight effusion into the contiguous cellular structure, from which the whole throat will become pale, flabby, and relaxed. The hoarseness may or may not remain, but it is usually very much diminished, while, on the contrary, the effort required for continuous speaking will be considerably increased. If the throat be inspected, not only will the uvula, velum, and back of the pharynx appear pale and doughy, but here and there an enlarged vein or capillary in a state of congestion will give the parts a streaky appearance. The uvula is not only elongated, but sometimes œdematous, and the tonsils swollen. The mucous membrane lining the trachea and larynx, and the vocal cords, also, are doubtless in a similar condition with those parts of the throat which can be seen. This condition is often seen in females in whom a chlorotic and deteriorated health may be dated from an attack of influenza; it is accompanied with distressing noises in the ears, and impaired audition, the

patients, after a short time, recover, on the exhibition of iron in its various forms; these cases probably arise from congestion; I have before alluded to them, and observed that the mucous membrane has the appearance as if absorbed in some places, in others raised in patches.

In the affections which we are now considering, influenza, as has just been noticed, is a very important agent, particularly during the autumn and winter months, producing disease in the throat, and, as a consequence, deafness in either one or both ears. This affection more frequently exhibits a rheumatic character, and the structures of the ear are particularly subjected to its aggression; the membrane becomes sometimes dry and sometimes granular; this appearance is continued up to the internal lining of the tympanum, after having produced a thickening of the sides of the pharynx, and frequently enlargement of the tonsil. The same consequences are observed to take place in the scalp and pericranium, and perhaps even in the meninges. But as the attack is generally attended with an asthenic condition of the constitution and great debility, we are precluded from treating it more actively than by blisters, or the colchicum, the latter to be applied both locally to the part most affected, and to be given internally also; I have also known otitis to occur, and sometimes abscess to form in the glandular system, more frequently in

the parotids, producing great pain over the head, with tenderness of the pericranium, and accompanied by catarrhal and laryngeal irritation in the chronic form: when the patient experiences a dryness of the nostrils and soreness of the throat, accompanied with a dry cough, and pain of the ears of one or both sides, then it is our attention is more particularly called for.

This condition now described is attended with considerable dulness of hearing; it may occur suddenly, or come on very gradually, during the course of the influenza attack, affecting one or both ears, until it arrives at so high a degree, as to occasion considerable inconvenience to the patient. It may so happen that one ear only suffers, the other not participating in the diseased action. Noises in the ears are present during the whole course of the disease, which often continue to distress and harass the patient for some time after the convalescence. This symptom, however, does not necessarily indicate any serious or unfavourable change in the structure of the organ, whilst the symptom may be referrible to chronic inflammation about the fauces and soft palate; they appear swollen, and the uvula considerably relaxed.

The indications of treatment appear *better* carried out by the exhibition of colchicum, both externally and internally, and by warmth to the head. There is an exacerbation ordinarily towards evening, the

affection assuming a remittent character. The disease so much resembles rheumatism in its paroxysms, that without objecting to the treatment ordinarily adopted for that affection, I cannot help observing that in the treatment, both as respects the ears and the throat, the colchicum combined with quinine is the only remedy we can rely upon, exhibited both internally, and externally in the form of embrocation.

I have for some time relied upon the wine of the seeds, and given it for a continuance in small doses, never exceeding five drops, three times in twenty-four hours. The granular appearance of the mucous membrane is tedious in yielding, but the most troublesome symptom, and one that continues most obstinately to distress the patient, is the noise in the ears, the most effectual remedy for which I have found to be the colchicum. As the normal condition of the membrane returns, so also will the audition. It is at this period we are more perhaps induced to look to the Eustachian passage, as the only means to relieve our patient. But in so far as my experience has been directed to this point, a much greater reliance can be placed upon the constitutional treatment than upon either local or instrumental interference; instrumental aid being deemed as a *dernier resort*. As I shall allude to this practice ere long in a more detailed form, I will only refer to this fact:—In a communication I had the



honour of reading before the Medical Society of London, on rheumatism affecting the ear, and its consequences to the organ, I therein stated that in these cases much benefit might be derived by such treatment, and more particularly when we had evidence of any chalky concretion forming in the meatus, which is not uncommonly the case, as may be inferred from analogy and the nature of the internal structures. I find the same observation has been made since by Dr. Garrod, in a valuable communication upon "Gout and Rheumatism."\*

In the employment of colchicum, I feel myself borne out by facts in supposing that the medicine operates chemically, by effecting some change in the alvine and urinary excretion, and the quantity and quality of both of which it evinces a tendency to increase; and, in the next place, its action seems directed more particularly to the nervous system. When it is given in considerable doses, its effects must be carefully watched; if the constitution of the patient is weakened by previous disease, we must not give it without either a tonic or an opiate; it may be as well also to have the bowels freely acted upon. At first, a continuance of its exhibition for some length of time in minute and repeated doses has been found extremely beneficial in chronic affections of the ear, supposed to be of a rheumatic origin; if it produce nausea or vomiting

\* See *Lancet*, April, 1850.

it is by no means beneficial in its results; if the skin secretes freely, which at all times should be encouraged, it is particularly serviceable. The preparations in which I principally confide are the wine of the seeds internally, and the acetous extract, combined with spermaceti, externally. The colchicum wine combined with bitter infusion, in small doses, as five or six drops in chronic cases, may be continued for a long period; in acute cases, however, half a grain of the acetous extract, combined with calomel, in two or three-grain doses, three times a-day, until ptyalism is produced, has been found particularly beneficial.

In these cases I have generally observed deafness, ear and headache, together with pain over the brow, and almost constantly over one or both ears, and sometimes with rheumatism in the joints of the side most affected.

With respect to the mutilation of the uvula, I would take the liberty of suggesting that, from its vast importance in the functions of articulation and respiration, more especially the former, practitioners should be very chary in maiming the organ, or in impairing its power. Occasions I know may occur where a great inconvenience is occasioned by irritation from its elongation; in such cases, the removal of only a small portion of it may suffice; but in truncating an organ of so much importance, the utmost consideration is re-

quired, as will appear from the following case, which is by no means a rare one, and as it is recorded by a gentleman of known powers of observation, I shall here insert it, as pointing to the indispensable necessity of treating such cases constitutionally, and not locally by excising a part which, however trifling in its appearance, is of the utmost consequence both as to articulation and respiration.

“Some of the first of these changes,” observes Dr. Mackness, “are the elongation and enlargement of the uvula. If the uvula be elongated, partial excision of the organ almost immediately gives relief. It is no unusual thing for the uvula again to grow and regain its former length, even after the operation; and herein we may remark the wonderful provision of nature for the renewal of an organ so important to the functions of articulation and respiration. In my own case, says an intimate friend of mine, Sir B. Brodie fifteen years ago took off almost two-thirds, or rather more, of my elongated uvula, which gradually recovered its former size, and again became inconvenient, by irritating the glottis; and a few months ago Mr. Aston Key once more removed it, I may say, *in toto*; but I find, at the present moment, that nature is making vigorous efforts to reproduce it by way of outrigger or jury-mast; and that, without any apparent diseased characteristics beyond the tendency to luxuriant growth. Several other cases besides this I have lately witnessed of a

similar description, and I am of opinion that the increased action of the velum palati in the moment of swallowing, in order to make up for, and compensate to the fullest extent, the absence of its temporary appendages, thus urges the mutilated parts to shoot forth, and once more to form an adjuvant to the process of deglutition."

The same observing physician remarks on his own case, that the last excision of the uvula was followed by a considerable inconvenience in the act of deglutition, particularly in swallowing those fluids which contained any portion of solid mixed with them.

#### DEPENDENCE OF SPEECH ON THE FACULTY OF HEARING.

It may not perhaps be deemed irrelevant here to consider some of the affections of the speech which seem to be more or less dependent on the organ of hearing.

The effects of deafness, as well on the *physique* as on the *morale*, are infinitely more marked and more striking in the deaf person whose infirmity dates from his birth, or at least from the early period of existence, than when it comes on after the organs have acquired their full development. The intimate connexion between the faculties of hearing and of speech must appear most obvious, when we consider

that the child learns to speak by the power he has of imitating those sounds which he is in the daily habit of hearing; whence it follows that the functions of the organ of speech being entirely subservient to those of hearing, when the organ of hearing discharges its duties imperfectly, the organ of speech must also discharge its functions but imperfectly; in fact, as we hear, so do we strive to speak; and it is from the power we possess of imitating the sounds which we hear, that the power of speaking is derived.

When the deafness is congenital, or commences at a very early period of life, it has the effect of throwing the individual affected with it into the melancholy state of moral isolation, draws with it in its train either imperfection of speech, as has been already observed, or absolute mutism, and as a necessary consequence, an incomplete development of the intellectual faculties. Those whose deafness is not entire, succeed in pronouncing some words by dint of great exertion and care; but their voice, imperfectly articulated, destitute of everything like modulation and euphony, forms merely an assemblage of words badly associated, expressive of incoherent, and never of abstract ideas.

Deafness and dumbness combined raise between the deaf-dumb and the intellectual world a double barrier, which prevents, on the one hand, his ideas and sensations from reaching us; and, on the other

hand, our ideas and sensations from reaching him; one only means of communication remains—viz., vision; but society—nature are, for the deaf-dumb individual only a spectacle, of which no voice can afford him any explication; in him the imitative faculties are alone cultivated; he is a being who presents externally the manners of a civilized being; whilst internally he evinces the barbarism and ignorance of a savage—he is the passive witness of all that surrounds him, when he experiences no sensation of pleasure or of pain purely physical. The instability of human life is to him an idea perfectly foreign. Ever isolated from society, he alone can take no share in the interests of country; he is distrustful and credulous, and therefore easily deceived and in a state of demi-infancy, obviously calling for the attention and care of the legislator.

If he is deprived of a number of advantages, he has at least that of being exempt from a multitude of prejudices and of idle terrors, which worry and trouble our social existence.

Having so far glanced at the moral circumstances and the moral disadvantages in which a deaf-dumb person is placed, we may now consider briefly the physical causes of this melancholy deprivation. It too often happens that children come into the world totally deprived of hearing. However, it is not always so; in the early stages of life changes may supervene which will occasion deafness, the child

having been born with the organs fully formed. Then the disease is no longer congenital; but as it is impossible to ascertain primarily the existence of the function; as dumbness, besides, is as well the consequence of deafness which has occurred in the early months of existence, as it may be of an original or congenital deafness, we are compelled to confound these two varieties under one and the same denomination.

All the causes of deaf-dumbness are not well known; the researches of pathological anatomy recently made by Itard, Kramer, and others, have shown that there are sometimes met in the deaf-dumb the same changes as in cases of acquired deafness. It seems to us a positive fact, that there may be obstruction of the Eustachian tube, of the cavity of the tympanum, destruction of the small bones, and perforation of the membrana tympani. Itard met, in some cases, vegetations, concretions, in fact, a substance resembling chalk, in the cavity of the tympanum. In another case, the stapes was found absent. But if the cause of congenital deafness is appreciable in some cases, there are several cases where it is not so; and we are forced to admit here abnormal states of the labyrinth, of the acoustic nerve, and of the brain itself, which escape and baffle all our minutest investigations, and which remain inaccessible to all the appliances of therapeutics.

We know that the child learns to speak by reproducing the sounds which he hears daily; the intelligence also is favourably disposed to this process in the early stages of life. If, then, the ear do not seize the sounds of the speaker, the mouth cannot reproduce these sounds; and this fact affords the simple and obvious reason why dumbness necessarily follows deafness; and if at a more advanced age we happen to restore by any means the faculty of hearing, entirely or in part, the intelligence is no longer so favourably disposed to the repetition of speech; this is what renders it so difficult to educate the dumb after their hearing faculty has been restored or improved.

Müller, in his physiology, thus connects speech with the faculty of hearing: "the formations of perfect vocal tones pre-supposes the possession of the sense of hearing. It is only with the greatest labour that individuals born deaf can learn to utter a series of harsh sounds. The deaf and dumb owe their want of speech to their deafness: they can by great labour learn the movements of articulation by means of their sight: but their speech is never more than a series of harsh sounds, not adapted for human society, for they want the sense of hearing to regulate their articulation. There is no nearer medium of connexion between the faculties of speech and hearing than the brain, and it is not evident how nervous communications could be of use to



either organ. The connexion of the facial nerve with the lingual branch of the fifth can have no influence on speech or hearing; for the facial nerve has nothing to do with hearing: the lingual branch of the fifth nothing to do with speech."

Hence, then, the deaf-dumb person is one who is dumb only because he is deaf; or, in other words, he is incapable of using language, the sounds of which he has never been able to hear, and consequently never could attempt. The senses of sight and hearing are no doubt the two most important channels by which knowledge is acquired—a deprivation of the latter would seem perhaps on a cursory view to be a less fatal impediment to the acquisition of information, than the former; but when it is considered that a want of the sense of hearing involves with it the loss of the principal medium of mental intercourse, language, it becomes evident that the bar to intellectual improvement is by such a deprivation doubly augmented. Hence it was deemed utterly hopeless to attempt any relief for the deaf and dumb, as being persons cut off by nature from the acquisition of knowledge; hence they have been abandoned to a state of mental destitution, as though no remedy was left, it being considered, that

T' instruct the deaf no art could ever reach,  
No care improve them, and no wisdom teach.

It has, however, been proved satisfactorily in

modern times, that the above opinion is erroneous, and that it has arisen from a superficial or mistaken view of the means by which the mind acquires the knowledge of language, and of abstract or general ideas, when the senses are perfect.

Before terminating this subject, we may observe, that there are several degrees to be noticed in deaf-dumbness. In the first degree the deafness is not complete; speech may be heard, but it must be slower and louder than usual; we are obliged to speak more directly and more specially to the child; dumbness then is incomplete, as the deafness. In a second degree there is simple audition of the voice, and a possibility of distinguishing only articulate sounds. In the third degree only inarticulate sounds are caught. In the fourth, deafness is complete—no noise, unless perhaps the loudest, can be perceived.

Thus we see that dumbness is always proportioned to the degree of deafness; and as the intelligence is developed more especially by correspondence with our fellow-beings through the medium of speech, it is necessarily imperfect in the unfortunate deaf-dumb. Not uncommonly idiocy accompanies deaf-dumbness. Condemned by his infirmity to a species of isolation, the deaf-dumb often remains in a state of semi-infancy: he seems incapable either of a permanent attachment or of a lively gratitude; he has but little enjoyments, and but few desires.

Still, contented in his misfortunes, the deaf-dumb is not aware of his wretched position—he appreciates not the value of a good he has never known.

Kramer says, that the problem whether deaf-dumbness be curable, is practically as yet unsolved; inasmuch as hitherto no single deaf-mute has been cured, that is to say, has been rendered capable of communicating, like a person who hears well, with his fellow-men, in an unrestrained manner, by means of hearing under all circumstances.

A deaf-mute can learn to read and speak perfectly without hearing even a single tone; so that the only true test of a deaf-mute, is his being able to converse with a stranger as well without the aid of his eyes as any person who hears well is daily in the habit of doing.

#### CASES.

Mr. Tesana, aged twenty-seven, a foreigner, after a severe attack of scarlet fever, came under my care for discharge in one ear, and inconvenient dulness in the other. The examination disclosed on the side of the discharge, an aperture in the membrana tympani, and considerable thickening of the mucous lining of the meatus; enlarged tonsils on both sides; the pharynx was equally in a diseased condition. As he was of a scrofulous habit, and considerably weakened by the fever, I at

once dissuaded him from attending to the tonsils, and advised the improvement of his general health, although, as the tonsils were observed to produce some altered condition of the voice, he was recommended to have them extirpated. This gentleman was put under a course of medical treatment, and more particularly quinine, with an external application of the colchicum, with considerable advantage: the absorption of the tonsils followed after a time, and he recovered his usual hearing on the side the membrane was left intact. No mechanical interference was adopted during the treatment.

Miss Susan P——, aged fifteen, I had the advantage of seeing early. She was attacked with pain in the right ear, after a seizure of sore throat; I ascertained from her parents that she had the tonsils removed twice, with the view of preventing the attacks in her throat, but “on each occasion,” observed her parents, “they appeared to grow again, and if possible larger, at least to cause considerably more inconvenience;” this I have observed to be the case in persons of a strumous diathesis, or after any severe attack of the eruptive fevers: and when it takes place, it requires prompt medical treatment directed to the constitution; if the glands be permitted to become hypertrophied, and to remain for many years without treatment, their size becomes at least considerable, and produces the many inconveniences which have been before alluded

to, and for which they are so often extirpated; this, I would say, as a rule, may be avoided—the occasional cough and sore throat are clearly in this case to be attributed to other remote constitutional causes: for on each time the glands were removed, they became more aggravated. These facts prove the necessity of reducing the tonsils early by a tonic regimen, and not allowing them to remain stationary. The remedy upon which I depended here was the nitrate of silver kept steadily pressed against a particular spot of each enlarged gland for some seconds, and repeated after a few days on another part, with at the same time a recourse to the tonic medicines externally; she had the colchicum and a salt-water bath every morning; her general health was established, and with it the gradual absorption of the glands; the plan adopted was carried out for five months, ere it could be said that they were reduced in size, and this is the case generally when so enlarged; the process is usually very slow.

Mr. —, a professional singer by occupation, and a teacher of music, states, that seven years back he was advised for some impediment in his speech to have his tonsils extirpated, which was done; they had been enlarged for years; in fact, since a severe attack of scarlet fever; they did not inconvenience him further than that at times after great fatigue in singing, he would speak a little thick. They were freely removed, as can be seen at

present. In this case, the roof of the mouth appeared quite vaulted, the muscular structure much atrophied, and his voice, from being one of great power before, is now almost gone; the difficulty in deglutition is very great, and, after talking for some minutes, his power of swallowing appears to require the muscles of the face to assist it. It has fallen to my lot to see several cases of this description after extirpation of the tonsils has been performed for some years; they almost all resemble the one I have detailed.

Mr. Slater, aged twenty-three years, came under my observation in the course of last winter;—he states, that six months previous he had attended a gentleman for the relief of an otorrhœa, accompanied by enlarged tonsil and thickening of the side of the pharynx, resulting from an attack of influenza. The treatment adopted was the introduction of the Eustachian catheter twice, and sometimes three times a week, when the irritation of the nostrils &c. would permit, which were much inflamed, and bled for some hours after the introduction on some occasions; the discharge continued unabated, and his constitutional powers being much disturbed, he consequently abandoned this treatment. In the examination made on his application to me, and on several occasional visits after, I could not detect any breach in the membrana tympani; this was thickened, and inflamed, and his tonsil

much enlarged, and the side of the neck and head in great pain towards evening, the discharge evidently progressing from the altered character of the mucous surface. The Eustachian canal was found to be pervious:—an astringent gargle was directed; his health was invigorated by quinine with colchicum; this course of treatment was pursued for a period of three months; the tonsil subsided with the discharge from the meatus, evidently from constitutional treatment.

Elizabeth Jarvis came under my care at the Dispensary for imperfect hearing, accompanied by large and indurated tonsils; the latter, she stated, she had from a violent attack of quinsy. The examination exhibited a granular condition of the mucous membrane of the pharynx; the tonsil was enlarged and hardened, and rough on each side; the Eustachian tube was examined both with the catheter, and also subsequently by the auriscope;—it was found to be pervious; the meatus externus dry, and the membrana tympani dull, and approaching to opacity around its circumference. She has suffered from deafness for a period of three years, and from noises under any excitement; no medical treatment was adopted for that complaint until the present; she was forthwith ordered to cleanse the throat with warm and cold water twice a-day, and directed to take the bichloride of mer-

cury combined with bark as directed in this work, and externally the embrocation of colchicum; this continued for a month, after which she took the colchicum internally in doses as recommended, and with marked effect both on the tonsil and the throat; the noises she complained of as disturbing her at all times gradually subsided, and after five months the hearing distance was perfect on one side, although on the left it has not regained much of its original power. I may remark that, in this case, I was obliged twice to suspend the colchicum; it produced on each occasion, after taking it for a few weeks, nausea and headache; it was resumed again, after a few days, combined with quinine, and sometimes the guaiacum.

Mr. —, aged twenty-six, of a good constitution, whose case was related to me by a medical friend, having his tonsils considerably enlarged, although suffering no inconvenience, was determined on having them removed; the hæmorrhage was so severe and lasted so long that doubts were entertained whether it would not be necessary to secure the carotid artery. The consequence of the operation was, that from loss of blood he has ever since lost all complexion, and is up to this moment remaining in an anæmic state. This case presents us with an example of the extreme caution that is necessary in attempting the removal of too



great a portion of these glands when enlarged, and shows that the operation is by no means devoid of danger.

Charles Poynder, aged sixteen years, and his brother, two years younger, suffered from tonsils enlarged to so great a degree as nearly to close the opening of the pharynx. The elder labours also under a severe impediment of speech, so as to evince considerable convulsive movements when attempting to speak. In consequence of this affliction he was recommended to have his tonsils removed, which was done, but without the least advantage to his utterance; if the mechanical obstruction caused the impediment, why does not the younger suffer from it, as he, similarly placed, is perfectly free in his utterance, although constantly in the company of his brother?

Mr. C——, a young gentleman, aged eighteen, was recommended to have his tonsils removed, for the relief of an impediment in his speech. This case was related to me by a medical practitioner of some experience, and who has been an attendant upon the family for five years; the removal of the tonsils produced no beneficial effect on his speech, but his voice became much weakened, and his health has suffered occasionally from bronchial irritation ever since.

The following case was detailed to me by my friend, Mr. Stone, of Christ's Hospital. A gentle-

man at college consulted him for deafness; he had enlarged tonsils, but was otherwise in tolerably good health. The treatment for his impaired audition was very tedious; and not succeeding as well as he could desire, he had his tonsils removed, which were very much increased in size. The removal of the tonsils produced no beneficial influence on the audition, but his voice became very much changed for the worse, his difficulty of deglutition appearing to require the co-operation of the muscles of the face in order to assist it. The grotesque appearance in consequence of the effort made to swallow when the muscles of the face are called into requisition, in order to assist deglutition, is striking.

Mr. —, a clergyman, aged thirty-three, after an attack of influenza, which was attended from the first with pains in the ears, on both sides, and sore throat, complained also of an increase in the size of his tonsils, which were before enlarged. This gentleman came of a rheumatic family; he resided in the low parts of Essex. This case I did not see for four months after the attack, and when much had been done for it. On examination, I discovered increased redness of the faucial mucous membrane, and enlarged tonsil, which was granulated in patches; he complains of brow headache and pains over the cranium, attended with very disagreeable noises in his ears towards evening, which

last through the night; the Eustachian tube on both sides open, although their pharyngeal extremity is swollen; on examination, the meatus was found dry; the membrana tympani discoloured and red. As this case was aggravated always on his return to his duty, I recommended him at once to leave for the sea-side, and commence with a course of colchicum. This he took in large doses, in combination with quinine, increasing the dose daily, for a fortnight. A residence at the sea-side considerably improved his health, but his hearing continued the same. This plan he pursued with occasional variation, and without any attempt at instrumental interference for six weeks. The pains in the head gradually subsided; so, indeed, did the noises; on one side the tonsil was reduced, but, as has been before observed, on this side the hearing did not improve, whilst on the other, although the gland remained almost at its usual size, as the health became invigorated, and the membrane of the throat more healthy, so did the hearing also improve.

This case was under my care for six months, and at length was perfectly cured. Considerable relief to the meatus in these cases is found in applying at bed-time the dilute citron ointment. Such cases are not infrequent, and they could be multiplied; but as the above may serve as a type for the whole class, I shall not adduce more.

Miss O——, of Colchester, consulted me for some dulness of hearing on both sides, particularly on the right: states that in the winter she had been seized with influenza, accompanied with rheumatism of the right side of the neck and shoulder. I saw this lady one month after the attack; she then complained of deafness, and I detected a granular appearance of the external meatus; on the left side, the membrana tympani was red and dry; on the right, a mucous discharge, and the membrane altered in colour. She complained of uneasiness about the throat and nose, and towards evening of some increase of pain in the head, over the brow, and constant noises in the ears; the throat appeared inflamed, and the tonsil enlarged on one side; the noises always increasing towards evening. The Eustachian tubes were examined on both sides; no obstruction presented. This lady was directed to pursue a method of treatment consisting of quinine and colchicum daily, for one month, and to gargle the throat occasionally with an astringent gargle. This was continued for some time with the effect of reducing the tonsil, and relieving the inflamed mucous membrane of the throat. The noises above mentioned, and which were extremely annoying, gradually subsided as her health improved. I may here remark that this lady had suffered from noises in the head parti-

cularly after rheumatic attacks, but no deafness until after the attack of influenza.\*

During the progress of an attack of influenza, the early symptoms affecting the ear should be attended to; as I have before observed, I have known the attack to be attended with otitis and glandular enlargement, and other well-marked symptoms of ear disease; the ear becomes early affected with noises, the catarrhal affections of the throat extending towards the Eustachian tube, involve the tympanum, and produce the inconvenient discharge from the nose, which is early affected with this diseased action. The treatment in most cases should be chiefly directed towards improving the condition of the constitution. I know of nothing equalling in its power the colchicum, either combined with bark or otherwise; the disease is tedious, and is liable to relapse from time to time.

*Tonsil enlarging again, after removal, and permanently relieved by medical treatment.*—Charles Belcher, a footman, applied at the dispensary: states that, from his childhood, he had always known himself to have enlargement of his tonsils; they had been removed twice, but had on each occasion after returned; and more so after suffering from rheumatic seizure, to which lately he had been very subject.

\* In these cases it would be useless to detail the pathological changes of the membrana tympani occurring from day to day, varying, as they do, after certain intervals.

His history is very interesting, as particularly showing the relation existing between the various remote secretions, and these affections of glandular structures, and particularly the tonsils. He at this time consulted me for a dulness of hearing on one side, with occasional noise in his head, and he being a wine-cooper, I thought it very likely to depend upon some irregularities. This was forthwith prohibited. A course of medical treatment, and more particularly quinine, with the external application of colchicum, was followed by considerable relief; the absorption of the tonsils followed after a time, and a return to his usual hearing.

This case was under treatment for some considerable time, and I had an opportunity of testing the perviousness of the Eustachian tube, which was never found in the least degree obstructed during his attendance.

Mr. —, a professional singer of some station, I see occasionally; he was advised to lose his tonsils in consequence of thickened speech; from the time of his having these glands removed to the present, the state of his voice has never permitted him to resume his profession as a singer, and although four years have elapsed, he has not yet recovered his original distinct and clear voice. The tonsils on both sides were removed, and the mouth is to a degree vaulted, the voice being much lowered.

I have under treatment for deafness two parties,

aged seventeen and nineteen, who were advised to have their tonsils removed. They never having had the eruptive fevers, their parents, forewarned of the dangers such disease brings upon the throat when the tonsils are enlarged, consented to their removal. The result is, that they suffer, to this day, now two years, from this operation, bronchial irritation and cough, on any change of temperature.

Of this class of cases I have seen several. Lately I had mentioned to me another, by a physician who gave me equally the same account from this procedure. The expediency and advantage of removing tonsils, although enlarged, in order to anticipate the occurrence of scarlet fever, are not yet sufficiently explained. It is clear that in such cases disease does not affect these glands in particular, but the whole pharynx.

Charles Jackson, occasionally a patient at the Dispensary, states that, seven years back, he was advised to have his tonsils and uvula removed, for stammering; this was done most effectually, as even now may be observed; although at so great a distance of time, no amendment has followed this operation; he further says, that he considers his deafness, which shortly after ensued, as a consequence of the operation; for months, he suffered from excruciating pain in his ears, and sore throat. In this youth, no morbid obstruction can be ascertained in the Eustachian passage, nor any disease

in the membrana tympani to account for the deafness.

Mr. B—— came under my observation last winter; this gentleman represented to me he had always had enlarged tonsils, and was particularly annoyed with their swelling under any cold or variation of health; he had a severe seizure of influenza, and, as a consequence, became deaf on one side—the right, complaining of pain down the side of his shoulder, over the head, and also of sore throat, and noises in the ear affected, aggravated always towards evening. This case was treated by a gentleman whose dexterity in the use of the catheter was great; but after having the treatment followed up for six weeks, and finding no relief to the audition nor to the noises in the head, he declined any farther instrumental interference. I saw this gentleman the following week; the symptoms complained of at that time were much as has been represented—the Eustachian tube quite pervious; there was a dryness in the meatus, and the membrane of the tympanum was of a dark pinkish colour, the tonsil much enlarged and hard. The treatment adopted was the administration of quinine combined with the colchicum, and warm fomentations to the throat; all manual interference suspended. This case was under my observation for three months; the tonsil was ultimately reduced in size, and the hearing perfectly restored.



The brother, also, of the last-named youth was seized with the disease, and as the morbid changes exhibited early the condition of the ear, I was requested to see him; the case did not terminate so happily, although early attention was given to the throat. In this case, the parts after death were examined, and more particularly the ears;—on one side—the left—the aperture was perfect, the membrana tympani raised and thickened, whilst on the other, the inner layers only were observed absorbed in two places, and the cavitas tympani filled with pus, as also the canal of the Eustachian tube, which suggests in all these attacks the necessity of early attending to the throat; in that case, indeed, as in many other cases I have examined, the early direction of the morbid action appears to be from within outwards. During the last year, I have had the opportunity of examining and satisfying myself of the progress of this disease in many cases.

John Monk, aged 27, came to the dispensary in the winter of 1847. His general health had been impaired by intemperance and other bad habits; he complained also of imperfection of hearing and enlarged tonsils, which he stated had existed for years; they presented the hard rough appearance, and resembled those filled with phosphatic concretions. He had had rheumatism severely twice, and was very susceptible on any cold to pains about his head. He states further, that his father

and mother were both subject to gout and rheumatism. The ears were examined on both sides, and presented only a dryness of the canal, and some red vessels over the membrana tympani. This man was forthwith advised to forego his irregular habits, and the use of stimuli. The case was treated with colchicum and bark, and bichloride of mercury at bed-time; in the morning a dose of the sulph. potassæ, with which I commenced in this case; the colchicum was given in ten-drop doses three times a-day, to be continued for one week. He reports, that having had rheumatic pains, he discontinued. The medicine was again resumed, with guaiacum, and continued for another fortnight. He further states, that his head is free from pain, his audition improved, but as yet the tonsil remains the same in hardness. This man I gave directions to continue his medicine, but in the diminished dose of six drops of the wine, for one month; and although in such patients we cannot always rely on them for adherence to rule, this man felt sensibly the improved condition of his health, as well as the freedom in his joints: he continued the dose from time to time for a period of six months, and at that time his tonsils became reduced in size; stimuli were interdicted. While under treatment, he commenced the colchicum and potass powder in the winter, which, generally speaking, is the worst time of year for such affections; nevertheless, the mixture was taken

with the restriction before stated, not only with the effect of reducing the size of each tonsil, but removing also the inconvenient noises in his head, which I believe originated in some chronic action in the membranes of the brain. During the whole progress of this man's attendance, and his taking the colchicum, his secretions were all much increased.

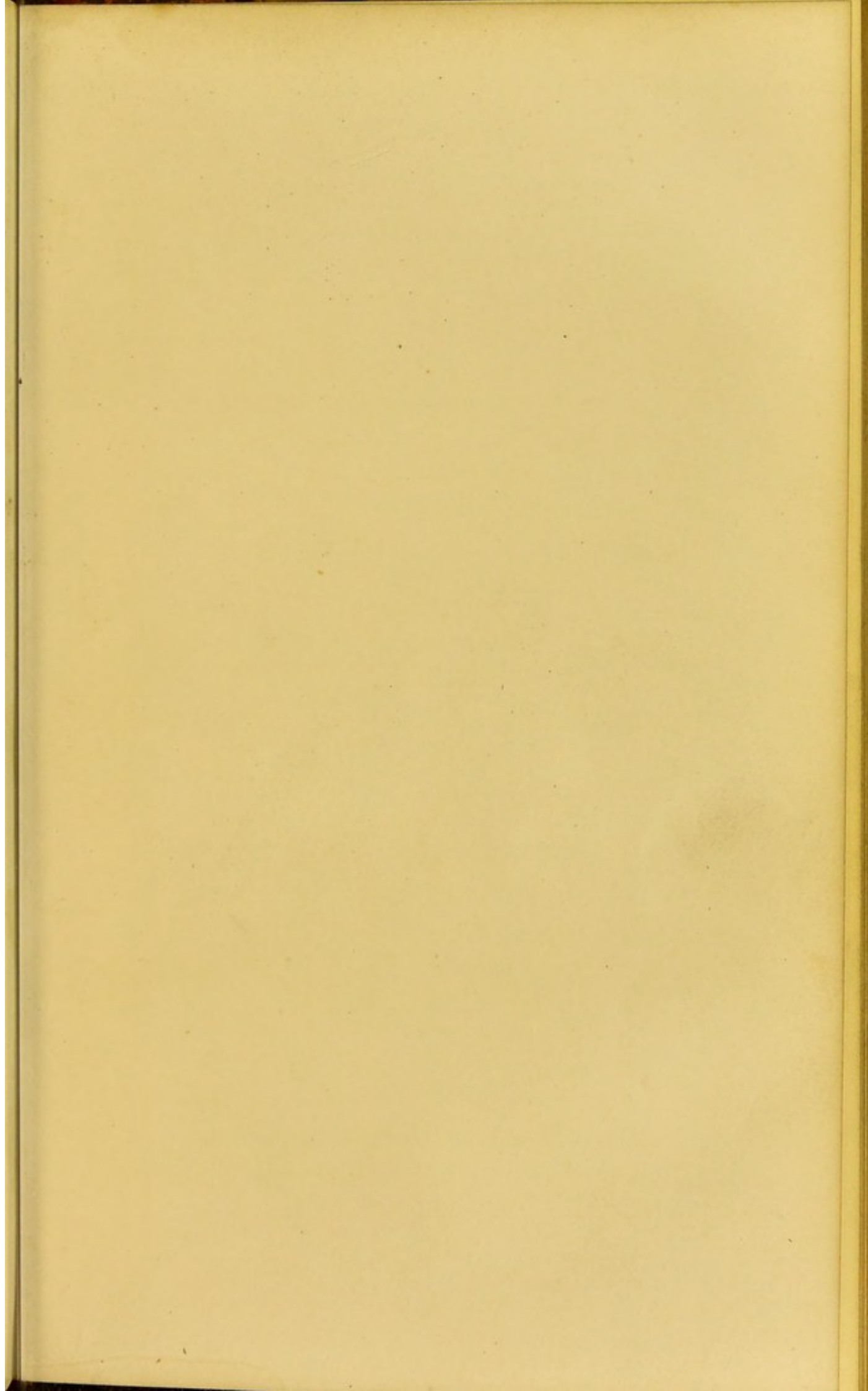
Mr. C——, a retired chemist, had been the subject of enlarged tonsil for years; he also complained of dulness of hearing on any cold or change of weather. This gentleman had occasionally been subject to attacks of rheumatism, and his father was for years a martyr to gout; one side of his tonsil was removed, with the view of relieving his deafness, and, at the same time, of assisting manipulation with the catheter; the bleeding, however, was so excessive after the operation, and the inconvenience since its removal so great, (now more than six years,) that he was decided against submitting again to operation. Advised by his friends, this gentleman, about eighteen months back, came under my treatment for enlargement of the tonsil and deafness; his early history determined me on at once administering to him the colchicum, as recommended throughout this Essay; this treatment, although it did not effect a decided cure, yet has considerably reduced the size of the one remaining, and his audition became much relieved. It was

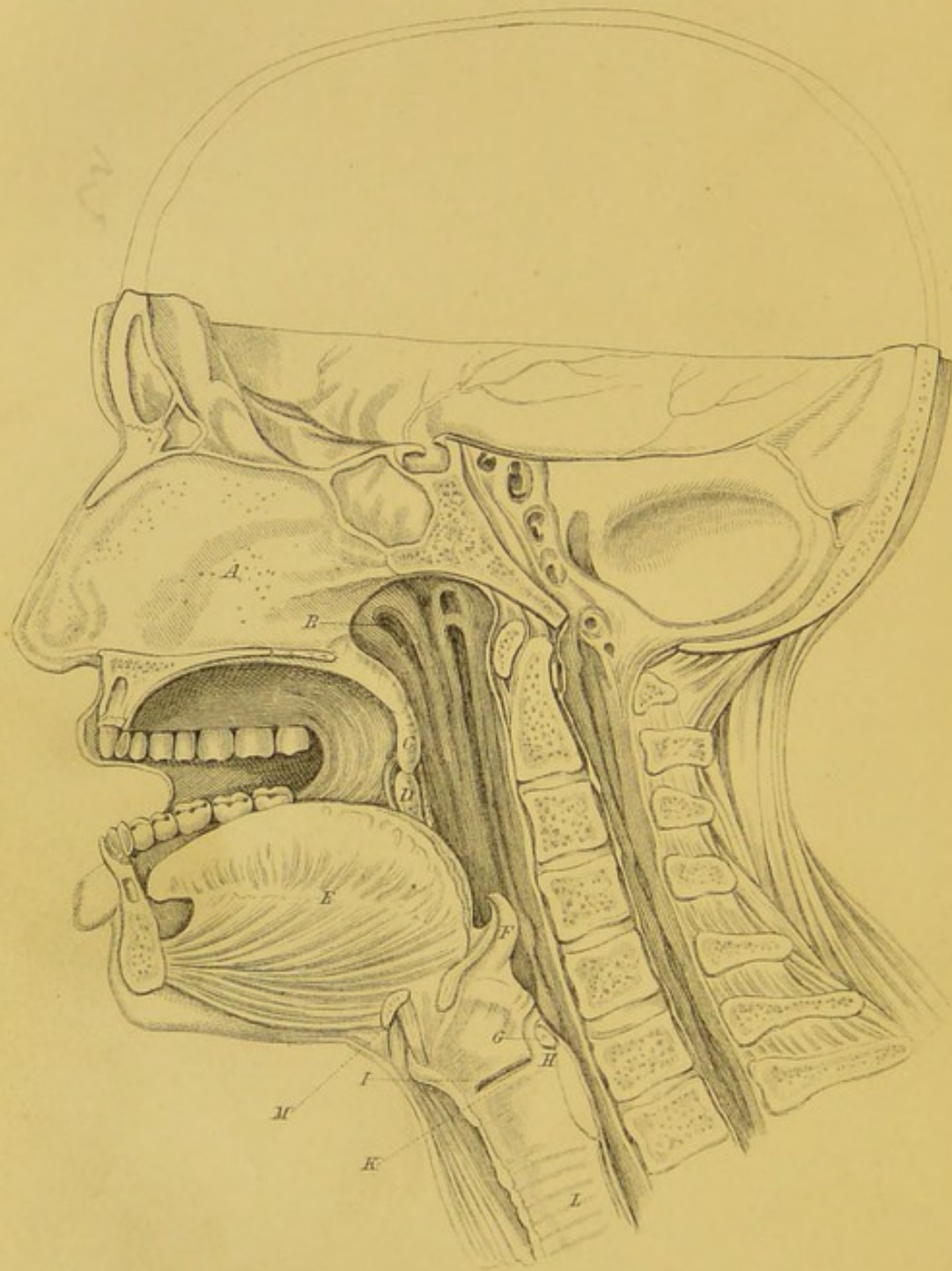
singular, in this instance, that on the side on which the gland was removed his hearing was very defective at all times—whilst on the one in which it remained considerably enlarged, the hearing was much better. This, I think, further strengthens the view that the tonsil, *per se*, has no reference to imperfect audition, but through the continuity of the other structures. I have seen this gentleman once or twice occasionally every two months, and his case is one strongly pointing out the efficacy of the treatment employed.

THE END.

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*A MESIAL SECTION OF THE VOCAL ORGANS.*

*A* Septum Narium  
*B* Eustachian Tube  
*C* Uvula  
*D* Tonsil of Right Side  
*E* Section of Tongue  
*F* Epiglottis

*G* Section of Arytenoid Muscle  
*H* Base of Arytenoid Cartilage  
*I* Right Ventricle of Larynx  
*K* Right Chorda Vocales  
*L* Internal Surface of Trachea  
*M* Section of Os Hyoides

ON  
ARTICULATE SOUNDS;  
AND ON  
THE CAUSES AND CURE  
OF  
IMPEDIMENTS OF SPEECH.

BY

JOHN BISHOP, F.R.S., F.R.C.S.

MEMBER OF THE COUNCIL OF THE ROYAL COLLEGE OF SURGEONS OF ENGLAND;  
CONSULTING SURGEON TO THE NORTHERN DISPENSARY  
LATE SENIOR SURGEON TO THE ISLINGTON DISPENSARY, ETC. ETC.

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## P R E F A C E.

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DURING the past and the present century great advances have been made in the science of Acoustics, which has been applied with considerable success to the functions of the vocal organs in man. The Author has therefore thought it desirable at this time to give a brief exposition of the Physiology and Pathology of the articulating organs.

Those who have studied the treatises of Euler, Poisson, Chladni, Biot, Sir John Herschel, and the Rev. Mr. Willis, must not only have derived a tolerably correct opinion of the present state of acoustic science, but must also perceive the difficulties with which the subject of vibrating membranes is still encompassed.

The first part of this work is intended to supply the data necessary for the study of the pathological condition of the organs of articulation. It is shown that the Physiology of the subject terminates at

that point where the Orthoëpy begins, and that the boundaries which separate these branches of knowledge are clearly defined.

Of the articulating organs, as of all others, the pathology is necessarily derived from the physiology. In the treatment of their disorders, however, we possess advantages much greater than in the disorders of many other parts of the body, of which the normal functions are less understood, and the pathological conditions less obvious to the senses. Hence, our success in the treatment of the defective use of the vocal organs is considerably greater, and it is hoped that, in the following pages, some of the points connected with this difficult subject are satisfactorily cleared up. A rational plan of treatment appears to be the more necessary because, when cases of this kind formerly presented themselves, surgeons were not in possession of any correct theory on the subject; the want of which has encouraged unqualified empirics to occupy the vacant ground, with manifest discredit to the profession, and detriment to the public.

It was after the author had occupied his leisure hours during several years in studying the physiology of the human voice, as a subject of abstract

research, that his attention was forcibly drawn to its pathology, by the surgical treatment of impediments of speech proposed by Dieffenbach, and others. The author has ever been at a loss to comprehend how a mechanism, so elaborate and perfect in its normal state as that of the vocal organs, could be expected to perform its office after mutilation. This question he leaves to the disciples of Dieffenbach to answer; but is satisfied in his own mind that the course they have pursued has resulted from their imperfect knowledge of the physiology of these organs, leading them in many cases to mistake functional derangement for organic defect.

38, *Bernard-street, Russell-square,*  
*March 30, 1851.*

The first part of the paper is devoted to a general discussion of the problem of the origin of life. It is shown that the origin of life is a problem of the highest importance, and one which has attracted the attention of the most eminent scientists of all ages. The author then proceeds to a detailed examination of the various theories which have been advanced to explain the origin of life. He shows that the most plausible of these theories is that which attributes the origin of life to the action of certain chemical compounds under the influence of certain physical conditions. He then proceeds to a detailed examination of the various theories which have been advanced to explain the origin of life.

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## ON ARTICULATE SOUNDS.

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WHEN it is considered that animals, especially those of the higher orders, are provided with a complex mechanism for the production and modification of sounds, that they are endowed with an exquisitely organized acoustic apparatus for transmitting the impression of sounds to the brain, and, lastly, that in the latter organ the nature and character of those sounds are perceived, and subjected to intellectual processes, it is reasonable to conclude that creatures so gifted were intended to employ those sounds for some beneficial purpose.

The modification of the voice depends on the development of the intellect; and, accordingly, the lower we descend in the scale of animal life, the less is the power of diversifying vocal sounds. Most of the orders of mammalia are provided with mechanism capable of producing an extensive range of sounds; but the intellect even of the highest quadrumana is not sufficiently developed, to admit of their applying these sounds for the purposes of articulate speech.



It is in the human race that we find the most varied and perfect adaptation of vocal sounds to the communication of ideas, both of material and intellectual subjects.

The sounds which in all ages have been selected by the different races of men to represent the ideas of things are, for the most part, purely conventional, and arbitrary, having in general no resemblance to the things themselves; since it is impossible by mere sound to imitate anything but sound, and therefore equally impossible to represent by the voice any other idea than that of sound itself, unless by common consent it shall have been determined that certain sounds shall serve to convey the notions of certain things. Hence, we need not be surprised that mankind, scattered over the face of the earth in different communities holding little or no intercourse with each other, would employ different sounds to express the same thing; at least where the thing intended to be designated had become known to a particular community after its intercourse with other nations had ceased.

The number of significant sounds or words must have increased with that of ideas and things required to be expressed in each society, according to its state of civilization; but, as sounds are transitory, and, so to speak, die at their birth, and as the modifications of them are constantly liable to change owing to their independent and arbitrary nature, it was found necessary to invent some

means of fixing them by visible representation, so as to render their influence permanent, and the sounds themselves capable of being recalled at pleasure; hence sprung the art of alphabetic writing.

The mechanism provided for the production of speech comprehends a large assemblage of organs. The most simple vocal sounds require the combined action of the lungs, windpipe, larynx, and respiratory muscles; and for articulate language an additional set of organs must be called into play, namely, the pharynx, hard and soft palate, uvula, tongue, teeth, lips, and nostrils.

All languages contain a certain number of elementary sounds, which are for the most part represented in their several alphabets; and it is of these sounds and their various combinations that all languages consist. But, although the whole of the elementary sounds which enter into all the known languages are comparatively few, they are capable of being combined into an immense variety of words; far greater, indeed, than is contained in all the languages of the earth taken together. The etymological investigation of languages belongs, however, to the philologist, while the structure and functions of the organs which produce their component sounds are the province of the anatomist, and physiologist.

After a lengthened inquiry into the elementary sounds of the various spoken languages which were

known in his time, Bishop Wilkins concluded that thirty-four letters, namely, eight vowels, and twenty-six consonants, are sufficient to express the whole of them.

Volney endeavoured to form an alphabet which should contain symbols for every articulation that occurs in every known language; so that each language might be read by any person with as much facility and precision in this new character, as by the native in its original character. For this purpose, he thought that about fifty-eight or sixty letters would be sufficient.\*

Sir John Herschel,† however, considers that thirty-four letters, thirteen of which are vowels, and twenty-one consonants, are essentially necessary for the expression of the English language alone; and it is his opinion that, with two or three more vowels, and as many more consonants, or about forty letters altogether, representing precise and definite sounds, every known language might be reduced to a written form, in exact correspondence with its pronunciation. This, he thinks, would lay the foundation of a universal language, “one of the great desiderata at which mankind ought to aim, by common consent.”

Among the examples which he gives of these thirteen vowels, several, however, admit of considerable doubt. For instance:—

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\* *L'Alphabet Européenne appliquée aux Langues Asiatiques.*

† *Encyclopædia Metropolitana*, vol. iv. Art. ‘Sound.’

The vowel sounds in the words *hard*, *laugh*, &c., as likewise those in *lamb*, *hang*, &c., although represented by Sir John Herschel as different, appear to be, in each case, the same. Again, the *A* in *hare* is a diphthong. Now, if this be admitted, we may reduce the number of vowels in the table of Sir John Herschel from thirteen to ten, as stated below. Those who have not studied the subject can have little idea of the nice distinctions by which the vowel powers are separated; indeed, it requires an ear well practised in articulate sounds to be able to detect their acoustic differences with any degree of precision.

Marsden has constructed an alphabet consisting of thirty-five Roman characters, which he thinks contains a sufficient number of elementary sounds, to express by their combinations the oriental languages. "This," he observes, "may be appropriately termed a conventional alphabet, and is meant to be restricted to the especial purpose of expressing oriental, or other foreign words, literal or oral, and not to interfere with the established orthography of any country."\* He however adds, that "the hope of seeing the accomplishment of such a literary coalition, or any material advance towards it, cannot be sanguinely entertained."

It is stated by certain writers that, among the Teutonic languages, the English has departed most

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\* On a Conventional Roman Alphabet, applicable to Oriental Languages. W. Marsden, London, 1834.

widely from phonetic principles; and that out of seventy thousand words, not more than seventy, or one in a thousand, are spelt as they are pronounced.

In order to correct our written language, and to spell words in letters which would express every sound as articulated in speech, it is proposed by the advocates of the phonetic system recently introduced, to revise and extend our alphabet, by making it consist of forty letters.

Lindley Murray has pointed out the importance "to every learner of the English language, of being able to pronounce perfectly and with facility, every original simple sound of which it is composed;" but he does not tell us *how* this is to be done, by what actions of the vocal organs these sounds are produced, or on what acoustic principles they depend. He alludes, it is true, to the long exploded views of Dodart for an explanation of the variations of tone, but he very properly leaves the subject of the physiology of articulation as a question beyond the pale of orthoëpy.

It is with the view of supplying this link in the chain of our knowledge of the vocal functions, that the following analysis of the physiology of the elementary sounds of our language has been undertaken.

In prosecuting this design, the theory of the vowel sounds will first be examined; premising, however, an explanation of some of the acoustic terms here

employed, such as vocalized, unvocalized, vowel, consonant, semi-vowel, mute, semi-mute, aspirate, sibilant, nasal, sharp, flat, &c.

VOCALIZED SOUNDS are those in which the vocal cords are in a state of vibration.

UNVOCALIZED SOUNDS are those in which the vocal cords do not vibrate.

VOWELS are sounds generated in the glottis, which pass freely through the mouth, and receive their peculiar distinctive characters in their passage. They form syllables without the aid of a consonant, and may be prolonged indefinitely.

CONSONANTS are sounds which are produced by the partial or total interruption of the vocalized or unvocalized breath by some of the organs of speech; and are therefore called "*Literæ clausæ*."

SEMI-VOWELS are consonants capable of prolongation without the assistance of a vowel.

MUTES are unvocalized consonants, which must be associated with vowels to render them sensible to the ear; and are incapable of prolongation.

SEMI-MUTES resemble mutes; but are vocal, and capable of slight prolongation.

ASPIRATES are unvocalized sounds, caused by the breath rushing through the pharynx, or between the tongue and teeth, or lips and teeth.

SIBILANTS are hissing sounds, caused by the voice or breath passing between the teeth.

NASALS are vocalized sounds passing through the nostrils.

EXPLOSIVES are sounds produced by condensed air in the vocal tube, when arrested in its passage from the lungs either by the velum, tongue, or lips; on the opening of which valves the air escapes in a gust. Explosives cannot therefore be prolonged.

SHARPS, called by some hard, are unvocalized consonants, such as P, T, F, K, S, &c.

FLATS, called by some soft, are vocalized consonants, as B, V, Z, &c.

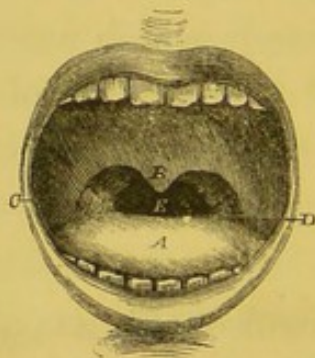


FIG. 1.—A view presented by the organs of articulation on looking into the mouth: A the tongue, B the uvula, C the velum, D the left tonsil, E the pharynx.

#### VOWELS.

When vowel characters are said by grammarians to possess various powers, it is merely meant that the same written letter may be sounded in as many different ways as there are powers assigned to it. These modifications are of two kinds; the one in

which, the articulation being the same, the difference lies in the time during which it is sustained, which constitutes the vowel either long or short;—the other depends on an alteration of the position of the articulating organs, whereby perfectly different sounds are produced, which ought to be represented by as many different symbols.

Vowels have been divided into three classes, having reference to the organs employed in their production, namely, guttural, palatal, and labial.

GUTTURAL VOWELS are produced by freely opening the mouth, while the fauces, and lining membrane of the pharynx, and velum pendulum palati, vibrate simultaneously with the glottis. The vowel sounds pronounced in *ball*, *bar*, *bat*, *but*, are guttural, and are produced without the interposition of the tongue, teeth, or lips; since the tongue may be moved into various positions during their utterance without altering their character.

PALATAL VOWELS.—In the pronunciation of these vowels, the sides of the tongue touch the molar teeth, and the dorsum is concave in the centre; whereby a channel is formed between the tongue and the palate, through which the voice is transmitted. The peculiar quality of these vowels is due to the vibrations of the membranes of the dorsum of the tongue, and palate. The vowels in *bate*, *bet*, *beat*, *bit*, belong to this class.

LABIAL VOWELS are produced by a partial closing of the lips, accompanied with depression of the



tongue, and contraction of the cheeks, while the lips and cheeks vibrate simultaneously with the glottis. In order to produce the sound of o in *bone*, the lips are neither so much closed, nor so much protruded forwards, as in pronouncing that of oo in *boot*; the transition from the former to the latter of these sounds being entirely due to the change in the state of the lips.

In the English language there are ten distinct vowel sounds, imperfectly represented by five letters. They may be classified according to the manner in which they are anatomically and physiologically allied; as will be seen in the following diagram.

PHARYNGEAL.		LINGUA-PALATAL.		LABIAL.
ball	.....	bate	.....	
bar	.....	bet	.....	bone
bat	.....	beet	.....	boot
but	.....	bit	.....	

It must not, however, be supposed that these ten vowels are the only ones which exist, for the organs of speech are capable of producing several others which are found in foreign languages, as, for instance, the sound of *u* in the French *tu*; but the latter are unknown to English pronunciation, and we have confined ourselves to those which admit of being illustrated by words in our own language.

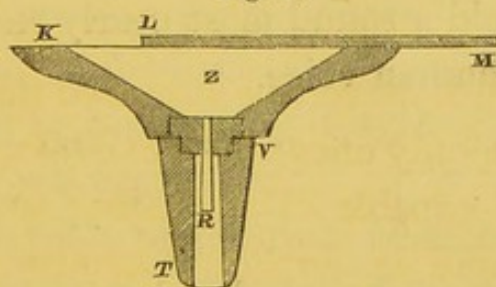
ON THE PRODUCTION OF VOWEL SOUNDS BY ARTIFICIAL MECHANISM.—In a memoir presented to the Royal Academy of St. Petersburg, in the year

1779, Kratzenstein proved the practicability of producing the five ordinary vowel sounds by artificial mechanism, which he constructed and described.\* He also calculated the relative degrees of aperture necessary for the production of each vowel.

About the same time, De Kempelen† succeeded in producing the vowel sounds by means of a reeded funnel-shaped apparatus, three inches deep from the mouth, and two inches in diameter. By inserting the hand, and moving it so as to vary the size of the aperture, he was able to modify the sound of the reed, so as to yield the qualities of the several vowel sounds.

Mr. Willis,‡ having succeeded in producing the vowel sounds on De Kempelen's plan, was induced to try other means of accomplishing the

Fig. 2.



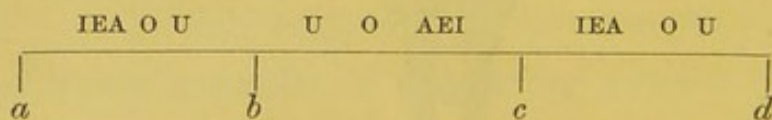
same effect. Having fitted a free reed, R, to the bottom of a funnel-shaped cavity half an inch deep,

\* *Journal de Physique*, vol. xxi.

† 'Le mécanisme de la parole, suivi de la description d'une machine parlante.' Vienne, 1791.

‡ *Cambridge Philosophical Transactions*, vol. iii.

and two inches in diameter at the top, of which *z* (fig. 2) is a section, the pipe *TV* standing on a wind-chest, he found that by sliding a flat board, *LM*, across the top of this funnel, which is only one-sixth the depth of De Kempelen's, the hand was unnecessary; for by merely enlarging the opening, *KL*, he produced the whole series of vowels in the order *U O A E I*.\* He also found that cubical, and other shaped cavities answered the purpose equally well with those used by his predecessors. The success of these attempts induced him to try the effect of cylindrical tubes, and for this purpose he constructed an apparatus consisting of tubes sliding on each other, the successive portions of which were multiple lengths of the first tube, and capable of being drawn out at pleasure over a fixed piston furnished with a reed. He used a free reed similar to that of Kratzenstein, which is considered to yield a sound most nearly resembling the tones of the human voice.



Suppose the reed, and closed end of the tube to be at the point *a*, and let *ab*, *bc*, *cd*, be each equal to a stopped pipe in unison with the reed. If the tube be now drawn out gradually to *I*, *E*, *A*, *O*, *U*, the

\* It must be borne in mind that the sounds here assigned to the vowel letters, are those which are given to them in the Continental languages.

pitch of the reed remaining the same, its tone will assume a succession of vowel qualities, corresponding to these letters in the diagram. As the elongation proceeds from *b* to *c*, the same vowels are repeated, but in an inverted order, and so on in cycles, each being a repetition of the primitive series, but the vowels becoming less distinct in each successive cycle; the distance of any given vowel from the centres *a*, and *c*, being the same in all the cycles. If another reed, having a different sonorous wave, be adapted to the same pipe, the same phenomena will be produced, the central points of the new cycles being now at distances from each other which are equal to the length of the new sonorous wave, but the distances of the several vowel points from the centres of the respective cycles will be the same as before; so that, generally, if the reed wave  $ac = 2a$ , and the length necessary to produce any given vowel from the point *a*, be equal to *v*, the same vowel will be constantly produced by a pipe whose length is  $= 2na \pm v$ , *n* being any whole number.

When the pitch of the reed is so high, that the length of its wave is less than twice the distance corresponding to any vowel, the production of that vowel, and of all beyond it, will become impossible. Thus, if we suppose *ac* to be less than  $2a_u$ , but greater than  $2a_o$ , the series of sounds will never extend to the vowel *u*; but, on lengthening the pipe indefinitely, the succession of vowels will be *IEAO*,

O A E I. If the pitch of the reed be still higher, more vowels will be cut off. This Mr. Willis considers to be exactly the case in the human voice; and he observes that female singers cannot pronounce the U and o on the higher notes of their voices, that is, higher than the double octave above the middle C of the piano, or a stopped pipe whose length is = 4.7 inches, and which yields the vowel o.

Mr. Willis found, on measuring the length of the pipe from *a*, that the pitch corresponding to each vowel was as follows.

VOWEL.	POWER.	LENGTH OF PIPE IN INCHES.	PITCH.
I	See . . . .	0 .38 . . . .	$g^p$
E	{ Pet . . . .	0 . 6 . . . .	$e^p$
	{ Pay . . . .	1 . . . . .	$d''^v$
A	{ Paa . . . .	1 . 8 . . . .	$f'''$
	{ Part . . . .	2 . 2 . . . .	$d''^b$
A <sup>o</sup>	{ Paw . . . .	3 . 05 . . . .	$g''$
	{ Nought . . . .	3 . 8 . . . .	$e''^b$
O	No . . . .	4 . 7 . . . .	$e'$
U	{ But		
	{ Boot . . . .	Indefinite.	

On inspecting the foregoing table, we see that the length of pipe required in order to produce the vowel quality A<sup>o</sup>, is ten times as great as the length for the vowel I; and that, while the reed sounded C, which beats 512 times in a second, the pipe yielded  $g''$  for the vowel A<sup>o</sup>; so that, as Mr. Willis remarks, their combined effect is  $g''$ ,  $g''$ ,  $g''$ , 512 times in such rapid equidistant succession as to produce  $e'$ ,  $g''$  si-

multaneously. If another reed were applied to the same pipe, vibrating 340 times in a second, the pitch of the reed would be  $f$ , but the vowel would still be  $A^\circ$ .

After a careful examination of the nature of the effects of the joint system of reed and pipe, such as has been described, on the column of air, Mr. Willis considers that the vibrating tongue of the reed generates a series of pulsations of equal force at equal intervals of time, which are alternately condensed, and rarefied. These, which he calls the primary pulsations, are followed by a series of secondary pulsations of decreasing strength, at equal intervals of time from their respective primaries, depending on the length of the attached pipe. From the co-existence of these primary and secondary pulsations, "there results a series, consisting of the repetition of one musical note in such rapid succession as to produce another," the secondary pulsations adding the vowel quality to the primary note of the reed.

Mr. Willis concludes "that, whatever effect be produced on the ear by applying a pipe (of a length =  $s$ ,) to a vibrating reed whose note is in unison with a stopped pipe, (of a length =  $a$ ,) the same will be produced by a pipe  $2na \pm s$ ." He also remarks that the pitch of the sound produced is always that of the reed, but that the vowel produced is always identical for the same value of  $s$ . Hence it would appear that the ear, in losing the

consciousness of the pitch of *s*, is yet able to identify it by this vowel quality.

The fact of the same results having been attained by apparatus differing in form, proves that the production of the vowel sounds does not depend on the shape of the aperture through which the air passes. Professor Faber very recently exhibited a piece of mechanism designated "Euphonia, or Speaking Automaton." It was composed of a bellows, a caoutchouc larynx, and some hidden movements which were acted on with the fingers by means of sixteen keys, like those of a pianoforte; and it had a second set of keys by which the pitch was regulated. This instrument had engaged the attention of M. Faber upwards of twenty-five years, and was able to produce immediately any words called for, to articulate entire sentences, to whisper, and to sing the national anthem, "God save the Queen." The particular mode by which the various elementary sounds were effected was not divulged.

Sir John Herschel inquires, "What is it that constitutes the essential character or distinction between vowel and vowel, and on what part of the mechanism of the voice do the vowel sounds depend?" Kratzenstein and De Kempelen considered that the condition necessary, for changing one and the same sound into different vowel qualities, depended upon the size of the oral opening, and the oral canal, the latter being, according to De Kempelen, the space between the tongue and palate. By dividing

the spaces of these apertures into five parts, De Kempelen estimated the dimensions for the production of the five English vowels as follows :

VOWEL.		SIZE OF ORAL APERTURE.	SIZE OF ORAL CANAL.
<i>a</i>	as in far	5	3
<i>e</i>	as ( <i>a</i> ) in name	4	2
<i>i</i>	as ( <i>e</i> ) in theme	3	1
<i>o</i>	as in note	2	4
<i>u</i>	as ( <i>oo</i> ) in cool	1	5

These estimates show the relative position of the organs of speech, but do not on any acoustic principle explain the influence which these changes exert, in passing from one vowel to another.

If the qualities of sound by which the vowels are distinguished depended *simply* on a certain number of vibrations, like that which determines any given note in music, it would be very easy to designate the vowels by the pitch. But, in the case of the vocal organs, all the vowels may be conveyed in a whisper, and they may all be produced in succession on a single musical note. If, again, they depended only on the configurations of the vocal organs, no mechanism incapable of similar configurations could produce them artificially ; but, this having been accomplished by Kratzenstein, De Kempelen, and Willis, by means of instruments which differ much in their construction from the vocal organs, it is evident that the difference of sound of the several vowels does not depend on configuration alone ; a conclusion which is further confirmed by the



power of articulation possessed by many birds, whose vocal organization is very different from that of the mammalia.

According to Euler, "the pitch of sounds depends on the number of vibrations in a given time; loudness, on the greater or less extent of the excursion of the particles; quality, and the vowel sounds," he thinks, "must depend on the form of the curve by which the law of density and velocity in the pulse is defined, or upon the latitude of the pulse;" but this, Mr. Willis observes, he offers as "a mere opinion, unsupported by experiment, save that to account for the peculiar quality of sound by which we know a flute from a trumpet, &c. : he remarks that, as the vibrations of each instrument are excited in a manner peculiar to itself, its pulsations must also follow peculiar laws of condensation and motion, by which he thinks the sound will be characterized." \*

In the application of the theory of vowel sounds to the mechanism of human voice and speech, there are two hypotheses which would equally satisfy the conditions for their production artificially. The first is, that the glottis produces the primary, and the *air* in the pharynx, mouth, and nostrils, the secondary or vowel quality pulsations. The second is, that the glottis produces the primary, and the *membranes* of the pharynx, mouth, and nostrils, produce the secondary pulsations of the air. Dr. Thomas

\* Cambridge Philosophical Transactions, p. 234.

Young\* seems to have entertained an opinion favourable to the first hypothesis. He observes, "The reflection of the sound from the various parts of the cavity of the mouth and nostrils, *mixing* at various intervals with the portions of vibrations directly proceeding from the larynx, must, according to *the temporary form of the parts*, variously affect the laws of the motion of the air in each vibration; or, according to Euler's expression, the equation of the curve conceived to correspond with this motion; and thus produce the various characters of the vowels, and semi-vowels." He further remarks, that "the nose, except in nasal letters, affords but little resonance; for the nasal passage may be closed by applying the fingers to the soft palate, without much altering the sound of vowels not nasal."

In taking the second view, it must be borne in mind that membranes exert a great influence on vibrating reeds. The researches of M. Savart on this subject are familiar to every one who has studied the acoustics of membranes; and we know by experience that the breath passing through the glottis is thrown into a certain state of vibration, and reaches the cavity of the mouth, which is already so disposed as to present a proper extent of its own membranes to the action of the breath. By these means the membranes are also made to vibrate, and these latter vibrations, co-existing with the original vibrations of

\* Natural Philosophy, vol. ii. p. 550.

the glottis, may generate the vowel sounds. A peculiar configuration of the mouth and pharynx is at the same time necessary for each vowel; and this is the true criterion by which we are to decide whether two vowel sounds are essentially different, for, whenever we pass from one simple vowel to another, the configuration is necessarily changed.

If, indeed, we attentively examine what takes place whilst the organs change from one vowel sound to another, we can easily detect different parts of the membranous lining of the pharynx, tongue, lips, and other soft textures of the mouth forced into vibratory motion, attended with a variety of configurations, and these different motions and configurations may, by disposing different membranous surfaces to a state of vibration co-existing with the glottis, determine the quality peculiar to the several vowel sounds.

From the researches already mentioned it would appear, that the vowels may be produced in several mechanical ways, and that the mechanism used need not be a fac-simile of the organs of speech, since the peculiar figure of these is not a necessary condition for the imitation of the sounds in question. The vowels, then, may be considered as sounds which are distinguishable from each other by definite peculiarities, and which, at least in the human organs of speech, are accompanied with certain definite actions and configurations, which are essential to them in consequence of their general construction.

This is obvious from the fact that children, when learning to speak, do not copy the actions of the vocal organs by visual inspection, but, when imitating the sounds which they hear, unavoidably produce the same configurations.\* If, on the other hand, the configurations were not due to the peculiarity of the structure and mechanism, a thousand persons might utter the same words, while their vocal organs were in as many different positions. This, however, we know is not the case; for, so regular and definite are the actions of the organs of speech, that there are persons who, having entirely lost the sense of hearing, can yet understand what is said to them, by attentively observing the variations of the mouth during conversation.

#### DIPHTHONGS.

The vowels are in general capable of being combined two and two, and there results a series of secondary sounds, or diphthongs; but, unless the simple vowels are sounded rapidly in succession, the secondary sound will not be heard, and no diphthong will be produced. Diphthongs, however, are not merely sounds resulting from the combination of two simple vowels, *ou*, *ew*, *oi*, following each other in rapid succession, but are also in part the effect of the movements of the articulating organs on the vowel sounds, during the transition of these

\* Hence those born perfectly deaf cannot imitate articulate language.

organs from the position of the first vowel to that of the second.

Some vowels do not easily combine, and when written in conjunction are not pronounced as diphthongs: others, again, are capable of being combined in triads, or triphthongs. Certain grammarians have asserted, that no one syllable consists of three vowels, and that there are consequently no triphthongs; but this is evidently a mistake, as *wound*, *why*, *your*, &c., are compounded of three vowel sounds which easily coalesce with each other.

#### CONSONANTS.

In the production of consonants, the whole mechanism of voice and speech is called into action in a variety of ways, so as to modify the sounds in a distinct and perceptible manner. Much confusion has arisen respecting them, owing in some measure to the arbitrary substitution of the sound of one letter for another, and the want of determining the exact and precise power and place of each character.

If we examine the consonants in groups, according to their natural, or physiological affinities, that is, as they are articulated by corresponding organs of speech, the labials, namely, B, P, V, F, M, will first claim attention.

*B* is a labial semi-mute, produced in the following manner. The lips being closed, the breath held in a state of condensation, and the glottis in the

vibrating position, the lips are then suddenly opened, and the sound assigned to the letter *B*, together with the vowel by which it is followed, is heard; as in the words *bat*, *tub*, &c.

*P* is a perfect mute, produced in a manner very similar to that of *B*; but the lips are more firmly pressed together, and the explosive force of the breath is stronger. If the hand be placed before the mouth, whilst these two letters are alternately and rapidly pronounced, the difference in the explosive force and action of the breath can be very perceptibly distinguished; as in *pat*, *tap*, &c.

*V* is a labio-dental semi-vowel. If the mouth is kept in the same position as in pronouncing *F*, and the glottis is made to vibrate, the vocalized breath in passing between the lip and the teeth causes the surface of the lip to vibrate and produces the buzzing quality of *v*, as in *van*, *have*, &c.

*F* is a labio-dental aspirate. It is produced by the inner surface of the margin of the under lip being brought into contact with the outer edges of the incisor teeth of the upper jaw: the unvocalized breath is then forced out between the lip and the teeth; as in *fat*, *staff*, &c.

*W*.—This letter is said to partake, in the English tongue, of the nature of both vowel and consonant. But, if we consider it capable of being decomposed into *uu*, as its name imports, it must always be a vowel. It has been regarded as a consonant in the English words *water*, *wood*, &c.; but this is a mistake; since the diphthong sound at the commence-

ment of these words may be decomposed into *ua*, and *uoo*, where *u* has the power of the French *ou*, or the English *oo*. The letter *w* is not used either in the French or the Italian language, and is pronounced by the Germans like the English *v*; whence, probably, the above mistake has arisen.

## N A S A L S.

## M, N, NG.

*M* is a labio-nasal semi-vowel, and may be indefinitely prolonged. Here the glottis vocalizes the breath; the lips are closed, as in pronouncing *B*, but the sound passes through the nostrils. It is, therefore, the result of a labio-nasal action, and its peculiar character is owing to the surfaces of the closed chamber of the mouth, and the open apertures of the nose, entering into a state of vibration synchronous with that of the glottis. The nasal character of *m* renders it unfit for frequent use in musical composition.

*N* is a lingua-nasal semi-vowel, produced by the dorsum of the tongue resting against the palate, and closing the passage through the mouth, whilst the sounding column of air is propelled through the nose. The most simple sound of *n* is heard in the words *no*, *nut*, *tun*, &c. Its softest sound is heard in the words *miniature*, *minion*, *maniac*; and is the Spanish *ñ* in *señor*.

*NG* is a lingua-nasal semi-vowel. Here the dorsum of the tongue intercepts the sound at a short distance in front of the velum, and the breath passes

through the nose, which is in a state of sensible vibratory motion. This is a simple sound, and not the resultant of the letters *N G* combined, as is evident from the mode in which the sounds of these letters are produced; it should therefore have a distinct symbol to represent it.

## LINGUA-DENTALS.

In the production of the next class of consonants *T, D, TH, DH*, the tongue is the organ most actively employed.

*T* is a perfect mute, produced by pressing the tip of the tongue against the roots of the incisor teeth of the upper jaw, the breath being condensed by the muscles of expiration, and the pharyngo-nasal apertures closed, while the glottis is maintained in the vocalizing position;\* so that, the instant the tongue is withdrawn, the aspirate sound is heard in combination with the vowel, or consonant, by which it is followed.

*D* is a lingua-dental semi-mute: the position of the tongue is nearly the same as in pronouncing *T*, but the breath is less condensed, and the sound is vocal. *T* and *D* stand in the same physiological and acoustic relation to each other as *P* and *B*.

There are two sounds represented by *TH* and *DH*,

\* For an account of what is termed the vocalizing position of the thyro-arytenoid ligaments, the reader may consult Mr. Willis's paper in the Cambridge Phil. Trans., vol. iv., and the author's paper on the 'Physiology of the Human Voice,' in Phil. Trans., 1846.



as if they were the resultants of T and D combined with H, the TH being aspirate, and DH vocalized: but these again are simple consonants, produced by protruding the tip of the tongue under the edges of the upper teeth, between which the air escapes as a whisper in the former case, but mixed with a certain amount of vocal sound in the latter. Our ancestors, the Anglo-Saxons, used distinct characters for these two consonants; namely,  $\text{ʒ}$  for *dh*, and  $\text{þ}$  for *th*; thus they wrote *Fæʒer*, *Moʒer*, *Faiþ*, *þief*, *father*, *mother*, *faith*, *thief*. Dr. Latham\* remarks, that the greatest mischief done by Norman influence to the English alphabet was the rejection from it of  $\text{þ}$  and  $\text{ʒ}$ . In other respects the alphabet was improved; the letters z, κ, j having been either imported, or currently recognised.

The pronunciation of these sounds is extremely difficult to foreigners; some of whom, even after a residence of many years in England, never succeed in acquiring it, owing to their pressing the tip of the tongue against the roots of the incisor teeth of the upper jaw, instead of protruding it beneath them.†

\* The English Language, by R. G. Latham, M.D.

† The sound which accompanies the production of the semi-mutes B, D, G, is confined to the mouth, the opening from the nares into the pharynx being closed. We can easily detect the state of the nasal valve in these semi-mutes, by pronouncing words containing syllables ending in B, D, G, followed by others beginning with N; as *abno*, *agno*, *adno*, during which the opening of the nostrils, on sounding N, can be sensibly felt.

## LINGUA-PALATALS.

L, R.

*L* is a lingua-palatal semi-vowel, produced by pressing the tip of the tongue against the palate, and leaving a chink on each side for the passage of the vocalized breath, by which its acoustic character is given.

*R*, termed *litera canina*, is produced by causing a vibratory movement of the tip of the tongue near to, and sometimes touching, the palate. Its character is more or less marked according to the force of the breath, and the extent and number of vibratory alternations effected by the tongue: sometimes one vibration only is made, and at others several, the tongue acting like a free reed.

The double *L* of the Welsh, and the double *R* of the Greeks, and of some other nations, are produced in the same manner, but, in each case, during one continuous emission of breath, the articulation begins with a whisper, and ends with a vocal sound.

## LINGUA-DENTALS.

S, SH, Z, ZH.

The two former of these may be more properly called sibilant, and the two latter buzzing consonants.

*S*, (termed, from its hissing character, *litera serpentina*,) is produced by a strong current of the unvocalized breath passing through a chink formed between the upper and under incisor teeth, the

tongue lying a little above the level of the chink. In English, the proper power of *s* is heard in the words *sit*, *abyss*, &c.

*Z*.—When the breath is vocalized in passing between the teeth as in *s*, the sound of *z* is heard. It is sometimes called *s* soft, and is properly the sound of the Greek ζ.

*ZH*, and its corresponding aspirate *SH*, have no distinct symbols, though they are simple consonants, and not the resultants of the letters by which they are represented. The latter sound is heard in the words *shop*, *fish*, *rush*; and the former is that of the letter *J*, as pronounced in the French language in *je*, *joli*, &c.; also in the English words *measure*, *azure*, &c. In the production of *ZH*, and *SH*, the disposition of the teeth and tongue is very nearly the same as that for the sounds *z*, and *s*; but the tip of the tongue is elevated rather higher than in the latter, or nearly to the level of the gums of the incisor teeth. The variation in the position of the tongue is sufficient to produce the acoustic differences by which these sounds are distinguished.

*J* is a lingua-dental, resulting from the combination of the letters *D*, and *ZH*; and is the same as the soft *G* before *E* and *I*, as in *ginger*, *gem*, &c., or the *J* in *June*, *January*, *joy*, &c. In the French language it loses the sound of *D*, and retains only that of *ZH*, as *Juin*, *Janvier*, *joie*, &c. The Italians and the

Germans give the letter the power of *y*, as in *jeri*, yesterday; *jahr*, year; and the English pronounce it similarly in the word *Hallelujah*. The Dutch represent the sound by *dsj*.

CH soft, *tsch* German, *tsj* Dutch, the sound of which is heard in *charm*, *charter*, and not the guttural sound *κ* or *c* hard, improperly represented in the words *character*, *chemist*. The articulating organs pass through the positions of *T* and *SH*, as above explained.

*X* has the sound of *z* at the beginning of words, but in the middle, or at the end of words and syllables, it assumes the power of *ks*, or *kz*. It is not used at the beginning of English words.

#### G U T T U R A L S.

C, CH, Q, G, GH.

The legitimate sound of *c* hard, as heard in the words *corn*, *caper*, &c., is identical with that of *κ*; one of which letters is, therefore, superfluous. It is a guttural mute, produced by the breath intercepted between the dorsum of the tongue and the velum, while the air is condensed in the pharynx, whereby an explosive sound occurs on withdrawing the tongue, and opening the vocal passage.\* The letter

\* Sir Charles Bell observed in a person, the bones of the upper part of whose face were lost, so that one could look down behind the palate, and thus witness the operation of the velum palati, that "during speech it was in continual motion; and when this

c is improperly substituted for s in words where it is followed by e, i, and y, as in *licence, docile, cynosure*.

In combination with h it sometimes takes the hard sound, as in *chemist, chronic*. It is then sounded as a simple consonant, equivalent to the power of the Greek κ.

K.—The preceding remarks will suffice for the letter κ, as its sound is produced precisely in the same manner as that of c hard.

G has two sounds in the English language; the one termed hard is heard in the words *game, gravity, egg, &c.*; the other soft, in *genius, George, ginger, &c.* The former is a lingua-palatal semi-mute. It is produced by pressing the dorsum of the tongue against the soft palate. The breath is then condensed in the pharynx, whilst the glottis is held in the vocalizing position, in order that the breath may be put into a state of vibration the instant the pharynx is opened.\*

G soft is composed of the action of D, and a soft person pronounced the explosive letters, the velum rose convex, so as to interrupt the ascent of the breath in that direction; and as the lips parted, or the tongue separated from the teeth or palate, the velum recoiled forcibly."—Phil. Trans. 1832, p. 311.

\* Sir Charles Bell was of opinion that the pharynx exerts considerable force in the production of the explosive consonants, and that by its aid persons are enabled to continue speaking much longer than they could otherwise do. He observes that "if we grasp the throat whilst speaking, so that the finger embraces the bag of the pharynx, we shall feel that every articulate sound is attended with an action of the pharynx; and preceding each explosive letter, we shall be sensible of a distention of the throat."—Phil. Trans. 1832, p. 311.

sibilant transmitted through the teeth, and is identical with the sound of J, as heard in the names *John, James, &c.* G hard bears the same physiological and acoustic relation to K, as D to T. Its substitution for J should not be used.

*GH* is a guttural, used in the Irish, Italian, and Persian languages. In the English words, *light, daughter, though,* the letters remain, but the sound of the *gh* has long been dropped.

*Q*.—The letter *q*, which is always used in combination with *u*, is equivalent to *KU*.

*H* is a guttural aspirate, produced by forcing the unvocalized breath through the mouth, and combines easily with all the vowels as, *ha, he, hi, &c.*

The following tabular classifications of the consonants must be regarded as only approximatively correct, and have been here introduced in order to avoid complexity of detail.

## ANATOMICAL AND PHYSIOLOGICAL CLASSIFICATION.

LABIAL.	LINGUA-DENTAL.	LINGUA-PALATAL.	LINGUA-PALATO-NASAL.	PHARYNGEAL.
B	... SH	... L	... N	... G
P	... ZH	... R	... NG	... K
LABIO-DENTAL.	TH	D	LABIO-NASAL.	H
V	... DH	T	M	
F	... S			
	Z			

## ACOUSTIC CLASSIFICATION.

MUTES . . . . .	P, T, K.	SIBILANTS . . . . .	S, SH.
SEMI-MUTES . . . . .	B, D, G.	ASPIRATES . . . . .	H, F, TH.
NASAL . . . . .	M, N, NG.	LIQUIDS . . . . .	L, R.
BUZZED . . . . .	V, Z, ZH.		

According to the preceding analysis, there are ten vowels, and twenty consonant sounds in the English language, the physiology of which has now been briefly explained. In our Alphabet, however, we find that several of the characters represent compound sounds, and that some elementary sounds have duplicate characters, whilst others have no special characters assigned them at all. Thus, in the first case,  $x = ks$ ,  $q = ku$ ,  $g$  and  $j = dzh$ ,  $ch = tsh$ ; in the second case,  $c = k$ ,  $f = ph$ ; and to the third case belong  $dh$ ,  $th$ ,  $zh$ ,  $sh$ ,  $ng$ .

In the English language, consonants are seldom, if ever, reduplicated in the same word; but, when two words are conjoined, whereof the first ends, and the second begins with the same consonant, such as book-case, &c., reduplication takes place; that is, the vocal organs which close on the first pronunciation of the consonant, re-open after a slight interval on the second.

In order to form a universal alphabet, and mode of writing languages, so that the natives of one country might read and sound the language of any other, it would be necessary, first, to have as many characters as would represent the elementary sounds of all languages, and then to assign to each character a single definite power of a standard acoustic value. In combining these into syllables, the sound of each syllable should always be the resultant of the component elementary sounds, and should not admit any arbitrary variations. It is probable that no

alphabet has the number of separate characters sufficient for this purpose; and that no language has hitherto been fully represented on the acoustic and phonographic principles here laid down.

The difficulty of interpreting hieroglyphics, which are perhaps only in part alphabetical, is well known. The Chinese characters are entirely ideagraphic, representing objects, and ideas,\* and not sounds. The effect of this is that, although the inhabitants of one province may not understand the dialects of other provinces, they use the same characters for the same ideas, and things; and the author is informed by a gentleman who has resided many years in China, that he has often seen one Chinese, in conversation with another of a different province, describe the figure of the characters by a flourish of his parasol in the air, when their vocal language was so different as to be unintelligible to each other.

The Roman alphabet, which is now in such general use, is very defective in acoustic representation. In several European languages its orthoëpy is indefinite, arbitrary, and continually changing, and we find that we cannot without difficulty read our own language as it was written only a few centuries ago. The following is an example of the Lord's Prayer, as it was written by the English about the seventh century.†

Uren fader thic arth in heofnas, sic gehalgud

\* See Penny Cyclopædia, vol. xii., Art. 'Hieroglyphics.'

† Camden's Remains, p. 23.



thin noma: to cymeth thin ric, sic thin willa sue is in heofnas and in eortho. Uren hlaf ofer wirtlic sel us to daeg; and forgef us scylda urna, sue we forgefen scyldgum urum; and no inlead usith in custnug. Ah gefrig urich from ifle. Amen.

Several of the subsequent changes which this prayer has undergone will be found in the Philosophical Transactions, 1668.

Bishop Wilkins has endeavoured to frame alphabetical characters in conformity with the configurations of the vocal organs in pronouncing them; and this is, perhaps, the nearest approach yet made towards a definite relation between the written letters, and the action of the organs in their production. He has constructed thirty-four of these characters, as fundamental to the formation of a "real character, and a philosophical language," the principles of which he has given in detail.

If the elementary sounds of letters were constant, and if the true resultant sounds of their various combinations into syllables were always preserved, there would be no difficulty in giving the proper sounds of words in any language, when once the alphabet had been perfectly acquired. In correcting the orthography of the English language on orthoëpic principles, great care should be taken—First, that letters representing the proper sounds be substituted for those now improperly used: Secondly, that in fixing the pronunciation, the most approved standards, such as the stage, the

pulpit, the bar, and the senate be consulted. It is chiefly through the neglect of these precautions, that the authors of the phonetic system have brought that project into ridicule. Their system of vowels is, moreover, imperfect; and their combinations of characters betray a pronunciation strongly savouring of that used by the uneducated classes of society.

In the employment of elementary sounds for the expression of ideas, whether conveyed in the form of melody, as in singing and recitative, in reading aloud, or in speaking, the principles of enunciation are the same; the distinction is only in the choice of the melody, which, however, is susceptible of great variety, and, in certain sentences, determines the meaning of the speaker. Pauses, accents, cadences, and choice of melody and time, aided by gesticulation in delivery, are all called into action by the finished orator, in order to render his subject impressive, and to secure the attention of his audience. Few, however, either in the pulpit, at the bar, or in the senate, attain by exercise that excellence in the method of expressing their ideas, of which the vocal organs are susceptible. In speaking, the proper intonation, time, accent, quality, and intensity, adapted to the magnitude of different assemblages, cannot indeed be acquired without much study and practice; and, as the art is little understood, and less cultivated in our schools, we need not be surprised that so few

persons are to be found in society capable of expressing their ideas in a manner satisfactory either to themselves, or their hearers. An exposition of the principles of intonation would be foreign to the object of this treatise; but every one must have observed as many shades of intonation as there are diversities of physiognomy; and hence we can recognise a friend by his voice, that is, by his peculiar *method* of intonation, and use of the articulating organs.

We have now concluded an anatomical and physiological explanation of the modes in which the several vowels and consonants of our language are produced; nor is this a merely speculative inquiry for the amusement of the curious, but a subject of high practical importance; for, unless the normal action of the vocal mechanism is thoroughly understood, it is impossible for the medical practitioner to undertake, with any probability of success, the cure of those distressing cases of defective pronunciation, and hesitation of speech, which are so frequently committed to his care.

## IMPEDIMENTS OF SPEECH.

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It is now well understood that the study of the physiology of voice and speech is surrounded with considerable difficulties. The acoustics peculiar to the vowel sounds have attracted the attention of the most distinguished mathematicians, and any attempt to analyze them involves very profound considerations. The investigation of the consonant sounds is not, however, involved in the same obscurity. The whole of the vocal mechanism during speech is under ordinary circumstances governed by the will.

But, since we find the parts of the mechanism so multifarious, and the conditions of their normal functions in voice and speech so numerous, we need not wonder that they should frequently present a great variety of irregular and disordered actions; indeed, the more the subject is investigated, the more must the investigator be impressed with the conviction that it is more wonderful that the majority of persons speak properly, than that a comparatively small number speak imperfectly. The difficulty of speaking our language is much increased,

especially to foreigners, in consequence of its exceedingly imperfect orthography; the same symbol being often made to represent several different elementary sounds in different combinations; so that, in certain words, it becomes a matter of uncertainty what should be the real sound of the symbol. To persons acquainted with the physiology of voice and speech, it must be obvious that the abnormal states may be various in their nature, and that, accordingly, their treatment must be equally various: any dogma of there being a single remedy must, therefore, necessarily be incorrect. They may originate in the mental processes, or in those states and conditions of the system which tend to disturb the mental associations, and power of volition. Other causes may exist in some peculiar states of the organs of hearing, or in irregular movements of the glottis, or of any of the articulating organs; indeed, it is not common to find any two cases precisely similar in reference to cause and effect.

The investigation of the causes of those defects in articulation which are usually comprised under the general terms *stammering*, and *stuttering*, has, until a very recent period, been much neglected by the medical profession; and the consequence has been, that this class of cases has fallen into the hands of uneducated empirics. Surgeons have, however, at length been aroused from this state of indifference by the energetic proceedings of Dieffenbach, Scott, Yearsley, and others. It has

been supposed by these authors that stammering is the result of some abnormal condition of one or more of the organs which compose the vocal apparatus, such as the frænum linguæ, the velum, uvula, tonsils, or some of the muscles of the tongue, &c. After proposing this hypothesis, the next rational step would have been to inquire whether such hypothesis strictly corresponded with the functions of the several parts in question, in reference to the production of voice and speech. Had this been previously done, we should never have heard of the many surgical mutilations of these organs, which have taken place both at home and abroad; since, even without the attainment of anything approaching to an accurate knowledge of the normal functions of these parts, it might easily have been ascertained by a little inductive reasoning, that some of the parts which have been subjected to operations could not possibly be concerned in the production of the malady.

Independently of voice and speech, the vocal organs are more or less concerned in the functions of respiration, deglutition, and the special senses of hearing, smell, and taste. Owing to the complex apparatus of the vocal organs, difficulties of the most formidable nature present themselves in the study of their physiology, and pathology, and it can therefore easily be understood how surgeons may often be mistaken respecting the causes and seat of these complaints. A

little attention to the action of the vocal apparatus during the act of stammering will, however, soon enable a competent observer to discover whether the affection is entirely of a functional character, or dependent on some organic lesion of the parts concerned in the production of articulate language. When it is of the former character, we may easily see the cause of the ill success which has often attended the operations which have been performed for the relief of this defect. It is true that, in infants, the *frænum linguæ* may be, and indeed often is so short, that they are unable to grasp the nipple of the mother, and consequently requires to be cut; but it is rarely so short as to prevent the tip of the tongue from touching the roof of the mouth; and if the letters *d*, *t*, *n* can be sounded, the point of the tongue has sufficient mobility for articulate speech. It may also be easily understood that, if stammering depended on malformation of some of the muscles of the tongue, as was supposed by Dieffenbach, the defect would be permanent, and consequently, that stammerers would not at one moment be able, and at the next unable, to articulate the same words, as is well known to be often the case.

It has been supposed by some that the tonsils are instrumental in the production of stammering. The tonsils may, it is true, affect both the pitch, and the quality of the voice, but these results are entirely independent of stammering. They may, indeed, be

so much enlarged as to impede deglutition, and block up the internal passages to the ears; or they may be ulcerated, and involve the surrounding tissues, but still without producing any sensible effects on the articulation. The velum is under the control of the voluntary muscles; and, if it should be found on investigation to be instrumental in the production of stammering, it may easily, by a method which will presently be described, be made to act so as to keep the vocal tube open. The uvula cannot close the vocal tube in speaking, and consequently cannot be concerned in producing the defect of speech under consideration.

It has been truly remarked by Sir Charles Bell that for the production of the most simple sound, or the articulation of a single word, the consent of a great number of organs is necessary. Dr. Arnott also observes, that command over the organs of speech is acquired in the same manner as over all the muscular organs of the body; as, for example, in walking, skating, fencing, and performing on musical instruments. Agreeably to this view, it will be found on analysis, that want of synchronous and appropriate action of each part of the vocal mechanism concerned in speech, is essentially and fundamentally the cause of stammering. The most common cases of stammering occur, when persons attempt to articulate the desired sounds without putting the glottis into vibratory action; and, therefore, in order to remove



this kind of impediment, the treatment consists in instructing and exercising the patient in the method of using the vocal apparatus properly. To effect this purpose, it is necessary to direct the patient to vocalize the breath so as to utter a continuous sound, as by singing a note in music. This he should do, in the first place, without making any attempt to articulate a syllable; and then, on repeating the same sound, should endeavour to articulate the word required. This he will be enabled to do immediately, if, during the whole time that the attempt is made to pronounce the articulate sounds, the glottis is kept in action by the vocalization of the air issuing from the lungs, and the articulating apparatus performs the necessary actions. In this manner the patient will be enabled to overcome, on the first trial, some of the difficulties of articulating at will.

In confirmation of the foregoing statement, it is a notorious fact that such persons, if they happen to be vocalists, can articulate with fluency during the act of singing, and hence we need no stronger proof of the defect having its origin in functional causes alone, and not in any malformation of the organs of voice. The painful configurations, and spasmodic contortions of the mouth and face are produced, in consequence of the stammerer attempting to articulate with unvocalized breath: these have been ascribed to a choreal state of the vocal organs; they may, however, be often traced

directly to an imperfect combination, rather than to a want of voluntary control over them. By pursuing the plan above described, no difficulty is experienced in making the worst stammerer utter whole sentences uninterruptedly; and, after a few lessons, the most illiterate persons may be taught how to articulate with facility.

Cases have been described in which the motions of the tongue are said to have been restricted by the genio-hyo-glossi muscles; and it has been asserted by Amussat, and others, that the division of the genio-glossi portions has been attended with apparent relief. There is most probably some fallacy in these views, and the power of articulation should always be tested on the principles already described, before any attempt is made to relieve the defect by operating with the knife. When we reflect on the severity and gravity of the methods pursued by Dieffenbach for the relief of stammering; which consist either in the division of the muscles of the tongue at its root, cutting at the same time through the linguales, genio-hyo-glossi, and stylo-glossi muscles, with their bloodvessels, and nerves; or in cutting a transverse wedge-shaped slice out of the dorsum of the tongue, we may easily conceive the danger of hemorrhage, and sloughing, which must result from such operations. It appears, indeed, to be wholly unjustifiable for surgeons thus to inflict wounds, and mutilate organs, upon mere hypothesis,

more especially when the practice is at variance with the physiology of the parts concerned in the defects of speech intended to be relieved.

Cases arising merely from temporary derangement of the nervous system, such as over-excited emotion, which may be indicated by the patient being at one time able, and at another time unable, to articulate fluently, have strangely enough been supposed capable of cure by the extirpation of some portions of the vocal organs. Effects such as these may be easily explained from our knowledge of the effects produced on the voluntary muscles, by any sudden impulse given to the mind. It is well known that many astonishing acts are occasionally performed by the voluntary muscles under excitement, of which they are incapable at other times. It is not, then, surprising that the extirpation of portions of the tongue, tonsils, uvula, and velum, should produce such a degree of mental excitement as to control for a time the vocal mechanism; but, after the excitement of the operation has passed away, the unhappy sufferers relapse into their former state of imperfect articulation.

There is, however, another class of cases of common occurrence, to which neither the principle of vocalization during articulation, nor of an impulse given to the mind, whether through surgical operation or otherwise, will apply. Reference is now made to those cases in which the mechanism has never been trained to execute the combined actions necessary

for the production of certain elementary sounds. These cases may arise from a variety of causes, such as defective hearing, imperfect imitation, or even inattention. We know that the power of speech depends entirely upon the sense of hearing, since those who are born deaf are likewise dumb. But there are also many persons whose hearing is good, but who, from some defect in their powers of imitation, or from a want of proper attention, are unable to articulate certain letters or words.

On careful investigation, it will be found that the interruptions of vocalized breath in stammering may take place by the irregular actions of four different sets of organs: 1st. By the closing of the valve of the glottis; 2ndly. By the closing of the isthmus of the fauces; 3rdly. By the dorsum of the tongue being brought into contact with the palate; 4thly. By the closing of the lips and posterior nares. In the first case, the air is condensed in the trachea; in the second, the same effect takes place in the vocal tube, posteriorly to the isthmus of the fauces. When the glottis is irregularly closed during speech, the articulation of all the vocal sounds is prevented. A prolonged closing of the isthmus of the fauces necessarily obstructs the pronunciation of those letters and syllables which begin with gutturals, as *king, good, &c.* The involuntary or misdirected action of the tongue affects the series of lingua-dentals, lingua-palatals, and lingua-palato-nasals, and therefore words and syllables beginning

with those letters. That of the lips not only affects the labials, but may likewise impair the pronunciation of all the other letters. By listening to the manner in which the breath is suppressed, or suffered to escape, the ear of any experienced person may easily detect, without ocular inspection, whether it is the valve of the glottis, or of the isthmus of the fauces, which is instrumental in producing the interruption. The same observation will enable him to discriminate the effect produced, when the sounding column of air is stopped by the tip of the tongue. When the lips are the cause of the interruption, we have ocular demonstration to assist us in distinguishing the organs which are instrumental in causing the defect.

The irregular actions of the vocal mechanism just described are very frequently found to be owing to derangements of the nervous system, such as excited emotions. There are, indeed, few persons whose emotions on some subjects do not disturb the equilibrium of the nervous force to such an extent as to interfere materially with the normal exercise of the intellectual, respiratory, and vocal functions. The extraordinary derangement of nervous force displayed in excited emotions, the control exercised by these emotions over the rest of the nervous system, and their influence on the living being in health and disease, render them a subject alike important to the physiologist, and the pathologist. When the force which produces emotion is in excess, its ten-

dency is to paralyze the intellectual, and to disturb the vital functions, in such a manner as to induce organic disease, and in some cases even sudden death.

Whatever may be the nature or cause of the changes in the brain which correspond to the several kinds of emotion, the changes themselves are, in the opinion of Müller, propagated from the brain to the medulla oblongata; the latter in its turn influencing the action of the respiratory muscles through the medium of the corresponding nerves, and affecting in an especial manner the motor nerves and muscles of the face. Dr. Marshall Hall has brought forward many facts which tend to show that the emotions are seated in the medulla oblongata, or at least in some part of the nervous centre below the cerebral hemispheres; and he has pointed out their influence on the paralyzed side in hemiplegia, when that of the brain is cut off.

The influence of the passions is transmitted by the motor nerves, producing effects corresponding to the nature of the passion, and may either increase, diminish, or even paralyze the action of remote parts during a longer or shorter period. It is observed, however, that similar phenomena may be produced by different emotions, and that weeping, sighing, and sobbing may alike follow intense joy, anger, or pain. Anxiety, fear, and terror depress the action of the brain and spinal cord, and the legs in consequence tremble and are scarcely able to

support the body; the look is vacant, and devoid of expression; the functions of the respiratory organs also are deranged, and cannot be controlled by the will.

In dealing with this question, then, we are restricted to the study of the phenomena themselves, and to the circumstances which experience shows will tend to restore to its normal intensity the force, which is either excessive or deficient in some portions of the nervous system.

The phenomena of the animal and vital functions show that the whole of the nervous matter is influenced by a force, which is in constant action in the automatic, and in occasional action in the voluntary functions; that this force is limited in amount; and that, consequently, if an undue portion of it be expended upon any particular function, the other functions, or at least some of them, will of necessity be imperfectly performed. The connexion between the formation of ideas and the various emotions is well established, and the latter are placed in some degree under the control of the will; indeed, were not the emotions regulated by the intellectual power, man would not occupy the lofty position which he now holds in relation to the lower animals, but would be the prey of his own passions. That volition has a decided control over the emotions, especially those which are exhibited through the agency of the voluntary muscles, is unquestionable; but its control over the organic system is very much restricted;

and on the stomach, heart, and other organs supplied by the ganglionic nerves, the emotions act almost independently of volition, except under extraordinary efforts of the mind. It is not surprising, therefore, that such functions should have a great influence over the voice, speech, and respiration. The emotions which arise in the system of a person, when he is about to address an audience, are often so overpowering, that the voice loses its natural volume, becomes tremulous, and sometimes inaudible, the respiratory functions are irregular, the flow of ideas is impeded, and the articulating organs perform their office so imperfectly, that he who is generally ready and fluent in conversation, hesitates, stammers, and cannot utter a single connected sentence. Now, if persons who at other times have a perfectly voluntary control over the organs of voice and speech, partially lose it under the circumstances just mentioned, *à fortiori* those who have at all times an imperfect control over their articulation will, in similar states of feeling, find their powers paralyzed, and their speech more than usually defective.

It is desirable now to explain the conditions necessary to be observed in order that the control over speech, when acquired, may be maintained; since without such knowledge the duration of this power is uncertain, and the patient is liable to relapse. In most of the cases which have come under the author's observation, patients who had attained the habit of



speaking very fluently when not over-excited, relapsed the moment anything occurred which produced emotions of fear or anxiety. In order to counteract this tendency, it is necessary, as soon as the power to articulate correctly in private is acquired, to accustom the patient to read and speak daily before strangers. Under this discipline, continued for a longer or a shorter time, the emotions gradually subside, and the power of volition over them is strengthened, and it is not until the patient has been thus thoroughly exercised, that any dependence can be placed on his retaining what he has acquired.

In many persons the intellectual and vocal organs are capable of acting very well separately, as for instance in the solution of a difficult problem by the former, and in ordinary reading aloud by the latter; but the same persons often fail in combining these functions, as is evident in those who, without being under the influence of fear, nevertheless cannot express their ideas clearly in public. This defect in the power of association generally commences early in life, and is chiefly owing to the imperfect training of the vocal and mental functions in our schools. It must be remembered that, not one of the series of actions under consideration is automatic, but that all are dependent on volition, exercised almost simultaneously, through the instrumentality of a multitude of organs. The working of such exquisite machinery cannot be acquired

without much practice; and when, on investigation, we find that such a variety of successive physical changes is necessary for the production and vocal expression of a single idea, it is rather a matter of astonishment that the generality of persons speak so well as they do. It is, moreover, an object of considerable importance to lessen the excitability of patients labouring under these nervous affections, by appropriate medical treatment, which may tend to aid the practitioner in bringing the patient into such a state as will enable him to exercise a voluntary control over the mental and vocal functions simultaneously.

It might be imagined by some persons that this is merely a psychological inquiry, and beyond the range of therapeutical studies; but, on mature reflection, it will be found in this, as in other cases, that those who exclude from their view the mental states of patients, and restrict themselves to the consideration of their bodily conditions, neglect the operation of an agent which controls more or less all the functions of the system.

The time occupied in the utterance of a series of monosyllables varies considerably in different individuals. When words are set to music, the time of each syllable is regulated by a definite scale; but, in ordinary speaking, the choice of the time is arbitrary, and left to the taste and ability of the speaker. Nervous and irritable persons are often

betrayed into a hurried mode of articulation; and, involuntarily attempting to blend the sound of one monosyllable with the succeeding one, necessarily stammer in the endeavour to accomplish a physical impossibility. For the improvement of such persons, it is found useful to fix their attention on the oscillations of the pendulum of a metronome, and to cause them to pronounce a syllable at each vibration. When the beat of the latter is from sixty to eighty-four in a minute, it will be sufficiently rapid for practice. Steel observes that "good speakers do not pronounce above three syllables in a second, and generally two and a half, taking in the necessary pauses."\*

Where the involuntary actions of the voluntary muscles which close the vocal tube, occur only under occasional states of mental excitement, the treatment consists in establishing a healthy nervous control over the vocal organs. It is now well ascertained that the ordinary respiratory movements belong to a series of automatic actions connected with the vital functions, while the production of voice and speech belongs to the voluntary system, and, of course, to the animal functions. Of the reflex and automatic nature of the respiratory movements we have conclusive proofs, from the circumstance that in some animals they continue in action on the application of stimuli,

\* *Prosodia Rationalis*, p. 49. London, 1779.

even after the removal of the cerebrum and cerebellum, and also continue during sleep when volition is partly suspended. On the other hand, vocalization and articulate speech are purely voluntary actions, which can be excited and suspended at pleasure. There is, however, in man, a mutual relation subsisting between the voluntary and involuntary systems, owing to which the reflex action may be disturbed by volition, and its rhythm deranged. The respiratory movements may thus be accelerated or retarded by different states of mental excitement; and, if this interference with the reflex action is often repeated, and the periods of its rhythm prolonged, the latter may be partially destroyed, and a voluntary act may then become necessary to replace the ordinary reflex movement of inspiration. Similar derangement occurs from the interference of voluntary action in suppressing the expulsion of the fæces and urine, after the spontaneous impulse for that purpose has taken place. Under these circumstances, the sphincters become spasmodically closed, and the intestines and bladder refuse to discharge their contents. Hence we infer, that the action and reaction naturally subsisting between the vital and physical forces of the animal economy concur only whilst they are uninterrupted; but if by the interference of volition they are prevented from taking place, the reflex action is either partially or totally suspended, for a longer or shorter period. Presuming the principles above stated to be

established as the results of experience, we may proceed to apply them to the subject under consideration. Many public speakers, such as clergymen, barristers, &c., when addressing large assemblies of people, are obliged to produce loud and prolonged sounds, under the influence of which the mind becomes more excited, and the chest is exhausted to a greater degree than occurs in ordinary conversation. The prolongation of the inspiratory movement thus occasioned tends to cause an engorgement of the lungs, and of the right cavities of the heart, impeding the arterialization and free circulation of the blood. Hence arises a tendency to dilatation of the heart, and the patient feels a sensation of weight and oppression in that organ, causing nervous depression, and anxiety of mind. The administration of stimulants tends to increase these symptoms, by increasing the engorgement of the lungs and heart, which continues as long as the number and force of the respiratory movements do not keep pace with the increased velocity of the blood produced by the stimulants. When a person addressing an audience endeavours, under the excitement of the moment, to finish a sentence in the same breath, the chest is often greatly exhausted, and no attempt is made to replenish it with air until the reflex system becomes so excited as to render an act of inspiration absolutely compulsive. The voluntary control being thus overpowered, a rapid inspiration is attempted;

but, the thyro-arytenoid ligaments being in a vocalizing position, the air cannot rush into the chest through the chink of the glottis as fast as is requisite, and in the first moment of the inspiratory act a croup-like sound is emitted. Whilst this is going on, the expansion of the chest proceeding faster than the intromission of air, a partial vacuum in the thorax would be produced, were it not prevented by a compensating, though unsteady movement of the diaphragm. If these interferences between the voluntary and reflex systems be repeated periodically at short intervals, as is often the case with clergymen, and other public speakers, the derangement of the functions becomes so aggravated, that the voluntary control over vocalization and the natural rhythm of the respiratory movements is lost, and the invalid is obliged, for a longer or shorter time, to abandon public speaking. These disturbances very commonly arise from the duties of clergymen, who are most usually the victims of these functional maladies. It is not uncommon for those who are celebrated for their command of language and eloquence to suffer in this manner, to utter a croup-like inspiratory sound in speaking, and finally to lose voluntary control over their vocal organs. In order to show the practical application of these general principles, I shall now relate one of several cases which have come under my notice. A clergyman of delicate constitution, and nervous temperament, with inactive

digestive organs, was seized, about twelve years since, with an attack of hemiplegia, which paralyzed the muscles on the right side of the head and face, including those of the eyeball, but he retained control over the functions of deglutition, and vocalization, and after the lapse of several years, the muscles on the paralyzed side resumed their normal action. The treatment to which he chiefly ascribed his improvement was electricity, administered by means of an electro-magnetic machine. At this period, his voice retained both its power and quality. About three years ago, however, he began to lose a portion of voluntary control over the vocal organs. He found that, after having exhausted his chest, he made a croup-like sound on drawing in the breath. This was no doubt owing to the ligaments of the glottis being at the time in the vocalizing position, and consequently vibrating during forcible inspiration. The diminished aperture of the rima glottidis prevented the chest from being fully replenished with air during the inspiratory process; consequently, when the patient had exhausted his chest, he found that he was obliged to stop suddenly in the middle of a sentence, and could not utter another syllable until the lapse of some seconds, when the balance between the action of the glottis and of the respiratory muscles was restored. On again proceeding to read, the same circumstance recurred, so that he was obliged to abandon for a time his clerical duties. The normal action of the

reflex system presiding over inspiration was in this case so impaired, that the ordinary stimulus to draw in the breath did not produce this result, and the patient, being unconscious of what was going on, continued to exhaust his chest until the stimulus arising from its physical condition was such as to render an act of inspiration imperatively necessary. After a time, the action of the vocal apparatus became so uncertain, weak, and tremulous, that he was unable to sustain his voice even in ordinary conversation. The circulation of the blood was carried on languidly, and with a sense of weight in the region of the heart, which he supposed to be diseased, or dilated.

Under these circumstances, he consulted several eminent medical and surgical practitioners in London, by whose advice he had recourse to tonics, sedatives, counter-irritants, and other remedies, which produced no relief. A galvanic current, daily passed through the larynx, seemed however to produce some advantage, and the voice acquired temporary power; but these effects were very transient. The patient had once or twice tried the compound decoction of sarsaparilla, which very materially diminished the power of the voice; at least, after repeated trials, the result was always a partial loss of voice. In the treatment of this case, after ascertaining the degree of control which the patient still retained over the muscles of inspiration, I directed him to fill his chest before attempting



to speak. This was performed with some difficulty, and the inspiratory process was languid and irregular; a state which seemed to be occasioned by some peculiar conditions of the diaphragm and glottis. After a little practice, however, the voice, which was at first weak and tremulous, could be sounded in a full strong tone; but it was necessary at intervals to remind the patient that it was time to inspire, or the chest would otherwise become exhausted. Some remedies calculated to restore the tone of the digestive organs, and to relieve nervous excitement were ordered; and he was directed to practise the periodic rhythmical actions between the respiratory and vocal functions. He was advised to abstain from his clerical duties until his power over the disordered functions was restored by exercise. It was, however, found very difficult for the patient to practise this exercise without assistance, inasmuch as he was totally unconscious of the degree of exhaustion which the chest had undergone, and did not perceive the proper moment for refilling it by inspiration, unless his attention were directed to it by another person.

There was considerable difficulty in forming a correct diagnosis of the nature of this case, since the paralysis which preceded the derangement of the respiratory and vocal functions might have been supposed to have had a share in producing the affection. It must be apparent that the restora-

tion of this patient could never have been effected by any of the remedies found in the pharmacopœias; and it is therefore not surprising that the tonics, counter-irritants, and sedatives employed, did not produce the results anticipated.

It is obvious that cases which present symptoms like those just related, must be treated according to the pathological state presented in each case; but this cannot be accomplished unless we are previously enabled to form a correct diagnosis of the cause of the symptoms.

The most frequent cause of stammering is the imperfect education or training of the organs of articulation, and a deficiency in that sympathetic association which ought to subsist between the articulating and vocalizing organs. The various and complex modifications of the organs of articulation are acquired only by long and attentive observation, the healthy action of the ear being fundamentally necessary for this purpose; and even although its functions may be healthy, experience often proves how difficult it is for some persons to imitate the isochronous pitch of the most simple sound, which many indeed can never accomplish. In like manner, when a person whose articulation is perfect hears a strange word pronounced, as, for example, a word in a foreign language, he is often obliged to make many attempts before he can repeat it. In the Turkish, Arabic, and Russian languages, words might

easily be selected which few Englishmen could imitate without long and continued practice. Is it not, therefore, reasonable to expect that stammering persons, whose organs of articulation have been for many years imperfectly or improperly applied, will require similar efforts to overcome the defect, even after they have been properly instructed how to do so. The configurations of the mouth and pharynx in speech being numerous and complex, the slight changes which modify the sound cannot be very readily explained to the stammerer: his ear must catch all the modifications of sound which constitute articulate language; but it is only by the regulated exercise of the organs of articulation that he can expect to be able to imitate them; and it is owing to the imperfect manner in which this has been performed, that stammering in the greater number of cases arises.\*

Drs. Arnold, Müller, and Schulthess agree in considering the cause of stammering to be a spasmodic affection of the glottis producing a momentary closure of the rima glottidis. Müller, however, remarks very properly, that "it must be remembered as a principle, that the momentary

\* No person who has once thoroughly learned to articulate properly can easily stammer while the glottis is maintained in a state of vibration. In the perfect mutes, however, as the vibrations are suppressed, it is necessary to preserve the thyro-arytenoid ligaments in the vocalizing position, in order to begin the intonation of the voice as soon as the mute is perfected.

spasm depends *entirely on a morbid association of the movements of the muscles of the larynx with the movements of articulation.*" We here observe that this definition is at variance with the idea of spasm of the glottis; for irregular voluntary association of actions does not constitute spasm, and the repetition of *ha-ha-ha-have*, is the voluntary attempt to overcome the difficulty, as likewise in the examples of *g-g-g*, *l-l-l*, *t-t-t*, and *b-b-b*, in which the impediment is caused by the organs articulating those letters, the glottis remaining mute, but not spasmodically closed. In fact, Schulthess is quite correct in saying that the repetition of the same sound in stammering is merely a series of attempts to overcome the difficulty, as *l-l-l-laughing*, *t-t-t-take*, *b-b-b-better*.

In sounding the sibilant s, many persons do not adjust the position of the tongue behind the teeth, so as to produce the clear hissing quality belonging to this letter; others place the tongue nearly as in TH, which is the cause of what is termed *lispings*. A great number of individuals pass through life with this defect; which is nevertheless capable of being very easily removed, by a little attention to the difference between the actions of the tongue, teeth, and breath, in s and TH respectively.

Those who are unable to produce the sound of R, have a difficulty in effecting the quick, vibratory motion of the tip of the tongue against the palate, and usually substitute the sound of L, which is

easier. A gentleman at the Irish bar, who laboured under this defect, consulted the author, to whom he stated that the defect had harassed him exceedingly, and injured him in his profession. He had made a tour in Germany, and had recently arrived from Rotterdam, but the attempt to pronounce the name of that place was almost unintelligible. After three or four consultations, however, during which the normal actions were explained to him, he acquired the power of articulating the letter R very correctly.

According to the researches of MM. Bennati, and Gerdy, the velum and uvula are chiefly instrumental in modulating the voice. In a memoir read before the Royal Academy of Sciences of Paris, the former has described and figured the positions and movements of the velum and uvula, coincident with the changes of pitch and modulation in singing. Although generally concurring in the views of these distinguished physiologists on the points above mentioned, it is proper here to state that the author objects to their hypothesis respecting the production of the falsetto. It is, however, by no means a matter of so much indifference as many persons appear to suppose, whether we have, or have not, such parts appended to the vocal organs as the tonsils, velum, and uvula. With regard to the tonsils, Bennati relates two cases, one of M. le Comte de Fedrigotti, who suffered, subsequently to an attack of acute nervous fever, from an enlarge-

ment of the tonsils, which was supposed to injure his voice. Two-thirds of them were therefore extirpated, and the effect produced was, that although the tenor register of his voice was improved, and the compass augmented by two notes, *he lost four notes of the falsetto register.* In the second case (that of M. Carcelli), the tonsils having been enlarged by chronic inflammation, the falsetto acquired an increased range of *five notes!* Gerdy also mentions a case, in which the whole pitch of the voice became more acute after the extirpation of the tonsils. Reference has been made to the preceding cases to show that, in singers at least, the tonsils are organs of some importance. The defective pronunciation of certain words, or the inability to sound certain letters, may, however, exist permanently in some individuals, without stammering, and may arise either from some malformation of the vocal organs, or from a misapplication of some portion of them.

In training the voice on the principle above proposed (see page 50), it is manifest that the duration of the interval between the pronunciation of each syllable will be inversely proportional to the power or control of the individual over the muscles of articulation, and *vice versâ.* In those who have very great difficulty in applying the principle, the interval must be long. The maintenance of a continued sound during speech, is not so difficult or so conspicuous as many persons may imagine. The

Parisians of the higher class most commonly speak with a continued sound, yet the tone of the voice is so modulated, as to render the effect but little different from the ordinary English mode of speaking, in which the tones are broken by brief intervals of silence between the words. Those who stammer in consequence of malformation, or disease of the organs of articulation, do not come within the range of this principle, and may possibly present fit cases for surgical treatment; but it is manifest that the indiscriminate application of the knife to healthy structures is unjustifiable, and irrational. When the horizontal laminae of the palate bones do not meet, and the posterior nares are imperfect, a defect of speech is produced altogether different from stammering. The pronunciation of the letters called *mutes* is accompanied by a nasal drone, and that of other letters and syllables is incorrect; but this kind of imperfect articulation may be easily relieved by the introduction of an artificial palate.

A case illustrative of the functions of the tongue in articulation, is recorded in the Transactions of the Royal Society for 1776.

Margaret Cutting had lost the apex and body of the tongue by disease, but nevertheless continued to articulate all the letters of the alphabet; those which required the apex, such as *d, l, n, r, t*, were produced by the action of the under lip against the upper teeth; the latter, however, must have been very imperfectly performed. The influence of

wounds of the tongue on articulation presents some very curious results, especially when they have been inflicted at an early age. The following cases were brought under the author's notice during the autumn of last year. Two young twin brothers presented themselves for examination to one of the metropolitan societies as missionaries; but their mode of articulation was so exceedingly defective and peculiar, that they were supposed to have some irremediable malformation of the vocal organs; but, before coming to a decision, the Society desired the author's opinion to be taken respecting them. On investigation, he found their intonation extremely nasal, similar to that in cleft palate, and that they could not pronounce many of the letters of the alphabet, but supplied their places with other sounds; so that their language was very disagreeable, and sometimes scarcely intelligible. The fauces, palate, and other vocal organs were, however, found to be in a normal state. On further search after the cause of the defective articulation, it was ascertained that one of them, when a little boy, had wounded his tongue so severely, that he was unable to use it in ordinary speech; and that, in order to make himself understood, he substituted a series of nasal sounds which did not require the wounded tongue to be put in motion, and in this way acquired the habit of articulating in the manner already described. The twin brother imitated the one thus affected, and, in consequence of their



being educated together, acquired the same mode of articulation. On explaining to them the nature of the normal actions to be acquired, they immediately began to practise them; and, after the second interview, ceased to consult the author, being confident of their ability to master their defects.

In another case, a gentleman called upon the author to request his opinion respecting the best kind of artificial palate for a friend; but was informed that, before any opinion could be given, it was necessary to see the patient, who shortly after presented himself, and spoke in a tone like that of a person with a divided palate. On looking, however, into his mouth, the vocal organs were found, as in the former cases, to be sound. On inquiry, he stated that when young he fell and cut his tongue, and from that time he had spoken very imperfectly, failing in all the sounds which required the use of the tip of the tongue, as well as in the letters *s*, *sh*, *ch*, &c. The cause and method of cure of his defective articulation were explained to him; and, after three or four visits, he wrote to say that he was able to speak correctly, and did not require further aid.

These cases are interesting as showing that when the actions of the organs of articulation are once deranged, they will require for their restoration a treatment founded on physiological principles.

Members of parliament, barristers, clergymen, and others, required by their professional duties

to exercise the voice for lengthened periods, often suffer from enlargement of the tonsils, relaxation of the pharynx, and irritation of the larynx. Public singers, also, are liable to the same kind of irritation, sometimes even giving rise to the rupture of a bloodvessel. In addressing large audiences, the room must necessarily be capacious, and the intensity of the voice must be proportionate. During these exercises of the vocal organs, the transit of the air to and from the lungs tends to carry away the moisture from the mucous membrane lining them; and, after speaking during a great length of time, a sense of dryness in the throat indicates the necessity of quiescence, or of a draught of water to restore the humidity. As soon as the mucous membrane is thus irritated, the tone of the subjacent fibrous tissues becomes relaxed, and the voice often either falters, or loses a portion of its power; the tonsils partake of the irritation of the surrounding tissues, and, like other glandular structures when irritated, become enlarged. In relaxed states of the system, the tonsils often acquire considerable volume; and under a frequent recurrence of the cause, as in the case of clergymen, there results a state of the tonsils and surrounding parts, commonly designated "clergyman's sore-throat." The early stage of these derangements is often neglected, and recourse is had to surgical advice only when the organs in question have already suffered considerable mischief. Under these cir-

cumstances, the patient should be enjoined to abstain for a time from clerical duties, to take such remedies as will restore the general tone of the system; and, if the application of escharotics, such as nitrate of silver, or nitric acid, fails to reduce the volume of the tonsils, recourse may be had to extirpation. In the early stage, the treatment may be of a more mild character, and will be attended with more satisfactory results. The most rational treatment is obviously the removal of the primary cause: for the treatment of effects, whilst the cause is suffered to continue in operation, cannot be expected to prove successful. The enlarged state of the tonsils in clergymen injures the quality and power of their voice, but it does not produce impediments of speech, as it ought to do, were the tonsils (as has been supposed) concerned in stammering. In singers, long-continued and excessive exercise of the vocal organs is often productive of protracted injury, more especially affecting the upper notes of the voice. Young females, endowed with great range of pitch, have, by excessive use, so relaxed the vocal mechanism, as not only to lose many notes of the scale, but also to impair the quality of their voice during the rest of their lives. The author has also been consulted by others suffering from an enlargement of the tonsils from the same cause. He has, at the present time, under treatment cases of this nature, occurring in young females between the ages of twelve and fifteen. It is therefore prudent

to recommend to very young vocalists, when beginning to train the voice during its development, to commence by exercises of limited duration. The uvula sometimes becomes relaxed by excessive efforts in singing, and then requires to be touched with nitrate of silver. In a case lately sent for the author's opinion by Mr. M'Whinnie, the person had a fine tenor voice of great range; but, from much exertion, the uvula became relaxed, and he lost the upper note of his voice. Bearing in mind the effects produced on the voice by excision of the tonsils, as described by Bennati, he recommended the lower third to be cut off, at the same time not pretending to predict the effect the excision would have on the voice. When, however, the author saw the patient a few days after the operation, he stated that he had recovered the lost note in his register, the quality being somewhat clearer. In other cases of professional singers, the author generally advises the use of caustic, rather than risk the effect of excision; inasmuch as, should the voice sustain injury by the operation, the prospects of the patient would be ruined.

Another example of derangement, resulting from excessive vocal exertion, may be worthy of notice. About five years ago, a lady endowed with a fine-toned soprano voice, whilst endeavouring to increase its power by forcible exercise, felt on one occasion a sudden pain, attended with a sensation as if

something had given way in the region of the crico-thyroid ligament. From that time, pain occurred in the same part whenever she attempted to sing. Shortly afterwards, the thyroid-gland began to enlarge, and has never since been entirely reduced. By applying tincture of iodine with a camel-hair brush every night, it appears, however, at length to be diminishing.

In conclusion, the principles here laid down for the treatment of impediments of speech have now been fully tested by the author; who, after considerable experience, has found that patients labouring under these defects have acquired a perfect control over the vocal organs, by applying the mode of treatment here proposed, after trying various other methods without any beneficial result.

It has been the custom of the author to furnish his patients with principles whereby they might always be enabled to recover themselves, should there exist any tendency to relapse. In this class of cases, however, as in many others, it is not uncommon to find persons too indifferent about the result to trouble themselves with the exercise of rules, after they had made themselves masters of them.

It must always be borne in mind, that we have not to deal with automatic functions, which, once set in healthy action, continue like the movements

of a watch; but with mechanism, the movements of which are placed under the control of the voluntary system, and subject to the irregular impulses of the intellectual processes.

THE END.

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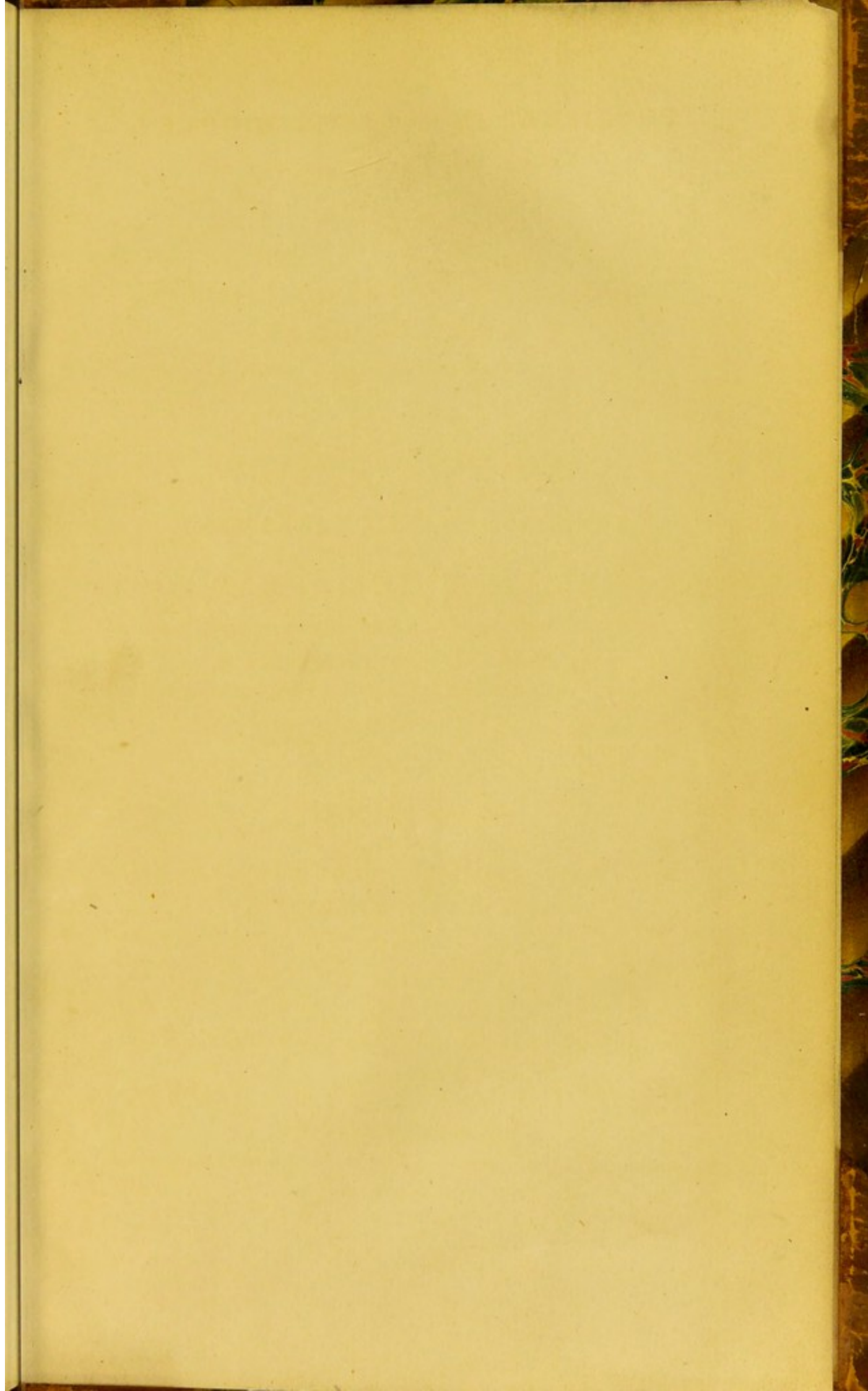
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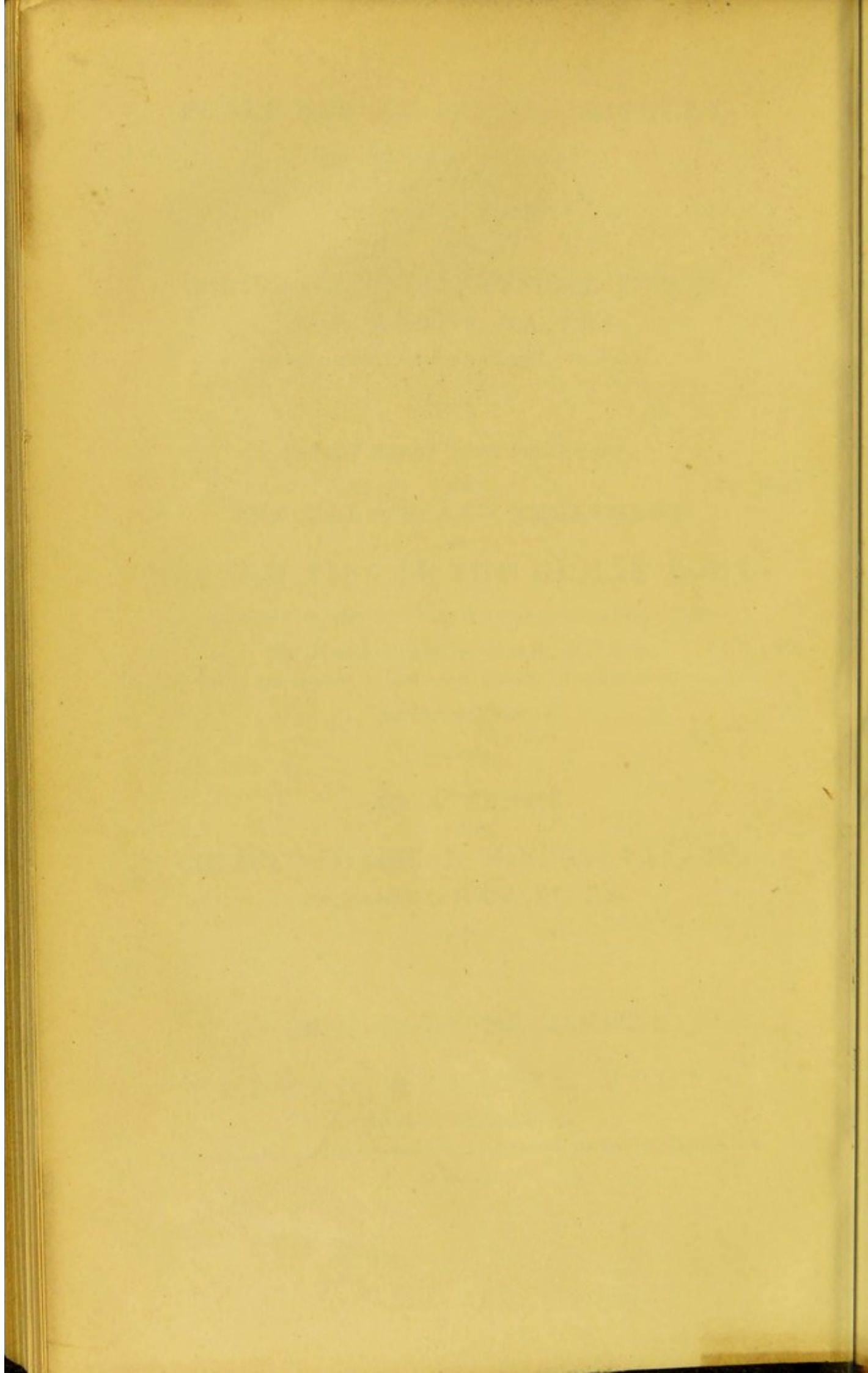
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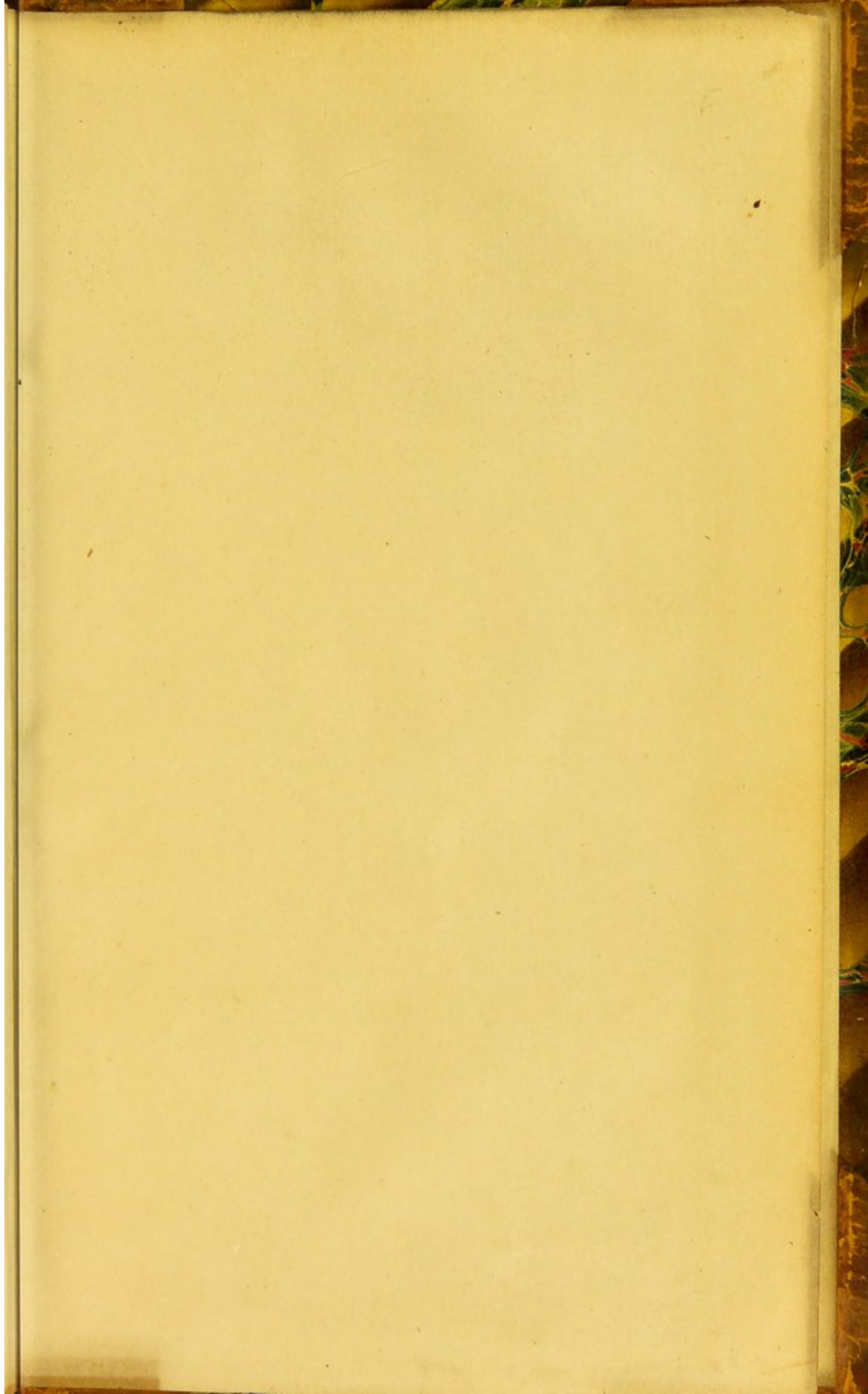
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