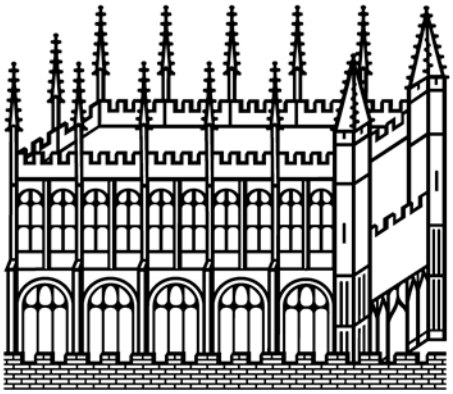

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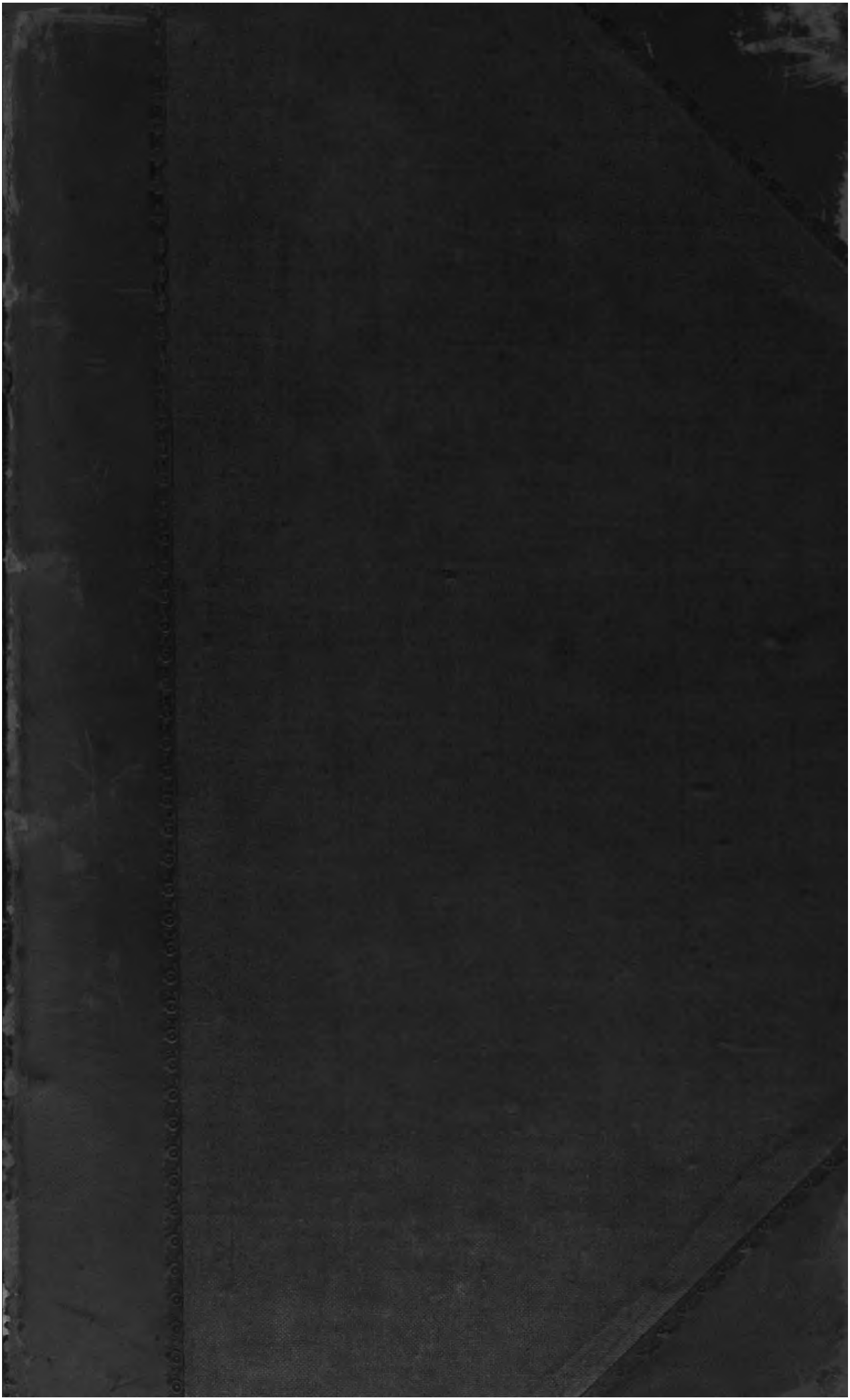

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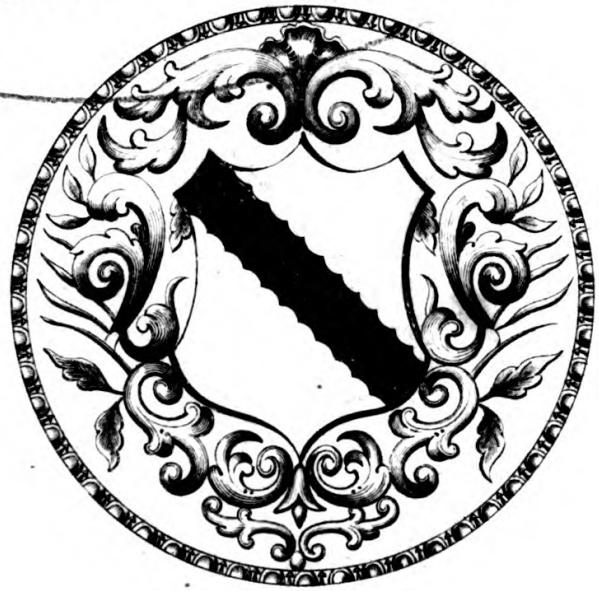

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OBSERVATIONS

ON THE

SURGICAL PATHOLOGY

OF THE

LARYNX AND TRACHEA,

CHIEFLY WITH A VIEW TO ILLUSTRATE THE AFFECTIONS OF THOSE ORGANS WHICH MAY REQUIRE

THE OPERATION OF BRONCHOTOMY:

INCLUDING REMARKS ON

CROUP, CYNANCHE LARYNGEA, FOREIGN BODIES IN THE WINDPIPE, WOUNDS, &c. &c.

BY WILLIAM HENRY PORTER, A. M.

MEMBER OF THE ROYAL COLLEGE OF SURGEONS IN IRELAND, SURGEON TO THE MEATH HOSPITAL AND COUNTY DUBLIN INFIRMARY, AND TO THE DUBLIN GENERAL DISPENSARY; AND LECTURER ON ANATOMY AND SURGERY IN THE MEDICO-CHIRURGICAL SCHOOL, PARK-STREET.

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AS A

GRATEFUL ACKNOWLEDGMENT

OF

NUMEROUS AND PERMANENT OBLIGATIONS,

THE FOLLOWING PAGES ARE

INSCRIBED TO

PHILIP CRAMPTON, ESQ.

SURGEON GENERAL,

&c. &c.

BY HIS FRIEND AND PUPIL,

THE AUTHOR.

INTRODUCTION.

THERE are few subjects found to present themselves under more interesting features, either to the surgeon or the patient, than those diseases which interfere with the actions of the respiratory organs. Whoever has in himself experienced the slightest difficulty of breathing, or has witnessed its effects on others, must be aware of the intense anxiety that such diseased action creates: and when we recollect that in no case can the surgeon more completely or more decidedly display the efficacy of his art, that he is sometimes enabled to restore the patient from a state of fearful distress to one of comparative tranquillity, and, that in many instances he may suddenly snatch him from the jaws of inevitable destruction, we shall not hesi-

tate to acknowledge the importance that attaches itself to this part of surgical science. Under these circumstances it would have formed matter for surprise if the operation of bronchotomy, and the diseases which may render it necessary, had not early attracted the notice of professional writers, and accordingly several valuable papers containing much useful information have, at different periods, been offered to the public. But amongst these I do not find any attempt to arrange those diseases in pathological order, to point out the morbid appearances that are discoverable by dissection, and to connect these with each particular symptom. On the contrary, the great aim of all seems to be to inculcate the necessity of resorting to the operation of bronchotomy, and to shew that several of those who were suffered to perish in a miserable state of suffocation might have been thus preserved. There can, however, be nothing more injurious to the advancement of professional knowledge than an attempt thus to generalize upon any subject, but more particularly on one connected with operation. There are many cases in which the enterprising surgeon will succeed,—there are very many in

which he must of necessity fail ;—and an investigation into the causes of these failures ought to be interesting, as every unsuccessful operation tends more or less to diminish the confidence of the public in professional skill ; and if the real nature of the case be not understood, to introduce timidity and indecision into the mind of the practitioner himself.

It has often been asserted that operations in surgery were by far too frequent of occurrence, and that the knife was resorted to whilst yet the powers of Nature or of Medicine were capable of effecting a cure. I know not how far the observation may apply in other cases, nor am I disposed to admit its truth in any, but I am certain that bronchotomy is too seldom practised, and that when it is performed, it is generally at a period of disease when its success is impossible. There is a prevailing notion amongst the public that wounds of the windpipe must necessarily prove fatal. This idea may possibly be traced to the older writers on surgery, where such a doctrine is almost universally inculcated, and perhaps is partially derived from observing the deaths of slaughtered ani-

mals, where this tube is wounded, and what is manifestly the effect of loss of blood is erroneously attributed to another cause. This view of the case renders a patient unwilling to submit to the operation as long as the disease is tolerable—that is as long as success is possible. He then calls for it—it is performed—and he dies: an event which is usually, by his friends, attributed to the operation. Under such circumstances the surgeon will hesitate to propose or to press a similar mode of proceeding in similar cases, and thus has one of the simplest and the safest operations come to be regarded as desperate or uncertain, dreaded by the public, and not sufficiently supported by the profession.—Within my own experience I think I have seen some cases that might have been saved by operation, suffered to perish through the influence of these causes.

It is now pretty generally admitted that pathological observation forms the only certain and unerring basis on which surgical practice can be established; and having, on my own part, experienced the want of such observations with reference to the diseases of the larynx, I

have been induced to devote some attention to the subject, with a view of attempting to supply the deficiency. The incertitude that prevails in this branch of surgery must have been apparent to every practitioner:—one man bleeds his patient in every disease interfering with respiration, another has met with cases where such practice has proved decidedly injurious: in some instances bronchotomy has been followed by the most splendid success, in other hands it has totally failed. The same uncertain variety of treatment will be found in those cases which are scattered through the different periodical publications, and which, though deficient in this one respect of pathological accuracy form the best, perhaps the only sources of information on the subject. It is obvious, then, that this difference in treatment and success must have some corresponding cause. The windpipe, simple as it is in structure and in function, is subject to a variety of morbid affections, the symptoms of which have a strong resemblance to each other: some of these are remediable by medicine, some require manual operation, and many, unfortunately, admit neither of pallation nor of cure. In the course of my at-

tendance on the Meath Hospital, I have met with a number of laryngeal diseases, sufficient to prove the importance that attaches to them on the score of frequency of occurrence alone; the nature of each of these I have endeavoured to investigate by dissection. whenever the death of the patient afforded an opportunity; and although I am far from believing I shall succeed in explaining the peculiarities of all or even the greater part of those affections, yet having commenced the undertaking I may possibly be followed by some other more capable, or possessing a more extensive field for observation.—The subject is second to none in difficulty or importance.

The greater portion of the following pages formed a part of the Clinical Lectures delivered at the hospital during the past* season, and it is chiefly at the request of some of the students that they are now laid before the public. It has been already stated, that a vast deal of information relative to laryngeal disease lies scattered in an unconnected form throughout various periodical publications, and many short though valuable papers are to be found in the

* December, 1825.

works of different authors. To the professional man of extensive reading and experience I can, perhaps, offer little that is new, or that will be found worthy of perusal: but it is otherwise with the student. His general avocations will scarcely permit him to search through a number of books, many of which are not easily to be procured; and perhaps it will be impossible for him to collect and arrange the different opinions on the subject, or to reconcile them one with another. My sole object must be understood to be, therefore, the facilitating the student's progress, relieving him from a labour which he will often find not to be very profitable, and teaching him to found his future practice on pathological principles, rather than on the unexplained results of numerous cases, the details of which can only burden the memory without ever improving the mind.

It will be found that I have not been over anxious to fill up my pages with a multitude of cases, each resembling the other, as if numerous details could impress a fact more strongly than one or two correct yet simple relations. The examples I have selected have most of

them occurred in the Meath Hospital, and some of the morbid preparations are there preserved, so that they remain to illustrate the observations arising from each pathological fact. In some few instances I have been obliged to transscribe or translate cases from foreign authors, where my own experience did not furnish me with the means of explaining my ideas, but they will be found to be inconsiderable as to number, I hope interesting, and always acknowledged as to the sources from which they have been derived.

OBSERVATIONS,

&c. &c.

AS the larynx and trachea possess an internal covering of mucous membrane, the morbid affections of these organs must be influenced to a very considerable extent by the effects produced by inflammation on this particular structure. Previously, therefore, to an examination of the nature of those derangements which are found here, and the symptoms by which they are characterized, it may not be unprofitable to take a brief survey of the phenomena attendant on mucous inflammations in general, and of the consequences resulting from them. A knowlege of the changes of structure produced by disease; of the varieties developed by age, climate and habits of life; and of the deviations from the natural progress of disease arising in particular constitutions, often from the influence of accidental circumstances, is eminently necessary to the practitioner who would under-

stand his profession rationally and scientifically. The symptoms of disease may advantageously admit of division into two great classes; 1st, Those arising from the presence of any morbid action in a particular structure, which are peculiar to this structure, and found to exist in it, under similar circumstances, in whatever part or situation of the body it may be placed; and 2dly, Those occurring in consequence of an organ being no longer in a fit condition to perform the functions for which it was originally intended in the animal economy. The symptoms that result from an interruption or cessation of function are in general soon discovered, and very easily discriminated. A man who finds his respiration become painful and difficult, quickly apprehends that something is the matter with his lungs or his windpipe, but he may have a dryness and huskiness of the throat, a tickling cough, an expectoration of mucous, or even of a muco-purulent fluid, without his attention being strongly attracted to the subject, or his suspicions being awakened to the perilous nature of his disease.

In those forms of disease, also, wherein a surgeon may be tempted to undertake an operation in the hope of being enabled either to prolong or preserve the existence of his patient, it must be of importance that he should be aware of the condition of the parts with

which he is about to interfere. Few circumstances tend more directly to diminish professional reputation, or the confidence the public should be encouraged to repose in the efforts of art, than the performance of unsuccessful operations; not of operations hazardous in their nature, and uncertain in their results, but those which are undertaken for the relief of incurable disease, and in which, of course, success must be impossible. Next to this class of operations might be ranked those undertaken with a view to give the patient a chance of life, when every other effort has failed; which are begun in uncertainty, conducted with timidity, and most generally end in disappointment. It must not be understood, however, that I would object to the performance of an operation in a case where the patient must otherwise inevitably perish. The infliction of a little additional pain is but of trivial consequence when weighed against even a feeble hope of recovery; and in the event of a patient's death it often affords the melancholy consolation that every possible effort had been made to save him; but still those operations which depend upon chance are not such as the surgeon who values his reputation would wish either to advise or to perform. A man should endeavour to make himself acquainted with the effects of disease: he should know the symptoms that mark its progress, and be able to say

when the knife of the operator may be used with advantage, and when it should be laid aside for ever. He should be familiar with those new formations and organic changes of structure that, being hopeless and incurable, ought not to be interfered with; and taking nature as his guide, he should as firmly decline an operation, when he thinks it likely to prove unsuccessful, as he should press its performance under opposite circumstances.

Perhaps there is no class of diseases involved in greater obscurity, or presenting greater difficulty to the practitioner, than those affecting the Larynx and Trachea. The functions of these organs are few and simple. They serve to transmit the air in the acts of inspiration and expiration, and in them the voice is formed and its tones modulated. The symptoms, therefore, derivable from an interruption or imperfect performance of these functions can be only hoarseness, a loss of voice, and respiration more or less impeded. But every practitioner knows how inadequate these circumstances would be to the formation of a diagnosis between the diseases of the respiratory tube. A man of experience may distinguish between the sibilous breathing that attends laryngeal obstructions and the raucal sob, so frequently met with in severe bronchial inflammations; he may be familiar with the peculiar ringing of a croupy

cough, or with other phenomena only to be learned by actual observation; but when he meets a case of laryngeal disease, how is he to know whether it is caused by an œdematous condition of the submucous tissue—by a chronic thickening of the mucous membrane itself—by laryngeal ulceration—by destruction of the cartilages—by the presence of abscess or tumour—or by any other of those numerous affections which dissection so frequently shows us to be the occasions of death? Perhaps, by reason of the difficulty of the subject, it will be long before the same accuracy of information with reference to the affections of the windpipe can be attained, that is, possessed in other diseases; but if ever the subject will admit of clear and simple arrangement, it can only be looked for as the result of pathological investigation—a branch of professional study only lately begun to be cultivated with industry and success, and to which, perhaps, the rapid progress lately made in medical science is mainly to be attributed.

In these preliminary remarks, which are only intended to illustrate the nature of the morbid affections observed in the larynx and trachea, it cannot be expected that I should enter at large into an explanation of all the phenomena resulting from inflammation of mucous mem-

branes. The limits I have prescribed to myself would be insufficient for such a purpose, and it would distract the reader's attention to find a number of pathological facts piled together, without reference to any practical end. But I, by no means, wish to be confined to those organs alone: for the appearances of disease, even within them, may often be more easily and more familiarly explained by reference to a similar structure in a different situation; and as my sole object is to facilitate the student's progress in the investigation of laryngeal disease, I may be permitted to take that path which I believe will offer the fewest impediments to the completion of my views.

When a mucous membrane is examined in a state of recent inflammation, its colour is found to be greatly encreased in intensity, varying, however, according to the violence of the disease and the situation of the membrane. It is more vascular where it is in connection with soft parts than where it lies against bone or cartilage, and therefore the former exhibits a degree of redness almost approaching to purple, whilst on the surface of the latter numerous small vessels are seen wandering like those on an inflamed conjunctiva, when the affection is not severe. In a case of bronchial inflammation, that part of the mucous surface covering the posterior membranous portion of the tra-

chea is often of a bright blood-red colour, gradually mellowing to a pale pink tint towards the front of the tube, whilst that covering the cartilaginous rings is sometimes nearly white. An inflamed tonsil shews the appearance of mucous inflammation extremely well, during life; but if the anatomist wishes to examine this structure after death, he should do so immediately, for the red appearance is either lost or greatly diminished after the lapse of a few hours, and injections afford but an indifferent representation, as during life the membrane is of a much deeper colour than vermillion can impart. Besides colored injections do not exhibit that variety of tinge observed in mucous inflammations, but resemble extensive ecchymoses rather than the natural appearances of disease.

Mucous membranes, when inflamed, are swollen, and soft, and pulpy. The surface of the membrane itself appears thickened, and wherever it is villous or flocculent those particular characters are more prominently developed. But the tumefaction of mucous membrane depends more on the submucous tissue than on any diseased action in itself. This tissue is reticular membrane, exceedingly short and close wherever a mucous surface is laid upon bone or cartilage, but much looser and more relaxed where it is connected to muscle, or to other soft

parts. This particular structure seems to have been made the connecting medium between mucous membranes and the adjoining tissues, for the purpose of guarding against any accumulation of fat which might possibly block up the canal, and prevent the passage of those substances to which nature intended they should serve as channels of conveyance. When inflammation occurs in this reticular tissue, the result is, an effusion of serous fluid, giving to the mucous membrane that soft and pulpy appearance already remarked, and which in some instances is of such importance as to form the prominent and dangerous character of the disease. The tissue connecting mucous membrane to bone or cartilage is so short and close that there is no room for any infiltration that might prove detrimental. In the looser organs, although the same tissue may be capable of containing a larger quantity of fluid, yet the canal admits of considerable dilation, and there will not be any great probability that a serious obstruction should be created. But where the mucous membrane is connected to soft parts, and these again are so restrained by the neighbourhood of others more unyielding, that if tumefaction takes place the swelling must press into the cavity of the canal, there is then danger, and it will be proportioned to the natural calibre of the passage, the consequent likelihood of its becoming obstructed, and the importance to life of the sub-

stances intended to pass through it. This latter case is well exemplified in the œdematous affection of the larynx, where in the course of a few hours that portion of the membrane near to the rima glottidis and ventricles, will become so puffed up as absolutely to cause suffocation, whilst between the thyroid cartilage and the membrane lower down scarcely a drop of fluid shall appear to have been effused. This species of œdematous swelling is also well shown in inflammations of the bronchial membrane, for the surface of the trachea in those cases will appear slightly corrugated, from the tumefaction of the cellular tissue connecting the membrane to the inter-cartilaginous spaces, whilst that covering the rings remains comparatively close and unaffected.

It sometimes happens that lymph is found effused on an inflamed mucous surface, but * *excepting in cases occurring under the age of*

* There is a case in the Edin. Med. and Surg. Journal for Oct. 1824, in which croup is stated to have occurred in a patient aged 31 years; but, as he recovered, the identity of the affection with genuine croup may admit of doubt.

In the winter of 1823, a case occurred in the Royal Infirmary of Edinburgh which was considered as a specimen of croup in a man aged 20, and therefore was regarded as an object of curiosity.—I have been favoured with an outline of the case by a gentleman who was a student in the infirmary at the time, and have added it to the present volume in the Appendix, that the reader may be enabled to judge whether or not it was an example of real croup.

puberty, it is very doubtful whether this substance, considered as the product of *acute* inflammation, be coagulating lymph or inspissated mucus. Occasionally white streaks, resembling lymph, are found marking the tonsils like a snail-track, and patches of a similar nature are discovered in bronchial inflammation, particularly in the vicinity of the ventricles of the larynx; and I have seen a similar substance in the nostrils,—in different parts of the intestinal canal,—in the urinary bladder and urethra;—but perhaps these adventitious substances should rather be considered as mucus than as lymph produced by inflammation. Something exceedingly resembling this viscid substance has been found on the fauces and coating of the stomachs of hydrophobic and tetanic patients, and which probably may afford some explanation why the most powerful and active medicines have so little effect on these diseases; but no anatomist ever spoke of this as lymph, and perhaps it would be more correct to describe all the viscid tenacious productions of mucous inflammation in the adult as consisting of inspissated mucus. But in more chronic affections membranous layers of lymph are often formed; as for instance in the bronchial cells, where, from taking the shape of the parts in which they are deposited, they appear ramified like the branches of blood-vessels, and were of old supposed to be portions of the pulmonary artery. These are

called bronchial polypi, and are generally found in patients of an advanced age. But the best example of lymph being produced by chronic inflammation is to be found in dysenteria tubulosa, where whole rings of a considerable length come away, and this so frequently, and to such an extent, as to give rise on some occasions to a supposition that they were large portions of the mucous membrane reduced to a state of slough, and thrown off by the efforts of Nature.

But, in the child, there can be no doubt that lymph is the genuine product of active mucous inflammation, although it would appear that the inflammation occasioning it is of some peculiar or specific character, and confined in this particular effect to the larynx and trachea alone. Even in these situations the membrane may be affected without a deposition of lymph, for in the hooping cough there is good reason to believe that it is more or less inflamed, and yet rarely is there an adventitious membrane formed; and I have seen cases so far resembling croup in all their stages, that they could not be distinguished from it, in which dissection, after death, shewed the mucous membrane swollen and soft and pulpy, with copious serous effusion, yet without the formation of a single flake of coagulating lymph. But, generally, inflammation of the larynx and trachea in the child is followed by the production of an adventitious membrane

consituting the disease called croup. This is of a pale yellow colour; viscid and tenacious; more generally found in the larynx than in the trachea; seldom occupying the entire circumference of the tube; unorganized; incapable of becoming the medium of union, and with a strong disposition to separate from the surface on which it was originally formed. It usually commences in the larynx, and travels downwards along the trachea; more rarely it seems to begin in the ramifications of the bronchial cells; and again still more seldom is the entire of the membrane seized at once and the adventitious substance thrown out over its entire extent.*

Soon after the lymph has been secreted, the appearances of inflammation in the membrane subside. It has no longer the swollen pulpy appearance, and it loses its blood-red colour. The lymph now separates and becomes an extraneous body, and portions of that formed in

* In an inaugural dissertation published by a German physician of the name of Schmidt, there are some experiments to prove that artificial inflammation excited in the windpipes of animals, *only produced the adventitious membrane in those very young:* whilst every attempt to create it in the old proved abortive. I have not been able to procure the book, and therefore cannot give the experiments in detail, but the fact will sufficiently demonstrate the effect of age in modifying the product of mucous inflammation.

the larynx are coughed up, whilst lower down in the trachea it is strongly adherent, and other parts of the tube are only commencing the process of inflammation, which in its turn is to terminate in a similar result. If the disease is circumscribed and has subsided, the lymph is sometimes expelled by coughing, and a few cases of croup have thus terminated favourably when such a result was the least to be expected. But on the other hand, this loose and floating substance has been thrown by the violence of the cough against the rima glottidis, become entangled there, and caused the death of the patient by instantaneous suffocation at a period of the disease and under circumstances otherwise promising a speedy recovery.

Another common occurrence connected with inflammation of mucous surfaces, is hæmorrhage without any apparent abrasion or lesion of the membrane. In some of the severest cases of dysentery little more has been discovered than an ecchymosis under the mucous structure, with an effusion of blood into the intestine. Epistaxis is a frequent accompaniment of common catarrh and hæmoptoe by no means rarely to be met with in inflammations of the bronchial membrane, where it is not at all so perilous a symptom as is generally imagined. If blood is expectorated florid and frothy, the great probability is, that it comes from some wounded vessel of the

lungs; but if it is darker coloured, small in quantity, and mixed in streaks with mucus, it will be more readily supposed to be poured out from the mucous surface, and is an index of the existence of inflammation therein. Hæmorrhage from these surfaces is found to occur under two very opposite conditions. One in a chronic stage of disease, when the vessels are relaxed and the constitution sinking under debility, as the flow of blood from the intestines in the last periods of typhus fever, and the bleeding from the surface of the bladder in broken-down old men: and another in the more active forms of inflammation where the vessels are overloaded and distended, and pour out their contents merely as an effort of Nature to relieve herself. These latter forms of hæmorrhage are rather to be considered as favorable symptoms than otherwise.

With respect to the natural secretion of mucous membranes, it is usually supposed to be increased in quantity and so altered in quality, as in all its characters both sensible and chymical to resemble pus. Already we have seen that some affections of this structure are not productive of this result, inasmuch as they lead to the formation of an adventitious membrane; but besides, it is only in some situations that the existence of purulent matter can be clearly demonstrated, whilst in others it is doubtful,

and in some others still, its non-appearance will admit of proof. Inflammations of the genito-urinary system produce the best specimens of purulent discharges without loss of substance, and next to them, those of the pulmonary. It is questionable whether the organs concerned in digestion ever pour out matter unless when actual ulceration is present, and the mouth, fauces, œsophagus, and perhaps the schneiderian membrane, never exhibit this symptom. At least, if they do, it has'never fallen under my observation.

In reference, however, to the larynx and trachea, it is certain that inflammation will produce purulent expectoration. Far, however, from this secretion being in itself a dangerous symptom, its appearance usually indicates the subsidence of the first inflammatory action, for it is when the vessels have begun to unload themselves,—when the intense redness has disappeared and the the swelling subsided, that the purulent discharge appears to flow from the surface of the membrane. It would, in fact, be always a favorable symptom except that mucous surfaces, when once they have taken on any particular action have a strong disposition to continue it to an indefinite period. Gleety discharges form a good illustration of this tendency to the maintenance of a morbid action, and gleets from the pulmonary membrane

would perhaps prove as trifling and afford as little trouble as those in any other situation, if it was not that the efforts to expectorate the secretion through the narrow aperture of the larynx very constanly produce such derangement in the lungs as to cause the most formidable symptoms and often a fatal termination. Indeed, it is frequently extremely difficult to distinguish between the protracted chronic forms of bronchial inflammation and regular phthisis arising from tubercular suppuration, for both diseases exhibit the cough, the nocturnal perspirations, the difficulty of lying on one particular side, and the purulent expectorations. And the similitude may be carried farther, for both very commonly have a like termination, the one dying of hepatized lungs, the other of the suppuration and destruction of the organ, as is observed in tubercular phthisis pulmonalis.

A very common consequence of inflammations of mucous membranes is, that their sensibility is so altered that they ill endure the presence of those substances, for the transmission of which the organs of which they form a part were originally intended, and they certainly do not operate on them those changes usually performed during health. If the lining membrane of the bladder be inflamed, the viscus will not contain a drop of urine even for a moment, and the patient is perpetually teized with the most urgent calls to

expel this fluid. If the urethra be the seat of disease, the passage of the urine over the affected spot causes a sensation of burning pain that is almost intolerable. If the stomach is attacked, not only is the presence of food within it painful and disagreeable, but vomiting is a symptom constant almost without an exception: and it is well known if the intestines are inflamed, as in acute dysentery, that the smallest quantity of mucus is so painful and so irritating, that the patient is frequently called upon to discharge it. In applying this pathological observation to the membrane covering the larynx and trachea, two facts of some importance come before our notice. First, that the passage of the air is more or less accompanied by pain, for at every inspiration the patient shows evident symptoms of suffering, although his anxiety to inflate his lungs, and the horror that always accompanies the dread of suffocation, makes him forget the actual uneasiness, in his struggles to procure a sufficient supply of air. And, secondly, that in acute cases of bronchial inflammation, the arterialization of the blood is but very imperfectly performed.

Whatever the part may be which the bronchial membrane has to perform in the act of respiration, as connected with the change wrought upon the blood in the lungs, it appears very probable, if not certain, that the function is so deranged by inflammation that very often the oc-

currence of death can only be explained by this circumstance. It may be easily supposed that if the surface of the membrane is covered by any adventitious substance, whether a layer of inspissated mucous, or of effused lymph: or if the bronchial cells be filled with serous fluid, the interposition of these may prevent the contact of the membrane with the air, and thus produce fatal consequences. But in numerous dissections after death, no such extraneous bodies have been discovered, and the subjects have appeared to have died because the blood could not undergo that change which is essential to the maintenance of life. It is also remarkable, that cases of very acute bronchial inflammation are rapid, if not sudden in their termination. Sometimes, it is true, the patient perishes in consequence of a rupture of some of the air vessels of the lungs, caused by the violence of coughing, and the organ thus becoming emphysematous, and incapable of performing its office. Sometimes, perhaps, and particularly in aged subjects, a vessel of the brain may give way from a similar cause. On other occasions the mucous membrane is found partially smeared over with a substance resembling thin paste or honey, which might slightly interfere with its healthy functions; but in the great majority of cases I have had an opportunity of examining, the mucous surface appeared red, swollen, and pulpy, rather exhibiting a deficiency of its accustomed

secretion, and unaccompanied by any other morbid production, unless a small quantity of serous effusion in the bronchial cells. This serous effusion I have just now noticed is found in greater or less quantity in all subjects that have died by obstructed or imperfect respiration, and has by some been considered as the ordinary product of mucous inflammation. But, independent of the circumstance that such fluid is not observed to be poured out by mucous surfaces in other situations, it is easy to account for its presence on other principles more consonant to the phenomena resulting from disordered breathing. Whenever, either by reason of an insufficient supply of air, or of the presence of inflammation in the membrane, the blood is but partially or imperfectly arterialized, congestion is the consequence, and the vessels, to relieve themselves, begin to pour out their serous contents. If the original cause be longer maintained, the heart is obliged to supply the brain with a fluid inadequate to maintain its healthy tone and actions, and the nervous influence imparted to the whole body, and of course to those parts concerned in the important process of respiration, being impaired, the lungs become still more loaded, and the effusion is continued and increased. Finally, the energy of the brain fails, and the muscles of respiration cease to act: and thus the patient dies, not because an effusion of serum into the bronchial cells had caused

suffocation, but because inflammation had prevented the arterialization of the blood, and thus deprived the brain of that stimulus which is necessary to the maintenance of its healthy actions. As a proof that serous effusion is only a secondary result of this species of inflammation, it may be observed, that in all cases where the respiration has been long obstructed, and the progress of the disease tedious, the quantity of fluid thrown out is very great, often so abundant as absolutely to fill the trachea; whereas if the disease has been rapid, and consequently the congestion but of short continuance, the effusion is seldom more than trifling.

Ulceration is an exceedingly frequent consequence of inflammation in mucous structures, but less so in the larynx and trachea than in other situations, although it is occasionally discovered here under particular circumstances. The appearance of ulcers here are sometimes irregular and anomalous, but, generally, they assume such peculiar and distinctive characters as to render their classification easy. We find three forms of ulceration to prevail on mucous surfaces. First, immediately at the apertures of these canals where the membrane runs into and becomes identified with the cuticle, ulceration assumes the appearance of a ragged crack, which spreads irregularly, scabs, and finally heals without granulation. The second is that

known by the name of the aphthous ulcer, a small circumscribed sore, either of an oblong or circular form, its edge red and slightly elevated, and its surface covered with a strongly adherent slough. This ulcer is rarely the result of acute inflammation, and may be regarded as sympathetic, indicating the existence of irritation in some distant part of the canal, as in the examples of aphthæ occurring in the mouths of young children, apparently in consequence of some diseased action being present in the digestive system. They also appear not to heal by granulation, but by a gradual contraction and approximation of the edges of the sore. The third is, perhaps, the most important form in which ulceration appears on mucous surfaces. Then we have a broad, flat sore, sometimes deep, sometimes superficial; its surface covered with a tenacious slough of a bright yellow colour, and its edges uneven, if not ragged. These sores have a wonderful disposition to spread, and frequently we see them rapidly making way in one direction, whilst they are healing just as rapidly in another. They are often met with on the surface of the intestines of scrofulous children, but their most frequent situation is in the throat, where commencing at the back of the pharynx or on the edges of the arches of the palate, they spread downwards to the larynx, and produce the most formidable consequences. The soft palate is often alto-

gether destroyed by them, and perhaps, after continuing during an immense length of time, and resisting every application and all kinds of medical treatment, they seem to heal spontaneously; but in general their termination is not so favorable. I believe they are, most commonly fatal; but death is not induced either by the irritation they create or the ravages they commit, but by the general constitutional derangement to which they owe their origin, and of which they may be considered in the light of symptoms. The most perfect specimen of this form of ulceration I ever witnessed was in the case of a man who died of laryngeal disease in the Meath Hospital. He was of a highly scrofulous disposition, had contracted a venereal taint, and taken mercury irregularly, so that he seemed to have suffered from a combination of morbid excitements at the same time, under which his health rapidly broke down. On examination after death, a number of broad, flat, irregular ulcerations were found in the œsophagus, with ragged, uneven edges, and their surfaces covered with a tenacious matter of a bright gamboge-yellow colour.

The appearance of sloughs on the surface of mucous membranes is far from infrequent, and they may be the results either of accident or disease: the swallowing of boiling water, or any of the strong acids, furnishing an example of the

one, and the malignant sore throat attending on scarlatina of the other. The colour of the slough is grey, or ashy; in some few cases it appears brown; its edges are abrupt and well defined, and it is surrounded by inflammation of an intensely deep red colour, amounting almost to purple. It is in general slow in separating, and when thrown off, it appears to resemble a membrane of viscid lymph not unlike the adventitious substance formed in croup, and the surface underneath looks of a bright red colour, is nearly level with the adjoining parts of the membrane, and seems more like the blush of erythema than the relic of mortification. It must however be understood, that it is only in the most favorable cases that such a termination is to be expected; for where the constitution is weak, and the attack of the disease severe, we find the casting off of one slough to be succeeded by the formation of another, until a deep and very foul ulcer is produced. I believe that wherever croup has appeared to have been contagious it will be found that the malignant scarlatina has prevailed also, and that the occurrence of the laryngeal or tracheal disease was occasioned by the spreading of the inflammation from the fauces to the wind-pipe, or perhaps by the actual presence of one of these sloughing ulcers in the immediate neighbourhood of the glottis.

In connection with the subject of mucous in-

flammation, spasm constitutes too prominent a symptom to be passed over in silence; for although it is so far not necessarily connected with the inflammatory action that it may be and often is present without it, yet on the other hand it so certainly manifests itself on every occasion where inflammation appears, adding considerably to the patient's sufferings, and very frequently causing his dissolution, that it may well be considered as forming an important symptom in affections of this nature.* Spasm, however, is not a disease either of mucous membrane or of the submucous tissue, for neither of these structures appear to possess within themselves a power of contractility adequate to explain the phenomena of this irregular action, but of the muscles situated around or in the neighbourhood of mucous canals, the natural and healthy uses of which are connected with the functions of them. In proof of which it may be observed that spasm does not occur in the membranous mucous ducts, or in that part of the urethra anterior to the bulb; whilst

* In opposition to the idea of spasm only occurring in situations that admit of being acted on by muscular contraction, there is a case related in the 11th Vol. of the Ed. Med. and Surg. Journal, the dissection of which shewed a contraction of the trachea more than two-thirds of its diameter, and one inch and a half in length, situated mid-way between the larynx and the bifurcation of the trachea. The contraction relaxed gradually after the tube was slit, so that the day following, the part did not appear contracted or in a state of disease of any kind.

it is most frequent in those situations where the canals are subjected to the influence of strong, frequent, and irregular actions of adjoining muscles, as in the bulbous portion of the urethra and in the larynx. Whatever can excite these muscles to action will occasionally be the cause of spasm. Sometimes it appears spontaneously, or at least its occurrence will not admit of explanation. Sometimes it would seem to be a sympathetic affection, as exemplified in the spasmodic croupy respiration of children, whilst under the irritation of teething or of deranged digestion, and sometimes it is the result of a more direct stimulus applied either to the mucous membrane or the muscles themselves. An example of the first of these will be found in the dreadfully harassing cough produced by the accidental admission of any irritating substance (such as a particle of salt) into the larynx, a cough which often continues long after the cause of offence has been expelled; and of the second in the paroxysms of dyspnœa, which always appear with more or less severity in cases of inflammation or other diseased action, going forward in the mucous membrane of the larynx. However, whatever may be the exciting cause of spasm, its effects, with reference to the respiratory organs, are really dreadful. In the child, particularly in the infant, they are sometimes suddenly and unexpectedly fatal. Even in the adult state, I am aware of a case in which

death could be accounted for in no other manner. In advanced life, however, they are rarely directly fatal, but they are always harassing, and hence it is that in asthma and other chronic forms of dyspnœa so much relief is obtained by the smoking of stramonium,—tobacco,—or the use of other such powerful anti-spasmodics.

Having thus laid before my readers a slight and superficial view of the principal pathological facts connected with the inflammation of mucous membranes, and of the symptoms found to accompany them, they will be better prepared for entering upon an examination of those diseases which appear within a limited portion of their extent, namely, the larynx and trachea; for however the respiratory tube may be affected, or in whatever structure the disease may have been originally situated, still the affection of the membrane that lines it will exercise such a decidedly modifying influence on its symptoms that they can neither be understood or explained without some previous acquaintance with the pathology of mucous tissues. It must be apparent now, that besides the numerous accidents to which the respiratory tube is exposed by its situation and peculiar functions, it must also be liable to many idiopathic diseases, all of which will present shades of difference according to the structure originally attacked, whilst they

will resemble each other in all symptoms occasioned by simple interruption or derangement of respiration. Into a consideration of all these diseases, or even the greater part of them, it is not my purpose to enter. They belong more exclusively to the province of the physician. But those cases which demand surgical interference, which can be thus relieved, and perhaps thus only, are sufficiently numerous to attract the attention of the surgeon, and sufficiently important to arouse his interest; and therefore I shall confine myself to those accidents and diseases for the relief of which the operation of bronchotomy has been either practised or proposed.

The idiopathic affections of the larynx and trachea falling within this description are, acute inflammation of the mucous membrane occurring in the child, constituting croup or cynanche trachealis;—spasmodic croup without the existence of inflammation;—inflammation of the submucous tissue of the larynx in the adult, or acute cynanche laryngea;—thickening of the mucous membrane, or chronic cynanche laryngea;—alteration of structure in the laryngeal cartilages or phthisis laryngea;—sloughing and death of the cartilages;—and the pressure exercised by abscess or tumour in the neighbourhood of the wind-pipe obstructing the passage of the air.

The affections of the larynx arising from accident are, the irritation and inflammation occasioned by the swallowing of boiling water, or the stronger acids; the admission of foreign bodies within the wind-pipe; and the injuries inflicted by wounds, principally in attempts to commit suicide.

CYNANCHE TRACHEALIS, OR CROUP.

Every affection of the wind-pipe occurring in the child, producing difficult respiration, with a peculiar ringing sound, and accompanied by a short, frequent, and dry cough, has been included under the one generic name of Croup, and perhaps justly so, as the phenomena are so truly characteristic of the disease that they leave very little doubt on the mind of the practitioner as to the general nature of the case. But it is evident, notwithstanding, that these affections will admit of considerable variety, both as to the supposed originally-exciting cause of the disease, its intensity, and the rapidity or slowness of the process of inflammation,—the prevalence of any one particular symptom,—the supposed seat of the disease,—and the nature of the morbid action going forward in the part. Accordingly the divisional arrangements of croup have been extremely arbitrary, and we hear of idiopathic and symptomatic croup,—of acute and

chronic,—spasmodic, —laryngeal, —tracheal,— and membranous croup, as frequently and as familiarly as if any very decided practical utility could be derived from such supposed varieties. But perhaps all divisions of disease not founded on pathological distinctions, or not involving some material point of practice, are at best useless; and may be injurious to the student in producing that worst species of ignorance—the mistaking a knowledge of the names of things for that of their nature. Laying aside, therefore, all distinctions of an arbitrary nature, we shall proceed to consider Croup under the forms most commonly developed by dissection, the only grounds on which the existence of variety in disease can be satisfactorily established.

I consider Croup as essentially consisting of three species :—One, in which dissection after death can discover no morbid change of structure, nor the results of any increase of action. The larynx and trachea appear pale and smooth and polished, without any indication of vascularity or thickening of the mucous membrane, and the occurrence of death can only be explained by supposing the existence of some irregular action, such as spasm. This form of croup is by no means infrequent, is often fatal, its attack is sudden, and it carries off its victim with a rapidity that almost precludes the possibility of surgical interference. The second con-

stitutes the inflammatory form of croup, and exhibits all the appearances and all the stages of acute inflammation of the bronchial membrane in the child. This is the form of disease which produces the adventitious layer of coagulating lymph, is by far the most frequent of occurrence, and when acute in its symptoms, very generally has both a rapid and a fatal termination. The third species I should suppose to be very rare, for out of an immense number of subjects I have only met with two examples. It is where the lining membrane of the larynx has become altered and thickened in structure, so as altogether to spoil the natural appearance of the organ, and of course to interfere with its functions. The commencement of this disease is extremely insidious, its progress slow, but its termination inevitably destructive. It is comparatively common in the adult, where it constitutes one of the examples of chronic cynanche laryngea.

The exciting causes of croup seem, in some instances, to be involved in obscurity, the disease making its appearance suddenly, and without any previous warning. In some particular situations it is evidently more prevalent than in others, being rarely met with in high, dry, or mountainous districts; whilst in low, moist, and foggy places its visitations are both frequent and severe. It is, however, by no means necessary that such a condition of the

atmosphere should exist in order to the production of croup, for it is occasionally met with during the warmest and finest seasons. There seems also something like a pre-disposition to the disease in particular families, many individuals of which shall be successively attacked by it, whilst other children placed under exactly the same circumstances with respect to local influences, diet, clothing, and general management, shall escape completely free. Individuals also appear occasionally to possess a similar disposition, for we see one child in a family to suffer five or six times from croupy affections, and not one of the others ever exhibit a single symptom. There are still others in whom this disposition exists so strongly, that any slight exposure to cold produces croupy breathing and cough; but in general these attacks are not very dangerous, as each successive affection seems milder and more manageable than the preceding.

As croup is generally an affection purely of an inflammatory nature, any cause capable of exciting this diseased action will be sufficient to produce it. Thus, indifferent clothing, unwholesome food, and want of general care, may be considered as its remote or pre-disposing causes; whilst its immediate will be found in occasional exposure, injudicious change of dress, mechanical injury or irritation, or any other of those circumstances found to produce inflammation in other structures. It is very question-

able whether the usual privations attendant on a state of poverty exercise any very decided influence on the production of croup. Allowing for the difference of numbers in the different ranks of society, it would appear to be much more prevalent amongst the rich than the poor; a circumstance that can be accounted for, partly by the degree of hardihood acquired by these little beings who run about nearly naked all the year round, and partly from the nature of their food being less likely to produce visceral derangement. Nothing seems to me more certain than that the habit of pampering children with improper food, or feeding them too highly as to quantity, very frequently predisposes to croup; and hence, perhaps, the foundation of the remark, that it most commonly seizes on the fattest and finest children.

There are other causes which seem directly and immediately to be exciting causes of croup. These are, 1st, the spreading of inflammation* from one part of the mucous surface to another;

* See Edin. Med. and Surg. Journal, April 1825. A paper by Mr. Makenzie, who notices the commencement of the exudation of fibrin on the surface of the tonsils, the arches of the palate and uvula, and its spreading thence to the larynx and trachea. I may here also mention the treatment adopted by this gentleman, that of smearing over the above parts with a strong solution of nitrate of silver, by means of a camel-hair pencil; and he speaks of this mode of practice as being very successful.

thus the disease may commence with common sore throat without cough or difficult respiration, and run along the membrane, until reaching the larynx it produces within it that sort of inflammatory action which ends in the formation of the adventitious lymph. 2d, The spreading of ulceration. Thus, occasionally the broad flat irregular ulcer occurring in the throat, enlarges until it arrives at the glottis, and becomes the exciting cause of genuine croup. 3d, The application of a direct irritation, as in the instance of taking a draught of boiling water. 4th, Eruptions which are repelled or which suddenly recede, very often occasion croup, and some of the worst and most intractable cases to be met with are of this description. It is by no means uncommon to meet with croup producing the adventitious membrane, and rapidly destroying life, as the sequela of the sudden recession of measles; and I have seen one instance in which it seemed to follow on the rapid disappearance of common itch.

Considering croup as a purely inflammatory disease, it would be only reasonable to expect that its attacks should be preceded and ushered in by those premonitory symptoms generally attendant on internal inflammations. But in this respect it presents very great varieties. Sometimes the child may have been observed during two or three days to have been languid, restless,

and uneasy: its skin hot and dry: its tongue foul, and that it refuses its usual food. Young children are apt to become peevish and fretful, and refuse to leave the nurse's arms for a moment. If the patient be more advanced in age, the symptoms are often more clearly developed, and the shivering, head ache, nausea, and other characteristics of fever, are easily to be observed. However, if these symptoms are not very severe, the child will be disposed to struggle against them, particularly if it is afraid of being obliged to take medicine or being restrained in its usual gratifications, so that frequently its mother or nurse will not have perceived its illness until croup appears all at once in a shape so formidable as not to be mistaken. Occasionally, however, the disease makes its attack without any previous warning whatever, and the attendants are alarmed at night by the cough and croupy breathing of a child that had retired to rest in perfect health. The early symptoms are, an excessive restlessness, with difficulty of respiration, accompanied by dry, short, and incessant cough. The character of this cough is very peculiar: it occurs every minute or perhaps oftener, but it is a single, solitary cough, without any thing like a paroxysm and without expectoration. The patient may easily be observed to be suffering from some irritation in the throat, which would be relieved if he could but expectorate. The sound

of the breathing is very characteristic. It is shrill, harsh and sonorous, and has been described as resembling the passage of air through a brazen tube. The restlessness increases, and even in the countenances of very young children something like an expression of anxiety and agitation may be traced. When the patient is more advanced, this expression is very evident, and he will in general submit to any proposal for his relief. A sweat soon breaks out over the upper part of the body, which hangs cold and clammy on the forehead; the eyes appear prominent, and the cheeks slightly swollen.

If not relieved in the earliest stages, the characters of the disease and the appearance of the patient soon alter: the inspirations are more slow, long and laboured, drawn with almost convulsive energy, and with every muscle that can assist brought into action: the expirations are comparatively easier. Like every other form of laryngeal disease, spasmodic exacerbations frequently occur in croup: the patient must then either be raised up, or he flings himself on his face, and works and struggles as if convulsed; and if the spasm of the glottis be severe or long continued, the blood may cease to be arterialized in sufficient quantity to maintain the functions of the brain, and the patient dies in a convulsion resembling that which might be occasioned by malformation of the

heart, or other derangement interfering with the due arterialization of the blood. The sound of the breathing becomes stridulous or whistling, conveying the idea of air forcing its passage through a contracted aperture. The cough is still harsh and incessant, but sometimes the patient in his efforts to expectorate, brings up some few flakes of separated lymph, mixed or rather streaked with blood or with a tenacious bloody mucus. The voice is entirely impaired, the little patient being scarcely able to articulate so as to be understood. The countenance now is pale, puffed, and swollen, with a cold damp upon the forehead: the lips purple and yet pallid: the eyes glassy, white, and apparently protruded: the nostrils dilated, the veins of the neck more distended than usual: the larynx moves upwards and downwards in the neck from the violent efforts to breathe: the chest seems to heave convulsively and every symptom indicates the extreme anxiety of the patient to inflate his lungs.

Towards the latter end of the disease, the efforts of the child to carry on respiration become gradually more feeble and languid: its countenance is pale—its eye sunken—and its lip pale and bloodless. It ceases now to toss itself about, and although respiration is carried on with considerable apparent muscular exertion, and with the same shrill sound, yet the

vital energies seem to be considerably impaired. Convulsions, if they have not previously appeared, are seldom wanting in this stage, and may continue with intervals to the last moment of existence. During the last few hours the patient is usually comatose—it lies stupid and insensible—incapable of being roused—breathing with extreme difficulty, and only by respiration giving any sign of life.

It is not always that croup exhibits those characters already described, neither is it by any means necessarily fatal. It sometimes happens that the inflammation may be cut short, and the progress of the disease arrested before it has produced the effusion of coagulating lymph; and even after this occurrence has taken place, it is possible that the membrane may be separated and expelled by coughing, and thus a recovery be effected. The symptoms, too, may be of an exceedingly chronic nature, and the intensity of the inflammation never proceed to the extent of causing the effusion of lymph. In such cases the difficulty of respiration is rather to be discovered by observing the motions of the patient's larynx and chest, than by the sound of the breathing, which is often so indistinct as not to be clearly perceptible to the ear. The cough, also, is neither so frequent nor so harsh, but nevertheless the termination of those chronic cases is by no means so favorable as the

comparative mildness of the symptoms would seem to indicate, for the constant excitement to which the larynx is subjected, and the encreased and irregular actions it must occasionally undergo in order to maintain respiration, will produce a tendency in the mucous membrane to become altered and thickened in structure, and thus lead to a certainly fatal issue with more protracted suffering.

If there is one point of medical practice, which more than another has engaged the attention of the profession, and given occasion to many valuable observations on the subject, it is croup. Nor is the interest it excites at all surprizing. The natural horror felt at the idea of suffocation, and the pain experienced in witnessing its effects;—the generally interesting age of the sufferer, and the compassion which this circumstance alone naturally begets;—the uncertainty which prevails as to the management of the case;—the inability of the practitioner to arrest the progress of the disease when once it has been fairly formed;—its sudden access;—the rapidity of its march and its too frequently fatal termination;—all these have conspired to render croup an object of peculiar attention, and to induce practitioners to give to the world the result of their observations. But hitherto I have not been able to discover any attempt to arrange the treatment of croup with pathological precision, and ac-

cordingly numerous and often opposite medicines have been recommended, as each has been employed by different persons, and found to be more or less successful. Bleeding, both general and local; the application of blisters; the use of the warm bath; the exhibition of purgative medicines; of emetics; of antimonial preparations; of calomel; and in short the adoption of almost every means which has held out a hope of resolving inflammation or arresting the progress of diseased action, has been followed by apparent success, and of course been warmly recommended. The operation of bronchotomy has also had its advocates, and cases are on record in which a recovery has been mainly attributed to its adoption; but there is no form of the disease, or no period of its duration attempted to be pointed out in which one remedy is more clearly indicated than another; and amongst an immense number of different modes of treatment, the young practitioner is left either to select by chance, or to attach himself to that which is recommended by the authority he most respects.

Acute cases of croup should be considered as examples of inflammation occurring in a particular structure, and tending to a certain given termination. The nature and uses of the organ of which this structure forms a part; the necessity of its functions being constantly per-

formed, and the consequent impossibility of the organ obtaining repose; the importance of these functions to life, and the nature of the parts which may be affected either directly or by sympathy in consequence of the organic derangement, must all be taken into consideration in attempting to lay down a rational mode of treatment for this formidable disease. In the commencement the disease is incipient inflammation, and the indication is, to subdue this morbid action, and prevent the production of an artificial membrane within the larynx or trachea. The second stage is after the lymph has been secreted, and then (if we possessed the means) the object should be to procure an artificial passage for the air, which would afford the double advantage of preserving the lungs from congestion, and allowing repose to the larynx, whilst by the common process of Nature the adventitious membrane might be separated and expelled. And the last stage of croup presents itself when the functions of the brain have become impaired in consequence of being supplied with an improper quality of blood, and of course all the energies of the animal machine are weakened in proportion. The result at this period must be fatal, for even if free respiration could be restored, the brain will not be able to recover so as again to perform its healthy functions.—Of course, in conjunction with these measures, every care must be taken to remove irritation

from the bowels, and to combat every accident which might even indirectly interfere with the recovery of the patient.

It will in general be found that cases of recovery in croup, have been frequent in proportion to the early adoption of remedial measures, because it is one thing to check inflammation and prevent its effects from taking place, and another to remove those effects when they have been fairly formed; and because it is to the first of these objects that the treatment of croup has been directed. But it appears to me not to be sufficient to diminish an encreased action, unless the constitution be kept, until the period of danger is over in a condition that will render a renewal of that action unlikely to occur; for, however a patient may be brought down (suppose by blood-letting), if he is not kept in this state a re-action will take place, and a disposition produced in the system exceedingly favorable to the progress of inflammation. It is this, which causes even large bleedings to be so frequently inefficacious in the treatment of acute diseases, and renders a repetition of them necessary before the affection is subdued: whereas one operation of the kind, if followed by measures calculated to maintain a state of nausea or debility, will usually be sufficient.— In many inflammatory affections, such as those of the head or of the gastric organs, the exhi-

bition of medicines possessing these powers is plainly impossible; but in those of the throat and chest similar objections do not obtain, and I have used them frequently with at least a fair proportion of success.

Blood-letting, in croup, should be always general, because the object is to produce direct and immediate debility, and the arm or the external jugular vein may be indifferently chosen for the purpose. Topical bleeding by leeches, &c. may be resorted to in cases where, in consequence of the child being very fat, it may be difficult to discover a vein, but otherwise I regard this practice as highly objectionable. It does not answer the purpose of immediately reducing the patient; and it is questionable whether it can produce any effect on the vessels of a part which lies so far removed from the surface. The oozing of the blood renders the patient's condition uncomfortable and filthy. The hæmorrhage is often so difficult to be controlled as to render bandages and compresses necessary, and these applied to the neck never fail to aggravate the sufferings of a patient already perhaps in a state of suffocation. But what is more important, it is often absolutely impossible to stop the bleeding from leech-bites on children, and many have perished from this cause alone. Has not every practitioner seen

children pale and exsanguineous, with heaps of rags and flour and lint piled over the punctures in order to stop the blood, which still continued to trickle, notwithstanding the weakness of the little patient, until the powers of life became irrecoverably impaired? Therefore in all cases where it may be practicable I would prefer general blood-letting; and this should be followed by the exhibition of some preparation of antimony calculated to produce a state of nausea, and no more. I know that the difficulty of putting this plan of treatment in execution will be objected to it; that with very young children it may be impossible, and not easily accomplished with those of more advanced age. But in many cases the difficulty is more imaginary than real; and with caution, carefulness and watching, scarcely any will occur that may not thus be most advantageously treated. An intelligent assistant should remain in the house with the little patient; he should superintend the administration of the medicine himself, and having once succeeded in producing a state of debility, it is very easy to maintain it afterwards.

Emetics are a class of medicines that have obtained much celebrity in the treatment of croup, and probably with justice: for it is well known that an emetic will often cut short the progress of local inflammation altogether. But

if it does not effect this purpose at once, the reaction subsequently produced is almost certain to prove injurious. Hence the reputation of these medicines is by no means universally established; some practitioners depending on them almost exclusively, and others rejecting them as uncertain, or perhaps useless. In the secondary forms of croup, it has been supposed that the shock of an emetic will be favourable to the expectoration of the adventitious membrane; but supposing that it was so, its employment might still be hazardous, for if the lymph is loose and unattached it might be forced against the rima glottidis, and the patient suddenly perish by suffocation. Notwithstanding these objections, however, there can be no doubt that emetics may prove a valuable adjunct to more active treatment, although they are by no means entitled to that entire confidence reposed in them by some practitioners. When the child is fat and plethoric,—has been unaccustomed to exercise, and fed highly; when he has been suddenly attacked, and perhaps after eating a hearty meal, it will be most desirable to evacuate the stomach; but there is this disadvantage attending the practice, that it will be next to impossible to administer nauseating medicines afterwards.

Croup is always attended by spasmodic exacerbations; and these, if not originally excited

by intestinal irritation, are always considerably aggravated by it. For this reason alone, purgative medicines would be most clearly indicated, and their administration should never be overlooked; but they are too slow in their operation to be solely depended on in a disease which runs its course so rapidly as often to destroy life within forty-eight hours. The same objection will hold good with respect to blisters; they are too dilatory in producing their effects, and besides, they cannot be resorted to at an early period without considerable risk of doing mischief. It is always hazardous to apply a blister in the immediate neighbourhood of inflammation, and particularly so if the constitution has not been previously brought down by bleeding and evacuants. In the latter stages of croup, when the lungs are congested, and there is a tendency to effusion within them, there can be no objection to try the application of blisters to the chest; but scarcely under any circumstances will they be found beneficial in laryngeal diseases, if applied near to the part affected.

The exhibition of mercury has also had its advocates in the treatment of croup, and within my own experience it has appeared occasionally to have produced material benefit; but its use is nearly confined to long-protracted and chronic cases, where there is a tendency in the

mucous membrane to become thickened and changed in its structure. Sometimes, in large doses, it has seemed to have been useful even in the commencement of acute attacks, although either here or in more chronic affections it is not easy to explain its mode of operation. It is very rarely that calomel, however administered, produces any sensible effect on children under nine or ten years of age, except when it exhibits its purgative effects; but something else must be looked for with reference to its action in the cure of croup, for certainly it accomplishes more than could be expected from any other purgative whatever.

Hitherto I have spoken of the treatment of croup, with reference to medical treatment alone, without supposing a necessity for surgical interference; but as there certainly have been cases* in which bronchotomy at least seemed to be of service, it becomes necessary to enquire into the following questions:—When, or at what period of the disease ought the operation to be resorted to, or is it indifferent in this respect whether the windpipe be opened in the beginning, the middle, or towards the latter end of the malady? How is it the operation may be supposed to procure re-

* See Medico-Chir. Transactions, V. 6. p. 151, a case of successful operation by Mr. Chevalier.

lief? What are the symptoms that indicate its necessity? What has been its usual success, and what are the objections that may be urged against its adoption under any circumstances? These are material points to be determined, unless it be imagined that every recovery after operation is purely accidental, and would have in all probability occurred had the knife never been employed at all.

Those who would argue in favour of the operation might advance, that it has succeeded more than once when resorted to nearly at the termination of the disease, and when every other hope had fled;—that it produces immediate relief, and that even when not ultimately successful, the tranquillity it affords the patient more than compensates for any pain he may have suffered;—that the diseased action is in the great majority of cases circumscribed to the larynx alone;—that even if inflammation be present in the bronchial membrane there is no reason to suppose it would be aggravated by the operation;—that thus a free exit would be provided for the effused lymph, or for any accumulation of mucus that might occur; and that without some effort of the kind the disease must have a fatal termination. These observations are certainly more or less founded on fact, but they go a very short way in establishing the ad-

vantage, much less the necessity of resorting to a severe and difficult operation.

The effusion of coagulated lymph is very generally confined to the larynx alone: but still in a number of cases the inflammation commences in the bronchial cells, and proceeds upwards in the wind-pipe. This is an affection in which an operation could not possibly be of service, and there is no mode of distinguishing accurately as to what has been the original seat of the disease. This one consideration must involve every case in obscurity, and render the success of an operation a matter more dependent on chance than on judgment. Again, if it be true, that inflammation interferes with the functions of the bronchial membrane, and that the blood will be imperfectly arterialized when such disease is present, it will be of little consequence whether air be admitted or not; the brain will as surely be affected as if no artificial opening had ever been practised, and all the relief the patient will experience, can amount to no more than a cessation of that extreme muscular exertion which is necessary to carry on respiration at all. I saw this admirably exemplified in the case of a little girl on whom bronchotomy was performed for the cure of croup: the disease had originally been confined to the larynx, but after the operation, the bronchial cells became affected, and the inflam-

mation spread upwards nearly to the place in which the trachea had been opened. In this instance there was no deficiency of air: the aperture was much larger than the natural size of the rima glottidis, yet the patient had convulsions, exhibited every symptom of cerebral congestion, and finally died comatose.

In a disease that runs its course with such rapidity, it would be desirable to ascertain at what period the operation should be performed, and what are the symptoms that indicate its necessity. In the earlier stages, when the membrane is red and swollen, and no lymph as yet effused, there can be no object in making an incision which will be much more likely to aggravate the disease than to relieve it. When the adventitious membrane has been formed, there is some reason to think that in the great majority of cases sufficient mischief has been already accomplished to render a recovery very problematic. The lungs have been already loaded with blood: perhaps effusion has been begun, and it may be, from the irritation it has undergone that the mucous membrane of the bronchial cells has already taken on a disposition to inflammation. It may be that the brain has already become affected, for I have met with many instances in which the disease proceeded with such rapidity that no lymph has been

effused, and yet the patients never during life shewed any symptom that could mark a difference between the two cases. At the latter stages of croup, it would be absurd to think that an operation could possibly prove beneficial, unless it be supposed that a wound of the windpipe could remove cerebral congestion; and therefore whenever convulsions have occurred, or that the patient appears comatose or sinking, let no man undertake it as a last resource, for it is a resource that will avail him little, and after his patient's death he may esteem himself fortunate if a great part of the blame is not laid to the account of himself and his knife.

It will be necessary to draw a distinction between the struggles a patient may make to free himself from some obstruction in the windpipe and the convulsions just alluded to, for in both cases the patient's countenance will become dark and purple, his eye suffused and staring, and his respiration heaving and laboured; and both these affections occur at a late period of the disease.—If the inflammation is about to subside and to terminate in an extensive effusion of mucus, the patient's struggles to relieve himself from the oppression naturally created by the accumulation of fluid in the respiratory tube, must be not only distressing but injurious, and may prove fatal. In this case an operation which will afford a clear and easy passage for

the fluid will probably be followed by the happiest consequences: or if there was reason to believe, that on the total subsidence of the inflammation, the membranous lymph existed in the trachea purely in the condition of a foreign body, an opening which would afford means for its easy expulsion might also be judicious. But it is unfortunate that no symptoms exist, by which a practitioner can positively establish the propriety of his operation; there are in both these forms of disease the same cough—the same difficult respiration—the same struggles to inflate the lungs and to free the air passages from the impediments that are within them. To these sources of difficulty may be added, that any obstruction to the air cannot endure long without the lungs becoming loaded and oppressed, and therefore if the operation is not performed almost at the exact minute between the subsidence of the inflammation and the commencement of the effusion, it will scarcely be successful. Thus it happens, that in the great majority of cases, when bronchotomy has been performed, the patient finds himself wonderfully relieved; great quantities of mucus are expelled by the wound; respiration is free, and a surprizing degree of tranquillity seems to be suddenly obtained. But the calm is only deceitful. In the course of two or three days the patient begins to sink. He is unable to expectorate the mucus which now accumulates in

greater abundance than before. He becomes heavy and languid—is with difficulty roused from this state of stupor, and generally within four or five days after the operation he dies comatose.

In cases of purely spasmodic croup, where there is reason to believe that no organic disease whatever had existence in the windpipe, the operation might not only be resorted to at the moment of attack, but probably offers the means of resuscitation if very speedily adopted subsequent to apparent death. In order, however, fairly to appreciate the remedial powers of surgery in this particular, a slight review of the nature of spasmodic croup may be necessary, and more especially of the formidable and often fatal manner in which it makes its attack. It is in general a diseased action consequent on irritation, and should be considered rather as a symptom than as a disease itself. It occurs in very young children,* and appears at the commencement of the period of dentition; sometimes earlier, and but very rarely after the child has reached its third year. The crowing noise which some infants make in respiration, and

* This is probably the disease which has been considered and described as cerebral croup, and on which Mr. Pretty has some excellent observations in a paper published in the Medical and Physical Journal Jan. 1826, to which I beg to refer the reader.

plication of a small bellows to the nostril will probably not be successful, for the spasm in the muscles of the glottis remains some time after death, and will effectually prevent the passage of any air; and it would be difficult, if not impossible, to pass an elastic tube by the nostril into the trachea. At all events this latter mode of proceeding would be attended with so much delay as to render the subsequent inflation of the lungs quite ineffectual. An operation under such circumstances is free from the objections that might be offered to it during life: the friends of the child will be pleased that any attempt should be made to restore it to animation; and the entire process may be completed without those cries and struggles which embarrass every operation, and render this one peculiarly difficult. However, it must be admitted that this proposal is solely supported by theory: I have never seen it put into execution, and I can well conceive that in the hurry and confusion that must pervade a family on the sudden death of an infant, there would be some delay in sending for assistance, and thus the time passed over in which there could be any chance of an operation proving successful. It is however worth a trial, for it can by possibility do no harm, and it seems quite as reasonable to expect a recovery by the *immediate* adoption of active measures in this as in any other case of suspended animation.

It sometimes, although perhaps rarely happens that the mucous membrane of the larynx in children becomes thickened, the ventricles filled up, and the general configuration of the organ so changed and spoiled, that the part after death, presents the same appearances as in the chronic laryngitis of adults. This form of disease is not inflammatory, at least it is not necessarily so, and therefore it is seldom preceded by constitutional fever. It seems to steal upon the patient, thickening the laryngeal membrane and destroying its organization, occasioning at first only a slight wheezing and a cough, which gradually increase until the disease bursts upon the attention of his friends in all its formidable and fatal colours. The symptoms are those of obstructed respiration, and evidently mark the difficulty with which the air forces its passage through the rima glottidis. The motions of the chest are much more frequent and more convulsive than where the membrane is only inflamed, and the cough, though harsh and teizing, is to the last moment unaccompanied by expectoration. Medicine and medical treatment are here most frequently expended in vain. Bleeding will not arrest the morbid action, and is injurious because it directly impairs the powers of life: the application of blisters is uniformly inefficacious. Emetics and purgatives afford a short and transitory relief, but the disease still urges on its destructive career until

the lungs, becoming loaded with blood, throw out a copious serous effusion, and after a convulsion or two, death closes the scene.

It must be understood, however, that in the foregoing description the disease is spoken of as fully formed, and having assumed a character of incurable disorganization, the progress of which cannot be interrupted. In its more early, and of course its more manageable stages it seems reasonable to suppose that its ravages may be prevented by the operation of medicine, and this is probably the affection in which calomel has been found so often efficacious. Every practitioner must have experienced the efficacy of this medicine in the earlier stages of chronic croup, and its success may be explained on the grounds of its alterative effects having arrested those morbid actions, and prevented those changes of structure which, if once formed, can never be removed.

If it be assumed as a general principle that diseased alterations of structure will not admit of cure unless by the extirpation of the part, it necessarily follows that any operation falling short of accomplishing this object, can under the most favorable point of view, be only considered as palliative. With respect to an ultimate cure it must be unprofitable, and the attempt may have the effect of bringing such opera-

tion into disrepute. For this reason bronchotomy seems totally unsuited to the advanced stages of this form of croup. It may relieve the patient's immediate distress by opening a free channel for respiration, and thus give birth to a fallacious hope—it may prolong a wretched, and to a child, a useless existence for a few short days —but it cannot effect a cure, and therefore there can be no reasonable motive for undertaking it. But, in the earlier stages, and before any incurable mischief has occurred, I can readily conceive that an operation which will procure for the diseased organ perfect and entire repose, may prove highly beneficial. In all morbid actions whatever, the advantage of absolute rest is so clearly ascertained that it forms a part of every surgeon's directions in their treatment, and perhaps the constant tendency of laryngeal diseases to become progressively worse may be explained, by the impossibility of the functions and motions of the part ever being suspended even for a moment. Nay, as the disease advances, we see these motions encreased even to a degree of convulsive exertion, which children cannot bear up against so long or so well as adult patients ; and when the condition of a person thus struggling to maintain respiration is contrasted with the calm he enjoys after an artificial passage for the air has been effected, it cannot be denied that if there is a chance of arresting the progress of the

disease, it must be by placing the organ in the most perfect state of rest. Then the operation of calomel or of any other alterative may come fairly into play, and if the diseased action has not proceeded to an incurable length, there will be every rational prospect of a permanent recovery.

It will be found, however, in practice, that the friends of a little patient will scarcely listen to the proposal of what appears to them a cruel and dangerous operation for the relief of merely a slight wheezing or a trifling cough. And the surgeon cannot press his opinion with convincing arguments, for there really do not exist symptoms to point out this form of disease with any degree of exactitude, or to distinguish it from common chronic inflammation of the mucous membrane. The practice of operating under such doubtful circumstances must be purely empirical, and the result uncertain. It may, possibly, in a lucky case turn out favorably, and be at least the apparent cause of saving the patient's life.—It may do neither harm or good, and the disease pass on to its usual termination uninfluenced by it—or what is much more probable, it may have the effect of converting a slow and chronic inflammation into one more acute and rapid, and thus have the effect of

directly inducing that fatal termination it was intended to prevent.

In the present state of surgical knowledge it would be presumption to attempt to lay down rules for the guidance of the practitioner in every possible case. Nature presents as much variety in the production of disease as in any other of her operations, and either in estimating the extent of derangement in any individual specimen of disease, or in applying the most suitable remedy, a surgeon must in a great measure be left to the exercise of his own judgment. But in matters connected with operation there are a thousand circumstances calculated to lead a young practitioner astray, and to give a wrong direction to his opinion. There is a certain degree of reputation attached to the name of a dexterous and successful operator which he wishes to attain, and there is such an apparent difference between the rapid removal of disease by the knife and the more slow and silent operations of medicine, that perhaps naturally his inclination is turned towards the former. Every young man can bring forward in argument a few instances of successful operation to justify a similar proceeding on his part, whilst he forgets those which have not had such favorable results, and it requires two or three practical lessons of severe expe-

rience to bring down his too sanguine expectations. With respect to the particular disease under consideration, I think I have observed that in proportion to the age and experience of a practitioner, so has been his unwillingness to propose or to practice an operation for its cure; and I know more than one who had been its warm advocates that since have expressed to me a very decided change of opinion indeed.

Quite independently of the difficulty of performing the operation of bronchotomy on a child, which forms, however, a most material objection, it is very doubtful whether it will ever become a favourite remedy in croup. Doctor Cheyne in his work on the Pathology of the Larynx and Bronchiæ, states that there are always $\frac{3}{8}$ths of the canal free for the transmission of air, a space which would be sufficient to maintain the process of respiration even in an adult subject. It would appear, therefore, that the patient dies, not because there is an absolute insufficiency of air to provide for the arterialization of the blood, but because some change has taken place in the organ by which this most important function is performed. In all cases where the disease consists of inflammation of the mucous membrane I feel satisfied that the artificial admission of any quantity of air (which is all that can be accomplished by the most successful operation) will

confer no benefit on the patient beyond relieving him from the exertions he is obliged to make to dilate the rima glottidis,—exertions which he will make if the larynx be only partially closed, and a sufficient aperture for the passage of the air still remains. There is something exceedingly acute about the sensibility of the larynx; it soon feels the presence of even a slight impediment, and its actions and its efforts are redoubled to preserve respiration.—Thus its muscles are thrown into violent and often irregular actions, there is spasm and cough, and the windpipe is moved rapidly and violently upwards and downwards in the neck; the patient then becomes anxious and agitated under the horror of suffocation, and all the muscles of inspiration are made to assist in expanding the chest and filling the lungs with air. Yet these symptoms may be produced whilst the larynx is only partially diminished in size, for I have seen a patient breathe calmly and tranquilly through a tube, the calibre of which did not approach near to the dimensions of the rima glottidis.

It would be wrong to assert positively that there are no cases of croup that might not be benefited by the operation, because some instances have been put upon record in which it had been performed, and seemed to effect a cure; but what is the precise nature of the case

to which it is applicable? what is the most favorable time for adopting it? and what are the symptoms which will regulate the surgeon's practice? Can any man exactly draw a line of distinction between the varieties of croup, and say that the inflammation in one case had commenced in the bronchial cells, and in another at the larynx—that in one instance the adventitious membrane had been formed, and in another it had not? Can he distinguish between chronic bronchitis and morbid thickening of the laryngeal membrane?—And if he cannot, is not his operation altogether empirical—just as likely to work out evil as good—undertaken without principle where it may do injury, and perhaps abandoned where it might have proved beneficial? To the casual success of such an operation I would attach no professional reputation, whilst I think much character may be lost to the individual, and general obloquy heaped on the profession by the too frequent performance of operations thus undertaken at a hazard, and almost always at a period of the disease when its efficacy (if it ever possessed any) must be exerted too late.

But Bronchotomy has in many cases of croup been successful. True—but where are the thousand and one instances to the contrary that might be brought against each single one of these? I have performed the operation myself

on the child, and have seen it frequently done by others, and in no one case has the life of of the patient been saved. I have known and heard of it often, but never understood that it produced a recovery; and I should suppose that my experience on the subject only resembles that of most men who have had opportunities of seeing and treating the disease. Most practitioners are fond of publishing cases of successful operations, but are not so willing to make known those of an opposite description, from an idea that these supposed failures might lower them in public estimation, but these detached and solitary expositions of fortunate surgery are calculated to produce very serious injury if they encourage others to similar attempts, in the hope of similar results. If it was possible to place a list of those cases in which Bronchotomy had not proved serviceable, in array against those wherein it had seemed to be useful, it would be scarcely necessary to advance any farther argument in proof of its uncertainty; and medical men would rather turn their attention to the improvement of that internal treatment which will generally be efficacious if resorted to in time, than look for advantage in the performance of an operation from which experience holds out such slender hopes.

I have added a few cases to illustrate the pa-

thological varieties generally to be met with in the examination of croupy subjects, but without any hope that they can throw additional light on the treatment of the disease. If Medicine or Surgery could be learned by a perusal of cases, our knowledge of croup should be extremely intimate, for there is unquestionably no deficiency on this subject to be complained of in professional records; but in general they consist of mere repetition, as if the re-iterated statement of a fact could make it more impressive than one single and simple narration. I have also selected a few instances in which the tartarized antimony was used with the most decisive effect, in order to shew the class of patients most easily treated in this way, and the manner in which the medicine was administered. Two cases only have been selected in which the operation was performed, because I deemed it useless to multiply statements, all having a close mutual resemblance, and all, without one exception, tending to the same fatal result.

CASE I.

INFLAMMATION OF THE BRONCHIAL MEMBRANE WITHOUT THE EFFUSION OF LYMPH.

Mary Anne Flaven, a patient of the Dublin General Dispensary, æt. about five years, was

suddenly seized with shivering, nausea, dry skin, thirst, restlessness, and other symptoms of fever. She was put to bed, and had some warm drinks given her by her mother. In the course of the night, symptoms of croup set in most violently, and her mother applied for medical assistance early on the following morning.

I saw her in a state of excessive restlessness, tossing herself about incessantly. Her breathing was loud, harsh, and very shrill, indicating that the rima glottidis was nearly closed. Pulse very rapid;—skin hot and dry, with much fever. Cough short and frequent, without expectoration. The child could not speak so as to be understood. The trachea was moved upwards and downwards in the neck, and the inspirations were performed with almost convulsive exertion.

The child was bled;—had an emetic;—got James' powder with calomel;—Enemata;—warm baths, &c. In short every thing was done that the urgency of the case indicated, but in vain. She died in the course of the night, 35 hours from the time of the accession of the disease.

DISSECTION.

Thirteen hours after death.—This was the only case I had ever met with, in which the

tumefaction of the mucous membrane of the larynx appeared to be sufficiently considerable to create any serious impediment to the passage of the air. It was red, very much swollen, and had somewhat of the appearance of œdema, but no fluid could be discovered in the submucous cellular tissue. The surface of the membrane in the larynx and trachea was covered with a yellowish soft substance resembling paste, which could be easily scraped off, and the inflammation extended down into the air-cells as far as could be traced. There was an effusion of serous fluid into the trachea, but not in very considerable quantity, nor to the same extent that is generally met with in similar cases.

The other cavities of the body were examined, but no appearance of disease discovered, excepting in the brain, which was very vascular, and there was a small serous effusion within the ventricles.

CASE II.

Miss E. M. æt. 4½ years. After a slight feverish attack which lasted a few days, was seized suddenly at night with symptoms of croup, difficult breathing, but without much muscular exertion, dry, hard, frequent cough, with the peculiar ringing sound. Her skin hot and dry;—tongue foul;—pulse 140. The most unpleasant symptom in this case was constant restlessness.

She tossed herself about, and changed her position every moment, and was peevish when her desires in this respect were not complied with.

This child was bled with leeches applied to the throat externally, and it was surprizing the quantity of blood she lost without appearing to be generally debilitated. The internal treatment consisted principally of emetics, but nothing seemed for a moment to arrest the progress of the disease; it gained ground rapidly, and she died comatose at the end of thirty-four hours from the commencement of the attack.

DISSECTION.

The larynx appeared in its perfectly natural state, except that there was some frothy mucous entangled in its ventricles. There was no trace of any adventitious membrane whatever. Immediately below the larynx, the trachea was inflamed, red and and pulpy, and the intensity of colour seemed to increase as it proceeded downwards towards the lungs. The air-cells and trachea were filled with a serous fluid of a reddish or brown colour, and on the thorax being opened the lung did not collapse.

An examination of the head was not permitted.

CASE III.

June 11, 1824. Eliza Doyle, æt. 2½ years, residing about four miles from Dublin, was brought to me on account of symptoms of croup having manifested themselves. She had been some time previously covered with eruption, which had been suddenly repelled, and during the week before the difficulty of breathing commenced, she was dull, heavy and languid, with dry, hot skin, restlessness. and unwillingness to take food. She breathed without much muscular exertion, but with a harsh ringing sound; a dry cough without expectoration, and there had not been any spasmodic exacerbation.

Two leeches were applied to the throat, which bled very profusely, and she was so much relieved that her mother neglected to bring her to the hospital next day. In the evening, however, the difficulty of breathing encreased, with something like a convulsion, and she passed the night extremely ill.

June 13. She was again bled with leeches and relieved; and her mother had opening medicines with calomel and antimonial powder to take home with her, as she was so frightened at the idea of the child being received into the

hospital, (which had been proposed to her) that she positively refused to bring her again.

June 15. I saw the child in the country; symptoms remaining pretty nearly as before. The mother stated that she had a regular convulsion every evening, accompanied with excessive difficulty of breathing, and great restlessness throughout the night, but that she was comparatively easier during the day.

June 16. On the recommendation of some person in the neighbourhood, the child's mother placed a blister on the infant's neck and chest. From this moment there was not a moment's intermission of the difficulty of breathing until the evening of the 18th, when she was seized with a slight convulsion and died.

DISSECTION,

Twenty-four hours after death.—The trachea amazingly full of a reddish or brownish-colored fluid mixed with froth. The entire mucous membrane of the larynx, trachea and bronchiæ, as far as it could be traced, was swollen, pulpy, and of a bright cherry-red colour. There was no effusion of coagulating lymph; no formation of any adventitious membrane, nor did there appear any apparent me-

chanical obstruction to the passage of the air. On the thorax being opened, the lungs did not collapse. The brain was not examined.

CASE IV.

CROUP WITH EFFUSION OF LYMPH.

Julia Quinn, a patient of the Dublin General Dispensary, æt. about 5 years: fat, and apparently of a healthy constitution. On the 17th of November, 1820, this child was brought to the institution as an extern patient by its mother, who stated that she had been ill during the nine preceding days. She had at first a slight, hard, dry cough, which was not attended to, and occasional paroxysms of difficult breathing, described by the mother as convulsions. During the last two days her powers of articulation were much impaired, and the cough had encreased in frequency. On the evening preceding her appearance at the dispensary she had coughed up a small portion of viscid lymph streaked with blood, but no other expectoration had been seen.

When I first saw her she had extreme difficulty of breathing, with a loud, harsh, sibilous noise; loss of voice; frequent hard cough;

great restlessness; *face swollen;** *eyes apparently protruded, and quite pale; lips livid;* pulse very quick and small; skin hot and dry.

Venesection from the jugular vein to 10 ounces,
Two grains of calomel with one of antimonial powder, to be taken every second hour.
The bowels to be freed by a turpentine enema.
A warm bath in the evening.

Nov. 18. Not in the least relieved; has had what her mother called convulsions twice during the night; difficulty of breathing greatly aggravated; cough incessant; restlessness rather encreased, as she tosses herself about in every possible direction; pulse and skin as yesterday.

The calomel and antimonial powder to be continued.
A large blister to be applied to the chest.

On visiting this patient in the evening, I was

* These symptoms may be regarded as indicative of a congested state of the lungs, and of course fatal.

informed she had had another convulsion, and I found her sinking rapidly. Her eyes seemed fixed; her limbs cold; and her pulse faltering. She died in about an hour afterwards.

DISSECTION,

Eighteen hours after death.—On opening into the larynx and trachea, an immense quantity of serous fluid ran about, which had apparently been poured out by the bronchial cells, yet there was not the slightest trace of inflammation of the mucous membrane of the trachea as far as it could be followed downwards. The lungs were gorged and loaded with blood, and were more solid to the touch than usual. The serous surface of this organ was studded over with small greyish tubercles, like grains of fine sand, scattered thickly over its entire extent. There was a quantity of dark-colored blood in the right side of the heart.

The internal surface of the larynx was covered with a thick, coriaceous layer of lymph, partly attached, partly flocculent, and floating into the cavity. Nothing like ventricles or chordæ vocales could be seen, so that the configuration of the organ was completely spoiled.

Part of the detached lymph had floated away in the fluid which had escaped from the trachea. The mucous membrane, in any place where the lymph could be separated from it, was red (rather of a pink or pale carmine colour) and slightly thickened, and the disease was accurately confined to the larynx.

CASE V.

M. A. King, æt. 7 years, a fat and hitherto healthy child, was suddenly attacked on the evening of the 10th June 1819, with difficult breathing, attended by a loud ringing noise which could be heard at some distance.

On the next day the difficulty of breathing had increased, accompanied by short cough of a harsh sound and without expectoration. Her voice was nearly lost, but as well as she could explain her sensations, she principally referred her uneasiness to a feeling of tightness or constriction in the chest. She had occasionally severe spasmodic exacerbations, and writhed and struggled excessively during their continuance. On this day, an emetic was administered with some apparent relief: she was bled from the jugular vein, an operation attended with more than usual difficulty on account of the fat condition of the patient. She took twelve grains

of calomel in divided doses, and a purgative enema was administered with effect.

During the night the patient seemed somewhat relieved, and did not suffer from spasm, but on the following morning all the symptoms became greatly aggravated. The cough was incessant, but still without expectoration: the voice quite indistinct: the pulse very rapid, small, and irregular: the countenance of a blueish paleness, puffy and swollen: and the lips purple. She was now largely bled by the application of leeches, and the medical treatment continued, with the addition of the warm bath, but without the smallest relief.

In the evening a large blister was applied over the throat and another between the shoulders. These blisters never rose, and about midnight the patient was seized with a terrific spasm, amounting almost to convulsion, after which she lay insensible, and died in the space of an hour afterwards, fifty-one hours after the first appearance of her illness.

DISSECTION.

Eight hours after death.——On slitting up the trachea and larynx, the entire of the mucous membrane seemed covered by a thick irregular layer of adventitious lymph, of a tubular form, but broken down in parts, so as to destroy the perfect shape of a tube. This

was thicker and more adherent towards the back of the trachea than anteriorly. It was more firmly attached in the larynx than elsewhere. Wherever the adventitious membrane had been completely separated from the surface underneath, this latter was of a pink or light carmine colour, but when picked off, where its attachment was more firm, the mucous membrane presented a very deep tint of dark scarlet.

The trachea was nearly filled up with a reddish-colored serum, containing flakes of lymph which floated off as the fluid ran from the wound. The lungs were more firm to the touch than usual, and gorged with dark-colored blood. There was effusion of serous fluid into the pericardium, and a more than ordinary quantity of dark blood at the right side of the heart. The brain was not examined.

CASE VI.

CROUP SUCCESSFULLY TREATED.

William Adams, æt. 7 years, a pale and apparently sickly child, had suffered for some time from infantile remittent fever, and was becoming convalescent when he was suddenly seized with symptoms of croup. At first he had only the short frequent cough without expectoration,

but every cough seemed to produce a spasmodic action in the muscles of the larynx, for the inspiration following was laboured and attended with a crowing sound. Although there was nothing like a paroxysm of cough, this affection was mistaken for hooping cough, and treated as such during two days, at the end of which time, the peculiar ringing sound of the breathing, with the great difficulty of carrying on the function and other symptoms, left no doubt as to the nature of the affection present.

When I saw him, he breathed with extreme difficulty, he had the croupy cough : the sonorous breathing : and the larynx was moved upwards and downwards in the neck by an almost convulsive action of the muscles. His chest did not seem to be affected ; his face was very pale ; his lips of a colourless transparency, but not blue ; he had no marked exacerbation of dyspnœa nor any convulsion.

I ordered for this child two grains of the tartarized antimony in eight ounces of water, and to take 2 desert-spoonsfull of the solution so as to produce nausea but not vomiting. In order to insure the operation of the medicine, I placed the patient under the immediate care of one of my pupils, who administered it himself and watched its effects. After the second dose, which was given in an hour after the first, the

child became very languid and fell asleep, an effect which I have constantly seen to follow the nauseating operation of the medicine. It was not necessary to repeat the dose until after an interval of six hours, and by keeping the little patient thus in a state of extreme sickness and debility during forty-eight hours, there was no further trouble with the case. The child recovered perfectly.

CASE VII.

Master D. L. G. æt. 9 years, was suddenly seized about 12 o'clock on the night of the 23d of January 1826, with symptoms of acute croup. The sound of his breathing could be heard outside his room: his cough was incessant, dry, harsh, and ringing. His pulse very rapid. His skin hot. He complained of some thirst, and was excessively restless, wishing to be raised in the bed.

I saw him within an hour after the first appearance of the disease, and immediately opened the jugular vein. From this but a small quantity of blood flowed, and I determined on bleeding him from the arm. After a short time he became very sick and faint, but did not vomit. The difficulty of breathing was relieved and he fell asleep, occasionally coughing as he lay, but

the character of the cough seemed changed, and its frequency much diminished.

Towards morning the symptoms returned, but not with their former severity: however the breathing was decidedly croupy, and the cough exceedingly annoying. I determined then on giving the tartarized antimony, and placed one of my pupils by the bed-side of the patient, to administer the medicine, and watch its operation. A single spoonful of a solution similar to that ordered in the above case made the child very sick, and he fell asleep. After an interval of four hours the dose was repeated, and again in five hours afterwards. The difficulty of breathing had now entirely subsided, but the cough remained; however its peculiar ringing character was removed, and it only occurred at intervals. The medicine was continued during the following day, after which the boy became completely convalescent.

CASE VIII.

James Doyle, æt. 3. The son of a dairy-woman living in the neighbourhood of Dublin, was attacked about four o'clock in the morning of the 7th July 1825, with symptoms of acute croup. His mother saw me on the road passing her door about eight o'clock, knew me, and re-

quested I would see her child, who she said was dying of quinsy.

The boy lay in a woman's arms, breathing with extreme difficulty: the sound of the respiration was harsh and sonorous: he had incessant cough without expectoration: his face was pale and apparently swollen: his eyes seemingly protruded: his lip, pale and transparently clear as if it contained no blood, but not purple or discoloured. The trachea was moved violently upwards and downwards in the neck, and the chest heaved with frequent and almost convulsive exertion.

There was a dispensary in the neighbourhood from which a solution of the tartarized antimony was immediately procured, in the proportion of one grain to eight ounces of water, one tablespoon full to be given every second or third hour.

On my return in about two hours afterwards, I found that the first dose had produced vomiting, and the child was now asleep and apparently relieved. I desired that the medicine might be repeated in half the usual quantity after the interval of an hour, and if the child became very sick that its use should be suspended until I saw him again.

The next day I learned, that the child had awakened with symptoms nearly as severe as ever, but on the administration of the medicine that he fell asleep again. A third dose was given about seven o'clock in the evening, and during the night frequent discharges took place from the bowels of green fetid matter. When I saw my little patient, the difficulty of breathing had been completely removed, although the cough remained still harsh and ringing, but diminished in frequency. The cough, now, occurred in paroxysms of longer duration, and occasionally he expectorated a thick mucus, which was got up with much difficulty. I directed the medicine to be continued, and on the following day I found the child convalescent. The cough, however, lasted for some time longer, diminished in severity and materially altered in its character.

This child has since experienced another attack of croup, which has been milder in its symptoms, and successfully treated by the same remedies.

CASE IX.

Pat. Finlay, æt. 5 years, admitted into the Meath Hospital on the 7th March, 1826. Had been attacked with cough and difficulty of breathing on the 4th, without any previous sickness.—His symptoms at the time of admis-

sion were, cough without expectoration, coming on at irregular intervals of from two to five minutes: croupy respiration, but not very sonorous: pulse very quick: the thorax heaving: the alæ of the nose distended: the eye white and full: and the lips of their natural colour and brightness.

The stethoscope was used for the purpose of ascertaining the state of the lungs and windpipe. Diagnosis,—lungs quite healthy: inflammation of the bronchial membrane nearly as far down as the bifurcation of the trachea.

This child was treated with the tartarized antimony, in doses of the eighth part of a grain every third or fourth hour. The first dose produced an emetic effect, and it was not repeated during that day.

Mar. 8. The symptoms were all aggravated: difficulty of respiration encreased, with extreme restlessness. The medicine was continued, and the resident pupil desired to watch its effects, so that if possible the child might not again vomit. In the course of the night it acted on the bowels, and there were three or four green-colored stools, extremely fetid.

Mar. 9. The frequency of the cough has diminished, and there was some expectoration,

but the croupy breathing remained, and was particularly remarkable while he slept. The stethoscope indicated a diminution of the inflammation.

Mar. 13. The medicine has been continued to this day, but may now be laid aside. The child sleeps quietly, and breathes with the utmost freedom. The cough entirely removed. The complexion has returned, and he may be considered as completely recovered.

CASE X.

Honor Buckley, æt. $3\frac{1}{2}$ years. Took ill with measles eleven days before her admission into the Meath Hospital. The eruption came out well, and was going on favorably until the third day, when it suddenly receded. About an hour afterwards she became hoarse, lost her voice, and could speak no louder than a whisper. The respiration became rattling and sonorous, with short, clanging cough, without expectoration.

At the time of admission the symptoms of croup were very well developed, and there were some appearances of fever: skin hot and dry, and accelerated pulse. The complexion, however, was clear, and the lips of their natural colour.—She was put under the influence of

nauseating doses of tartarized antimony, and the effect, in this instance, was surprizing. At first she became very sick, but did not vomit, and soon fell into an undisturbed sleep. The medicine was persevered in, and on the fourth day the child had completely recovered. There was a slight blush of redness over the face, as if of some eruption coming out, but nothing like measles re-appeared while she remained in the hospital.

CASE XI.

BRONCHOTOMY EMPLOYED FOR THE CURE OF CROUP.

Miss E. K. an interesting little girl about five years old, was attacked on the 10th May 1824, with short, troublesome cough, without expectoration, but the inconvenience was so trifling that at first it was not attended to. On the 11th some imperfection of voice appeared, with occasional spasmodic difficulty of breathing, and the cough encreased. This latter symptom was peculiarly spasmodic, and along with the dyspnœa presented such characters as to render the disease like to hooping cough, for which it was actually mistaken by the first practitioner who saw the child.

On the 12th and 13th the above mentioned symptoms had encreased, but so gradually as not to cause alarm until the evening of the latter day, when an access of fever followed by dreadfully spasmodic difficulty of breathing, reduced the patient to a condition truly alarming.

On the 14th Mr. Hewson saw her, and found her in a state that decided him at once on performing tracheotomy as the only means by which a chance of life could be offered. The operation was performed, to which the little creature cheerfully submitted, in the hope of being freed from the uneasiness she suffered, and when it was completed, she appeared to be much relieved, and fell asleep, quietly breathing through a canula introduced into the trachea.

On the 15th she seemed to be improving rapidly : she was recovering strength, and able to sit up in bed ; but was teized with the quantity of mucus she was obliged to expectorate through the wound, and which she was scarcely able to expel. An assistant constantly sat by the bed-side, and quickly removed this as fast as it was thrown into the wound. Her pulse had fallen considerably in frequency : she had some appetite, and ate a little light food with apparent relish. Her sleep, however, was disturbed every four or five minutes by the

necessity of getting rid of the mucus which was constantly accumulating.

On the 16th she appeared to be still improving, and hopes were entertained that she would ultimately recover: but on the evening of the 17th (the fourth day after the operation,) symptoms began to shew themselves that promised rather an unfortunate result. About 4 o'clock, P. M. the mucus accumulated in such quantity that she became unable to relieve herself, and but for the uncommon assiduity of the assistant she must have been suffocated. After this struggle she sank with great rapidity:—she seemed to dilate her chest with pain,—and breathed convulsively even through the artificial opening. The pulse faltered—the rattling of mucus in the trachea encreased, and she died about 12 o'clock at night.

I have not deemed it necessary to prolong the relation of this case by detailing the medical treatment, as it has been introduced only with reference to the operation as a mode of cure, and on account of the interesting appearances observed on examining the body.

DISSECTION, *

Eleven hours after death.—The mucous sur-

* Vide page 56.

face of the larynx seemed entirely altered in structure. It was of a yellowish opaque colour, granulated, and in parts having flocculi of lymph floating into the cavity of the organ. When any of these minute patches of unorganized lymph were detached, the surface underneath appeared thickened and altered, but not red. There was no trace of ulceration. The ventricles were obliterated, and the figure of the organ altogether spoiled. The boundary of this disease was abrupt, and confined entirely to the larynx, terminating exactly at its inferior edge. The trachea was filled with mucus, frothy, and of a reddish colour; and about half an inch below the situation of the wound caused by the operation, a blush of inflammation was perceptible, which encreased in intensity as it descended lower in the tube. The mucous membrane of the bronchiæ was red, swelled and puffy, and slightly smeared over with a yellowish substance resembling paste. Thus above an inch of the extent of the trachea situated between the two diseases was left completely unchanged and healthy.

The head was not examined.

CASE XII.

Emily Toole, a fat little girl, aged about 3½ years, was attacked with croup on the 10th

June, 1821. As she lived at some distance from Dublin, she had no medical aid until the following day, when her mother brought her to town, and objecting to go into hospital, took a private lodging for herself and her child.

This was a form of disease seemingly very acute in its symptoms, and promising to be rapid in its progress. The child's lips were already livid and purple: its cheeks apparently swollen, and very pale: its eye prominent, white and bloodless. The veins of its neck occasionally greatly dilated, and the actions of the muscles of respiration almost convulsive. The pulse very small, like a thread under the finger, and so rapid as scarcely to be counted. The cough incessant, and the breathing hard and sonorous.

This was a case in which medicine held out but little hope, and the operation was resolved on, without much expectation of success, but to give the patient a chance of her life. At the first incision some superficial veins were wounded, which poured out blood in fearful abundance. The child could not cry, but it struggled violently, and these struggles encreased the hæmorrharge to an apparently alarming extent. However the operation was proceeded in, with considerable difficulty, the parts being obscured by blood, and each stroke

of the knife being made in uncertainty as to what might be under its edge. Some of the thyroïd veins were wounded, and this still added to the hæmorrhage, nor was it deemed adviseable to open the trachea until after the lapse of half an hour, lest the flow of blood into the windpipe should suffocate the patient. At length the child seemed to be sinking, although in consequence of the application of sponges and pressure it had not lost a very great quantity of blood: its face became pale and exsanguine, and its eye fixed; its respiration calmer, but the efforts of the muscles in the neck could be distincly seen, and the larynx was moved up and down, although much slower than before. In this state a small portion of the trachea was excised, and the child coughed and struggled and expelled some bloody mucus by the wound with more strength than it was supposed to have possessed. The difficulty of respiration was removed, and it fell asleep in half an hour afterwards.

In the the evening, the child had rallied a good deal, but it became apparent that the operation had accomplished nothing. The cough was incessant, and the efforts to expectorate violent, but unsuccessful. When any mucus was thrown into the wound, it was instantly sucked back again by the next inspiration, and the cough and distress renewed. The

rattling of the mucus in the windpipe became audible at some distance, and an attempt to relieve this by the application of a syringe to the wound failed entirely. The child became weaker every moment, was stupid, almost comatose, and died about twelve hours after the operation.

On dissection it was difficult to discover the veins which had bled so freely during life, and given so much trouble in the operation. The thyroïd veins did not unite into a common trunk, and only one branch could be seen, slit up nearly its entire length, but then so minute that it could hardly have been supposed capable of pouring out much blood. The connecting slip between the lobes of the thyroïd gland had been divided, but no arterial trunk had been injured in the least. The hæmorrhage, therefore, seemed to have proceeded entirely from the surface of the wound.

The larynx had, in this case, been the seat of the disease, and was covered with a thick layer of adventitious membrane, which seemed nearly capable of blocking up the rima altogether.

There was no trace of inflammatory action in the membrane around the incision that had been made in the operation.

Just at the bifurcation of the trachea the

membrane began to assume a red colour, which was continued downwards. The lungs seemed a little firmer than usual, and sections made into their substance produced an oozing of dark colored blood. There was considerable effusion into the bronchial cells and bronchiæ.

The bag of the pericardium contained perhaps less than half an ounce of serous fluid: the heart itself seemed healthy; but there was dark blood in each of its four cavities.

This case presents a view of some of the difficulties attendant on the operation of tracheotomy in the child.

LARYNGITIS ŒDEMATOSA.

It is no inconsiderable proof of the defective state of pathological knowledge in general, that a disease so very fatal as this, and certainly not so infrequent as to justify ignorance on the subject, should have been so recently as the year 1808 viewed with all the interest of a new discovery. It is probable that previous to this period, whenever an example of œdematous laryngitis occurred, it was regarded as a case of croup occurring in the adult; for we find that * one of those physicians who lost their

* Med. and Chir. Transactions.

lives by this affection in the year above mentioned, declared that his disease was to be considered as croup. Since that time, however, such a multiplicity of cases have been published as ought to be sufficient to satisfy every man that any deficiency as to the pathological nature of the affection must have arisen rather from an inattention in investigation after death than from any paucity of subjects.

It appears not improbable that this form of disease was known to Hippocrates,* as he speaks of angina, in which the eyes are affected and prominent, as if the patient was strangling; the face, throat, and even the neck in a state of inflammation, and yet no appearance of disease discoverable by examining the fauces. Galen † also mentions an affection of the throat producing suffocation, and alludes to Asclepiades, as placing his chief reliance on opening the larynx in such cases. Paulus Æginetus too, speaks of a quinsy requiring Bronchotomy for its cure; but as in describing the operation he seems to think it called for in those cases where the inflammation lies chiefly about the throat, the chin, and tonsils; there may be some doubt entertained as to whether he was acquainted with this exact species of laryngeal

* Hippocrates de Morbis. Lib. 3. Cap. x.

† In Medico. Cap. xiii.

affection. It is, probably, the disease mentioned by Boerhaave under the name of angina aquosa: but that it is a malady by no means novel in the history of medicine may be proved by reference to M. Louis' * paper in the Memoirs of the Royal Academy of Surgery, which contains some excellent observations on its symptoms, its progress, and the necessary mode of treatment. However, in the works of these authors, or indeed of any other, I do not find any direct account of the disease in question, or any explanation of its exciting causes, and the morbid changes induced within the parts affected; and it is principally by referring to cases published for the purpose of shewing the advantages of Bronchotomy that a knowledge of its symptoms and characters can be acquired.

The seat of this affection is more in the cellular tissue, connecting the mucous membrane to the adjacent parts, than in the membrane itself, although this latter structure is very frequently found to have been inflamed. This tissue is reticular, † and the effect of inflammation upon it is to cause an effusion of serous fluid within its cells, and thus to create, by approximating the sides of the rima glottidis, a directly mechanical obstruction to the passage

* De la Broncotomie.

† See page 7.

of the air to the lungs. It is evident now, that the danger of such an affection must be proportioned to the quantity of effusion that takes place, and the rapidity with which it is formed, so that a patient may be quickly suffocated by the complete closure of the rima, or he may be left to struggle during three or four days with partially obstructed respiration, and finally perish of congestion in the lungs and brain. When inflammation of the mucous membrane has accompanied this affection, I cannot find any satisfactory examples of its having extended beyond the larynx, and into the trachea: on the contrary, the chief intensity of disease has been in the epiglottis, which is found red, erect, thickened, and swollen, and during life has been seen to resemble a piece of raw meat.

The exciting causes of this affection appear in no wise to differ from those of inflammation in general: chiefly they seem to be exposure to damp, to cold, the passing from a warm temperature into the night air, and sudden variations of season. It does not appear that persons of any age are wholly exempted from it after puberty, as I have known it to occur, and to prove fatal in more than one young subject; but it is most frequently to be met with in persons of a more advanced age; in men more than

in women; in large plethoric people who have led a sedentary life, and indulged in the pleasures of the table: and there is some reason to suspect a predisposition to this disease in those patients who suffer severely from sore throats on the slightest exposure to cold. It is sometimes the result of sporadic inflammation, and follows its occurrence in some of the neighbouring parts;—it is also to be met with in connection with cynanche tonsillaris, but most frequently there is no appearance of co-existent inflammation in any surrounding structure. It is also, occasionally, very insidious in its approach, and I have two instances within my own recollection of young men who had retired to bed at night without complaining, and were found dead from this affection on the next morning.

The symptoms of acute cynanche laryngea might almost be enumerated from considering the morbid actions that have taken place, and the changes produced by them. They may, with reference to the treatment of the disease, advantageously admit of division into two classes: first, those merely indicating the existence of some mechanical obstruction which prevents the lungs from receiving a sufficient supply of air; and secondly, those shewing a state of congestion in the lungs, and perhaps in the brain.

The former of these will present some variety, according as the disease may happen to be complicated with other inflammatory affections. In general its attack is sudden, but it may be otherwise; and if it be preceded or accompanied by cynanche tonsillaris, there will be previous shivering, nausea, headache, loss of appetite, heat and dryness of skin, with accelerated pulse, and other symptoms of inflammatory fever. Along with these, there will be a greater or less difficulty of deglutition, redness and swelling of the fauces and enlargement of the tonsils. The occurrence of such symptoms as these may possibly lead the practitioner astray, if it should induce him to suppose that the difficulty of breathing arose from the inflammation of parts surrounding the larynx, and that the mischief was not situated within the organ itself. It is asserted on high authority * that a combination of difficulty of deglutition with obstructed respiration, forms the essence of this disease; but it by no means follows that there should be any imperfection in the act of swallowing; for the larynx may be totally blocked up, so that scarcely a particle of air shall pass through it, and yet every part of the fauces be found after death to have been entirely free from disease.

At first this affection makes its appearance

* Sir G. Blane. Med. Chir. Transactions, v. 6.

with difficulty of breathing, and a sense of dryness or huskiness in the throat, which obliges the patient to cough frequently in order to get rid of what seems to be an extraneous source of irritation. This increases rapidly, and he is obliged often to draw a full inspiration in order to inflate the lungs, and in doing so there is a painful sensation of constriction about the windpipe. Soon the respiration becomes sonorous and laboured. There is a peculiar sound caused by the air forcing its way through the contracted aperture, which cannot be described, but which once heard, can never be mistaken. It is harsh, sibilous or whistling—accompanies each act of inspiration, and is less distinct, or perhaps wanting in expiration. The patient now becomes excessively anxious and uneasy: he has a strong disposition to slumber, and perhaps sleeps for a moment or two, but soon starts up in all the horrors of impending suffocation. His face is flushed; his eyes portruded, as if starting from their sockets; his lips swollen, but pale, and as if trasparent; the larynx and trachea are moved quickly upwards and downwards in the neck, and all the muscles of respiration are brought into almost convulsive action, so that the chest heaves violently. At this time the patient cannot lie down, partly because the position is uneasy, and partly because he dreads falling asleep, and the horrible sensations with which he awakes. He will be generally found walking

about, occasionally going to an open window with a view of inhaling purer air, and sometimes stopping to grasp a chair, or any other body which may serve to fix his arms, and thereby bring into action additional muscles to assist the process of respiration.

In this stage the patient's voice is greatly impaired, but it is rather an inability to articulate at all than what is usually termed hoarseness. When asked as to the seat of his uneasiness, he points to the pomum adami. He is subject to dreadful spasmodic exacerbations, in which all the symptoms are aggravated, and the sweat pours off his forehead in abundance. The pulse at all times indicates the presence of irritation, being above 100, and occasionally 120, small, quick and vibrating.

It would be difficult to determine, on seeing a case of this description, whether the symptoms arose from the actual presence of inflammation in the mucous membrane of the larynx, and its becoming consequently thickened and swollen and pulpy, or whether they were occasioned by the effusion of serum within the submucous tissue. Yet a material difference of practice would depend on such discrimination, if it could be accomplished, for if the disease be purely inflammatory, unaccompanied by any mechanical obstruction, the great probability is, that it will

be relieved, and ultimately removed by blood-letting and other measures of depletion, whilst if the effusion has taken place, the object will no longer be to check inflammation, but to remove certain effects of it which have already been produced. Very* many cases are related of acute cynanche laryngea, successfully treated by the usual means of combating inflammation; but it may reasonably be doubted whether these measures would be efficacious in producing an absorption of serous fluid once effused, although they might arrest the progress of the disease, and thus prevent its being thrown out at all. Perhaps cases of sporadic disease which have commenced in the palate, the tonsils or the fauces, are those most likely to be benefited by such treatment; but it must be remarked on the other hand that in many of the cases which recovered without operation, it is distinctly stated that no trace of inflammation could be discovered on examining the throat.

* See case by Mr. Wilson —Medico-Chir. Transactions, V. 5. p. 156; also a case by Dr. Arnold, V. 9. p. 31, of the same work.

Ed. Med. and Surg. Journal, V. 10. p. 284, a case by Mr. Anderson, treated successfully by bleeding, and the use of tartarized antimony.—See also Dr. Roberts' case in Med.-Chir. Transactions, V. 6. p. 135. This case is particularly interesting, as the person who was the subject of it, died of another attack of the same disease 14 years afterwards.

But the great probability is, that the majority of cases are those in which the morbid action is seated in the subjacent cellular tissue, and then the effusion takes place with such rapidity that the disease is hardly formed until the mechanical obstruction is produced. And this opinion is strengthened by the remark of Mr. Lawrence, that "bleeding, blistering, and the usual means for subduing inflammation, are here found totally inefficacious," for not one of these will be of the least use in removing the effused fluid, however powerful they might prove in checking inflammatory action. The only manner, then, in which we can reasonably promise safety to our patient is, to procure for him some mode by which respiration can be carried on, other than the larynx which is no longer competent to the performance of its functions, and thus afford time either for the spontaneous subsidence of the disease, or its removal by medical treatment.

Besides the uncertainty that must prevail as to the precise nature of the morbid action that is going forward in acute laryngitis, and the consequent hazard a practitioner will run of losing his patient whilst he is attempting a treatment that may be unsuccessful, there are many reasons why he should, in the present instance, decide at once on performing Bronchotomy. Thus, it allows the organ in which the

diseased action is situated to remain in a perfect state of repose.—It takes the place of treatment which besides being injurious from the loss of time, is often in itself positively detrimental.—Considered as a wound, it adds nothing to the patient's danger—and as the relief it affords is, at least for some time, complete, it imparts confidence to the surgeon, and allows him more leizure to examine the symptoms, and adapt his remedies accordingly.

Acute cynanche laryngea is a disease which runs its course very rapidly, and often terminates in the course of a few hours. If blood-letting be resorted to, it should be adopted to a large extent, and without delay; and if it produces a decided alleviation of symptom, and is followed by the exhibition of tartarized antimony, so as to keep the patient in a state of depression during several hours, the case will probably terminate favorably. But this will not be likely to happen if a serous effusion has already taken place in the submucous tissue, and then it will be injurious, inasmuch as patients who suffer from obstructed respiration soon become weakened in vital energy, and sink with wonderful rapidity. Persons who have their minds strongly directed to any one particular object are thereby less likely to be affected by medical treatment, and therefore if a man be under extreme anxiety to maintain respiration, and

thinks that bleeding will afford him relief, it is probable he will lose a large quantity before it produces syncope. I have known an instance in which the veins of both arms were opened, where the patient suffered from cynanche laryngea, and although above forty ounces of blood were drawn *pleno rivo*, yet he never became weak or sick under the operation. But it was very near to have proved fatal afterwards, for in the course of an hour he shewed symptoms of extreme debility: his pulse faltered: his extremities became cold, and it was only by great care and exertion that his life could be preserved. However, under all circumstances, bleeding is the least hazardous of any mode of treatment, because it can be tried without any delay, and its efficacy is perceptible at once. If, therefore, after a large quantity of blood had been drawn, no alleviation of symptom became observable, it would form strong grounds for suspecting that the cause of the difficult breathing was mechanical, and be an additional reason for resorting to the operation without unnecessary loss of time.

In like manner, it may be objected to every remedial treatment, whether local or constitutional, that if the effusion into the submucous tissue has taken place, every moment suffered to elapse before an artificial opening is established must be pregnant with danger. The lungs very

soon become oppressed, and incapable of effecting the arterialization of the blood; and if the brain is supplied with a fluid not suited to the purposes of maintaining its functions, its vessels become congested, and a diseased action is commenced, which even the subsequent establishment of free respiration will not remove. This is a fact well illustrated by persons who have attempted to commit suicide by hanging, and been discovered before the vital spark has been completely extinguished; for many of these, although respiration has been perfectly restored, have died with symptoms of oppression of the brain, perhaps in a week after the deed has been committed, and on dissection, nothing has been found except venous congestion in the cerebrum, with a slight effusion on the surface under the arachnoïd membrane. It is thus, that bronchotomy so frequently proves unsuccessful in the treatment of acute laryngeal affections; * for, as during the first stage the patient's strength remains unimpaired, as he is able to walk about and use considerable exertions in endeavouring to procure relief; and as he enjoys the perfect use of his sensorial faculties, the degree of danger is

* On pratiquera toujours la broncotomie trop tard dans cette maladie, qu'on assure être inévitablement mortelle, si on ne l'admet que comme un moyen extrême: l'operation sera souverainement utile quand on y aura recours dès le commencement de la maladie afin de prévenir l'engorgement du poumon.

LOUIS.

seldom appreciated in time, and the operation is postponed for the trial of antiphlogistic remedies, until such disease has been induced in the lungs as will render every subsequent effort entirely unavailing.

It is very possible that a patient may perish during the first stage of this disease, being strangled by a spasmodic action of the muscles of the larynx, and thus die *constante mente integrisque sensibus:* indeed the unwillingness a patient feels to make an attempt to swallow, which always brings on a spasm, or sometimes even to speak, shows that he is sensible of the danger attendant on spasm, quite independent of the fearful distress it occasions. But it is not thus that the disease terminates in general, for after the difficulty of breathing has continued for some time, the patient's countenance becomes swollen and of a livid paleness,—the eyes are pearly white and suffused, as if an exhalation had taken place from the conjunctiva, and dried upon the membrane;—the lips are purple,—the disposition to slumber increases, whilst the extreme anxiety of the patient to maintain respiration, and his efforts to carry it on are increased. Every muscle that can be brought into action is forcibly employed, whilst the sound of the breathing is altered, and there is a kind of sob of distress accompanying each expiration. The sweat pours over the face and forehead,

and perhaps from the entire body. Sometimes the patient becomes inconceivably restless: whilst again he may remain quiet, apparently under the influence of hopeless despondency. The pulse very generally increases in rapidity.

After these symptoms have endured a few hours, the patient is observed to make less violent efforts to support respiration, and the intervals between each act is longer. The want of accordance between this function and circulation becomes more apparent; for the pulse is very small and encreased in frequency, and often immediately before death it is so rapid that its strokes cannot be counted. The breathing seems to be more a convulsive effort than a regular action, and is sometimes accompanied by stertor. The countenance becomes sunken, the eye loses its brilliancy still more, and the forehead is bedewed with a cold and clammy sweat. The patient becomes insensible, and death soon closes the scene.

It is perfectly evident that when symptoms such as these are observed, no treatment whatever, either surgical or medical, will be likely to save the patient, although it may be possible to prolong his existence during a few days by performing the operation, for it seldom or never fails to afford a temporary relief, and this is a circumstance worth the consideration of the

surgeon, if his patient's situation is such as to render a slight prolongation of life desirable. But beyond this point it must be totally unavailing, and affords an instance of the danger of procrastination under the idea of trying the effect of other measures, for at any time previous to the occurrence of congestion in the lungs, the operation will almost certainly save the patient's life, and at any time subsequent, it will as surely fail of accomplishing the end desired.

It may still be objected, that many cases have recovered without resorting to an operation which, however simple and easy of performance, is at all times viewed with terror by the uninformed spectator; and moreover, is strongly opposed by authority of the most respectable nature. * And the objection would bear very materially on the case if the surgeon could distinguish a case of common inflammation from that occasioned by effusion into the submucous tissue, or if he could be aware of the precise time in which disease would commence in the

* The celebrated Desault seemed not at all friendly to the operation of Bronchotomy, which he calls "une operation toujours facheuse," and has recommended the introduction of an elastic tube into the trachea through the nostrils in almost every case wherein this operation used to be practised. He acknowledges however, that this mode of proceeding will not answer in the "esquinancie inflammatoire."

lungs. Until these two circumstances can be ascertained, the safest mode of treating those sudden and severe attacks of difficult respiration will be, to regard them as cases of mechanical obstruction, and proceed to the operation without delay. The necessitity of an early adoption of bronchotomy may be well illustrated by comparing it with other surgical operations. For instance, it has often happened that an hernia has been fortunately reduced after a patient has been placed upon the table, yet no man now thinks of waiting until he sends round the town for a number of practitioners to try the effect of the taxis: and if he did so, or delayed on any other account, the chance of failure in his operation would be precisely in proportion to the length of time thus thrown away. The cases are nearly similar, except that the one which threatens suffocation is far more urgent, and that therefore the reasoning which is applied to the one, and now universally acted upon, should be allowed to have some weight upon the other. In fact, it should never be on the results of a few fortunate cases that any point of surgical practice ought to be established, but on a due comparison between those which ended favorably or otherwise under the same treatment, and on a knowledge of the pathological effects either produced or likely to be produced during the progress of the disease. If, then, it can be ascertained that bron-

chotomy adds little, or perhaps nothing to the patient's danger, there seems to be no sufficient reason why it should not be practised in the very outset of the disease, and afterwards, when the immediate danger of suffocation is past, the surgeon can take his measures for subduing inflammation calmly and securely, and with the fairest prospects of success.

Having advocated the early performance of bronchotomy in cases of acute laryngeal disease, I cannot avoid offering an opinion that if it is not adopted early, it had much better be let alone altogether. It is exceedingly injudicious in any practitioner to undertake an operation merely on chance, or at least without maturely considering as to its probable result; and as principle must be altogether abandoned in such a mode of proceeding, the majority of such cases will be found not to have added to the reputation of either the individual or the profession to which he belongs. But if the case has proceeded to an extent which renders recovery impossible, how much more injudicious is it thus to tamper with the feelings of a patient or his friends, and therefore how necessary is it for a surgeon to be cautious in proposing an operation until he has first satisfied his own mind of the non-existence of any symptom unfavourable to his undertaking. It is, unquestionably, very difficult to ascertain

the precise moment after which the case becomes hopeless; for I believe disease commences in the lungs before the lividity of the lip and countenance * appears, and therefore an opera-

* At the time the above remarks were written, the same facilities for ascertaining the condition of the lungs did not exist that are enjoyed at present by means of the stethoscope. This instrument was scarcely known in Ireland, and like most other novel inventions, was decried by some and ridiculed by others. Amongst the rest I confess I had very little faith in the accuracy of prognostics made by means of this tube, and as I had seen some of them erroneous, my conviction of its imperfection, if not of its inutility, was rather strengthened. Of late, however, I have been induced to alter my opinion very considerably. The stethoscope is receiving a full, fair and impartial trial in the Meath Hospital by Doctors Graves and William Stokes, and it is quite clear from the accuracy of their observations during the life-time of a patient, and the strict accordance of those with the pathological investigations after death, that many of the objectionable circumstances connected with its early use arose rather from the inexperience of the practitioner than any decided imperfection in the instrument. Like most other improvements, it has probably been advocated too strongly on the one hand, and opposed on the other, on opinions too hastily formed; but it must be remarked that opposition has usually proceeded from those who understood least about the matter, whilst the more it has been cultivated the more warmly has it been supported. It is a mode of investigation that can only be learned by practice.—No description can convey the idea of one particular kind of wheeze or another, and as its use is not well accommodated to the bed-side of a private patient, it will be long before it comes into general use, except in hospitals. However, when it does so, and its merits are fairly ascertained, it will probably be found an useful adjunct in investigating diseases of the chest, although perhaps not to the entire extent at present imagined by some of its warmest supporters.

tion may be undertaken with reasonable probability of success and yet terminate unfortunately. However such a failure is excusable and, is by no means to be ranked with those attempts which are made at a time when the patient must die whether an operation is performed or not. I have witnessed some operations in cases of acute laryngitis, and as yet have never seen one successful ; and I would attribute this, not either to the severity of the affection or to the inadequacy of the operation to procure relief, but solely to the circumstance of a considerable portion of time being previously employed in trying to subdue it by the usual measures for combatting inflammation, and the use of the knife being thus postponed until a period when it was only tried as a last resource, and could by no means promise even a probable chance of success.

I shall attempt to illustrate these remarks with only two cases, one of which fell under my notice at a period when I had never observed or reflected on the nature of the disease, and the other I had never an opportunity of seeing during life ; but I conceive the dissection might prove interesting and useful to those who may be called on to examine the bodies of persons that have died under suspicious circumstances. On reference to my notes, I could add several cases of acute laryngeal affections, but as they

were not under my own immediate care I do not think it right to publish them, however I have the less regret in leaving this part of the subject imperfect, as there are numerous cases already before the public highly illustrative of the disease, and scarcely a periodical work has appeared since what may be termed its discovery in the year 1808, that has not contributed more or less to supply the deficiency.

CASE XIII.

In the month of April, 1816, a gentleman residing about sixteen miles from Dublin was attacked with what he considered to be a sore throat. He was a large man, very strongly made, inclining to corpulency, but of active habits, and moderate in the pleasures of the table. He might have been 47 years of age. He was taken ill in the evening with shivering, and an inclination to crouch over the fire, slight head-ache, pain in the throat and a trifling difficulty in deglutition. He had some warm drink and went to bed, but passed the night rather restless and uneasy, and when towards morning, exhausted with watching, he had fallen asleep, he shortly awoke in a paroxysm of suffocation. Still, when he had roused himself, the difficulty of breathing was not such as to occasion great alarm: he complained of a dryness or huskiness in the throat,

and was annoyed by a short cough without expectoration.

In the morning an apothecary who resided in the neighbourhood was summoned; and by the time he arrived, the symptoms had advanced so rapidly as to become serious and alarming. The patient was bled, had purgative medicines, and a large blister was applied to the throat, but without the smallest relief.

Happening accidentally to be in the neighbourhood, I was called to see him about four o'clock in the afternoon. His face was then pale and swollen; his eyes glassy and protruded; his breathing loud, harsh and stridulous, and the efforts he made to carry on this function were frightful. His pulse very rapid but not full. He perfectly retained his senses, and pointed to the thyroïd cartilage when questioned as to the seat of his distress. He died in about an hour afterwards, twenty-one hours from the first approach of the disease.

After a good deal of difficulty, I prevailed on the friends of the deceased to allow me to examine the windpipe, and permission was only granted under a promise that no other part should be interfered with. The lining membrane of the larynx appeared slightly inflamed,

of a bright pink colour, but not thickened in structure. The epiglottis did not participate in the disease at all. The submucous tissue was œdematous, so as to approximate the edges of the rima glottidis, and nearly close up the aperture. The larynx contained a good deal of frothy mucus, and its surface was smeared over with a yellowish glutinous substance, not very unlike diluted honey.

CASE XIV.

On the 16th February, 1819, I was requested by a woman of the name of Mathews, who resided in an obscure court off Fishamble-street, and who had formerly been under my care as a patient of the Dublin General Dispensary, to examine the body of a boy, to whom she had through charity given a lodging in a waste room, and whom she suspected to have taken poison.

She could give no account of his illness, except that he had been dull and heavy the entire of the preceding day, unable to beg about the streets, as usual, but complained of feeling his throat sore, and in the evening had gone to an apothecary's shop, where he got something in a cup, but what it was she could not tell. He went to rest early on his bed of straw, and was found dead next morning.

I examined the abdomen first, but found every part of the viscera healthy; the stomach was empty, unless a little mucus on its internal surface, but neither here or in any other part of the intestinal canal was there the smallest trace of inflammation, or any indication that he had died by poison. The circumstance of his having had sore throat led me to examine this part. There was very little appearance of inflammation about the fauces; the epiglottis was red, erect and swollen to twice its usual thickness. The mucous membrane appeared inflamed as far down as the rima, but here, as if a line of separation had been drawn, the progress of the disease seemed to have been abruptly checked. The submucous tissue was quite œdematous, and on looking down into the larynx, it became evident that the tumefaction had absolutely closed up the glottis, and caused suffocation.

The lad appeared to have been about 19 or 20 years of age.

CHRONIC CYNANCHE LARYNGEA.

Under this name may be included all those affections of the larynx which materially inter-

fere with respiration, but which commence so insidiously, and proceed so slowly, as often to produce an incurable disease before the patients attention is aroused to the perilous nature of his condition. Very generally the result of these chronic affections is a morbid alteration of structure that can never be removed; but it is also to be recollected, that the symptoms will not be sufficient to mark a distinction between diseases of the larynx that are curable, and those which are not. It is true, that if the mucous membrane has been thickened to a certain extent it never recovers its former healthy state; and even if the patient is preserved, he will ever after suffer from hoarseness, or other imperfection of voice: it is also true, that if the mucous membrane is ulcerated,* or the cartilages degenerated and in a state of exfoliation, the disease may be considered as totally incurable; but if the affection be only simple abscess seated behind the larynx, or tumour pressing upon this organ, a case of which is related by Morgagni, there can be no reason why surgical interference should not in these cases prove successful. The only difficulty will be to distinguish one of these affections from the other, and this can alone be accom-

* Excepting in cases of syphilis.—Nothing is more common than for venereal ulceration to spread to the larynx, and be afterwards cured by mercury.

plished by attention to collateral circumstances, such as the age, disposition and habit of the patient, his exposure to specific contagion, and by comparing these with what is known of the pathological changes occuring in the various structures under these different influences.

There is an exceedingly curious circumstance connected with laryngeal pathology, which is, that all the symptoms of difficult respiration may exist, and even prove fatal, whilst the internal structural derangement is either not observable or so trifling as scarcely to account for the severity of the affection. The cellular substance *external* to the larynx and trachea is sometimes the seat of inflammation and suppuration; and I am in possession of a case in which no diseased appearances were found after death, except purulent matter surrounding the external surface of the entire windpipe. A nearly similar case is mentioned in the 11th vol. of the Edinburgh Journal, excepting that in this latter there was a laryngeal disease also, but scarcely sufficient to account for the unfortunate result. It is not easy to explain how such external affection can produce internal functional disease, unless, perhaps, by attributing it to the effects of spasm; but the fact is exceedingly interesting as it shews the difficulties

that surround these forms of morbid action, and how very attentively they must be studied in order to form a rational conception of the nature of each individual case.

The cartilages of the larynx are also liable to two forms of disease. One of these, which presents symptoms very analogous to pulmonary hectic, I have named the Phthisis Laryngea; it occurs from a degeneration of these substances into an earthy, gritty, calcareous matter, mixed up with portions of denuded and carious bone, giving rise to the formation of abscess, which bursts and affords a plentiful purulent expectoration. The other exhibits a specimen of the true mortification of the cartilage as the result of inflammation. In it these structures are found dead, black, and dissolved, resembling wetted and rotten leather. An abscess usually accompanies this, which either bursts into the œsophagus, and thus establishes a communication between the two passages, or externally, and then the air having access through the ulcer dries up the cartilage, which lies at the bottom of the sore of a brown colour, and corrugated or gathered up like horn that had been exposed to the action of fire. Occasionally the abscess opens in both these situations, and then the food, but particularly the drinks passing through the ulcer, afford some little in-

sight as to the nature of the case. It should also be noticed that the rotten cartilage has a peculiarly offensive smell, differing from that of carious bone, but not the less disagreeable; and when a surgeon has become acquainted with this symptom, it affords another important help in discriminating this form of disease from others. However, unless to assist in the accuracy of prognosis, it cannot be of much importance to distinguish these affections of the cartilage, for they are both accompanied by considerable alteration of structure in the lining membrane, so as to occasion excessive difficulty of breathing, and, as far as I know, are both uniformly fatal.

The simplest form of laryngeal disease with which I am acquainted, is that which is usually termed hoarseness, and which varies from a rough, raucal tone of voice, to an indistinct articulation, or perhaps to a total loss of voice. Sometimes this is a sequela of common sore throat, and perhaps is occasioned by the spreading of inflammation to the small muscles of the larynx, and occasionally there is considerable pain experienced in every attempt to speak. Very often, however, there is no uneasiness whatever felt, and as there is no difficulty of respiration, possibly there may not be inflammation or thickening of the mucous membrane, although the occasional occurrence of slight

catarrh subsequently, would rather militate against this opinion. This affection is usually brought on by exposure to cold, or to the moist evening air, and often seizes the patient so suddenly that the loss of the power of articulation is the first symptom observed. It is most prevalent in spring and autumn, and some patients seem so disposed to it as to be affected by the most apparently trifling causes. Persons who are unaccustomed to speaking either loud or long are often attacked thus, after being obliged to make an exertion of this description; and I have known a young clergyman nearly unable to articulate for three days after his first essay in the pulpit. Young females too, who occasionally exert themselves in singing, frequently suffer in this manner; but generally speaking, the disease, if disease it can be called, is occasioned by cold or damp, and is therefore probably of an inflammatory nature.

In the common forms of this affection it is seldom necessary to adopt any medical treatment, for it will usually subside spontaneously; but if it be so troublesome or unpleasant as to render it desirable to be got rid of, the inhaling the steam of warm water, or of water and vinegar during a few hours, will scarcely ever fail of the desired effect, particularly if combined with abstinence from animal food, and confinement to the house for a short time.

Occasionally, either from frequent attacks of the affection just spoken of, or from exposure to a more severe exciting cause, an encreased action takes place, and a more permanent disease is formed. The membrane becomes thickened, the respiration of course more or less impeded, and as the organ can never enjoy repose there is a strong tendency in the disease to become aggravated. It is extremely common amongst the poorer classes, and I have met with many cases among the extern patients at the Meath Hospital, most of which were washer-women, who attributed their illness to going out of a warm laundry for the purpose of hanging clothes to dry in the open air. In some instances the attack is so severe as to be accompanied by symptomatic fever, shivering, and head-ache. The voice is always impaired. There is sometimes pain, and when this symptom is present, the uneasiness is always referred to the situation of the thyroïd cartilage. On examination the fauces are found healthy and free from marks of inflammation. Cough is sometimes present, but dry, husky and without expectoration. There are in this, as in every other laryngeal affection, severe spasmodic exacerbations, which are the source of great inconvenience to the patient, but are, however, seldom dangerous.

When the morbid action has not proceeded

to a greater length, I have been in the habit of using mercury to the extent of slightly affecting the mouth, and I cannot recollect a single instance in which it failed of affording relief. After recovery the patient's voice is generally restored, but if the disease is of long continuance, such an alteration of structure takes place in the mucous membrane of the larynx that the power of articulating clearly is never again recovered.

There is sometimes considerable difficulty in distinguishing between these milder laryngeal affections and inflammations of the bronchial membrane, for in both the voice is impaired, in both there is a harsh and husky cough and difficulty of respiration, and in both the disease seems to give way on the appearance of mucous or purulent expectoration. But bronchitis is usually preceded by febrile symptoms, and during its continuance the circulation is accelerated, which does not happen in laryngitis. There is also a painful sense of oppression in the chest, with difficulty or impossibility of drawing a full inspiration, and perhaps of lying on one particular side. In bronchial inflammation also the countenance is generally swollen and pale, and the lips clear and colourless, and it is very frequently accompanied by palpitation or other irregularity in the action of the heart.*

* The stethoscope will be found a very useful instrument in distinguishing between these two affections.

When the larynx alone is affected, these symptoms are usually absent, unless in the latter stages when the lungs become engaged, and then the two diseases are found complicated. I have seen hysteria in one or two instances produce symptoms bearing a strong resemblance to chronic laryngitis, but this is easily discovered by paying even a slight attention to the progress of the disease.

It sometimes happens that from ineffectual or injudicious treatment the disease under consideration becomes truly formidable, and brings the patient's life into the most imminent peril. At first, as I have mentioned, there is only a loss or depravation of voice, that may or may not be accompanied by sore throat or other inflammatory symptoms. This is succeeded by difficulty of breathing, at first slight and not very troublesome, except during a paroxysm of suffocation. If, however, the patient is observed in this stage of the disease, he will be found to make strong exertions at every inspiration; the trachea and larynx will be drawn up as high as possible in the neck, and the digastric muscles will be seen in strong and constant action. At this period he will be likely to apply for relief, for few persons can quietly submit to any disease that interferes with respiration, and he is bled or probably blistered, or gets some trifling antispasmodic medicines. The disease is not checked,

perhaps it is aggravated, and either at once demands speedy and decisive surgical assistance, or proceeds more slowly, but not less certainly, to that period when only such aid can be the means of preserving life. The difficulty of breathing now becomes excessive, the inspirations long and produced by violent muscular exertion, the expirations comparatively easier and shorter. The voice is almost entirely lost, and in every respect the symptoms resemble those of laryngitis œdematosa. The patient is liable to severe spasmodic attacks of dyspnœa, and is nearly incapable of any exertion, the mere act of walking a few steps being sufficient to induce one of those terrific spasms. It is possible he may die in one of those, but such an occurrence is not likely; for it is astonishing to what an extent any morbid action may proceed, provided its progress is gradual and slow. Neither is there much danger of an incurable affection being produced in the lungs, these organs seeming to accommodate themselves to the diminished supply of air; and I think I have seen persons endure a degree of difficult respiration apparently without much inconvenience, and subsequently recover, who must have perished miserably had the occurrence of the disease been sudden or its progress rapid.

This is the affection to which the name of chronic cynanche laryngea most properly be-

longs: it is that in which the operation of bronchotomy has been most frequently followed by fortunate results, and it is one in which it will always be successful if not delayed too long. The disease here is caused by a mere thickening of the mucous membrane, without any morbid alteration of structure; but the circumstance of the larynx being in constant use tends to maintain the action that is going forward, and finally, if not relieved, to produce such a thickening of the part as will be incompatible with the maintenance of its functions. It is thus that creating an artificial passage for the air operates in promoting recovery, and there is some reason to believe that after the operation the powers of nature would be sufficient to work out a cure, even without the intervention of medicine, merely because the organ can enjoy repose. It is, however, a very rare occurrence for this affection to proceed to such extremity, unless it is allowed to increase through neglect, or is aggravated by injudicious treatment; and even without the operation mercury will seldom fail in removing, or rather in relieving it; for when the membrane has been thickened to a certain extent, the voice is never afterwards perfectly recovered, and a considerable degree of hoarseness will remain, if not for ever, at least for a great number of years.*

* In the month of February 1821, I performed the operation

I know not what particular circumstance first induced practitioners to try the effects of mercury in laryngeal diseases. Its well known powers of stimulating the action of the absorbent vessels, and the number of cases that owe their origin to a syphilitic taint, may have led to its employment, and will account for a good deal of the success that has attended it. In every case not depending on or connected with disorganization of structure it will probably afford relief, no matter at what period of the disease it is administered, or under what unpromising circumstances. Where the symptoms are not urgent, it may be given according to the constitution of the patient in large or small doses, but always with a view to affect the mouth. If the symptoms are severe, I believe diseases of the larynx are not to be trifled with, and I have given calomel in ten-grain doses four times a-day. As soon as the specific effects of the medicine become developed, the disease begins to decline, and it seldom requires more than a week or ten days to render the cure complete.

on a man for this disease, and he recovered. (See Med. Chir. Transactions, vol. xi. p. 414.) He has never since that time experienced any difficulty of breathing; but I saw him a few days since, and a very considerable degree of hoarseness still remains, although after an interval of more than five years.

PHTHISIS LARYNGEA.

Every disease of the respiratory tube producing difficult or imperfect respiration, accompanied by cough, purulent or bloody expectorations, pain in the region of the larynx or trachea, and exhibiting the usual phenomena of hectic fever, such as night-sweats and colliquative diarrhæa, has been considered and described under the name of laryngeal phthisis. This will probably explain why it has been so often spoken of by some as admitting of cure, and by others as uniformly fatal; for it is evident that these symptoms may be connected with diseases by no means terminating in disorganization of structure, and which therefore have been cured; and that on the other hand, they may result from such derangement as must be utterly irremediable. It will be proper therefore, in the first instance, to review those different circumstances which may give origin to symptoms of laryngeal phthisis, with a view of arranging them in pathological order.

1st. *A thickened state of the mucous membrane of the larynx and trachea, accompanied by chronic inflammation.*—This will cause difficult respiration, with occasional spasmodic exacerbations, low fever, with nocturnal perspirations, cough, profuse muco-purulent expectoration,

loss of strength, and wasting of flesh. However, the respiration is not sonorous, nor is there difficulty of swallowing, nor pain felt in pressing in the situation of the larynx; and after death, instead of effusion into the bronchial cells, an hepatized state of the lungs is usually discovered, particularly if the patient is advanced in years.

2d. *Acute asthma.*—The symptoms of this affection are in some respects resemblant to those already described, but still the diseases may be distinguished by even a superficial examination. The symptoms of hectic fever are scarcely ever observable.

3d. *Abscess in the neighbourhood of the larynx.*—This, in some one of its forms, constitutes the true laryngeal phthisis, and therefore it will be necesssary to investigate the different circumstances under which it may occur, the situation it may occupy, and the several symptoms it may give rise to. Abscesses are sometimes formed on the anterior and lateral part of the neck, situated deep under the fascia, and occasionally creating considerable uneasiness and difficulty of breathing by the pressure they cause upon the larynx. These are easily recognized by the hardness and tumefaction of the upper part of the neck, by the pain occasioned by handling or pressing on them, by the inability of opening the mouth wide, and the exist-

ence of severe symptomatic fever. Fluctuation cannot be perceived, but there is œdema: And although there is great difficulty of breathing, it does not resemble that occasioned by obstruction in the larynx; it is not sibilous or whistling. The patient expresses much anxiety, and and is often obliged to keep the erect posture, but has not exacerbations. Even when the tumour has not arrived at the suppurative stage an incision carried deeply through the fascia will always afford relief by giving it room to enlarge without pressing on the larynx. The purulent matter, when evacuated, is generally small in quantity and of extremely fetid odour; but the evacuation is productive of certain relief, unless when the abscess happens to be situated in immediate contact with the laryngeal cartilages, or that it has burst internally, circumstances that shall be observed upon hereafter.

In some instances the distress produced by abscess pressing on the larynx or trachea is almost intolerable, producing excessive difficulty of breathing, occasional sense of strangulation, orthopnœa, with uncommon restlessness and agitation. In all these cases I have been in the habit of making a deep incision down to the trachea; and although it has happened that I have not cut upon the matter in the first instance, yet it always made its appearance on

the following day, the abscess never failing to burst into the wound. This result of the incision in the neighbourhood of an abscess seems to depend on the disposition of purulent matter to make its way to the surface by that route which offers least resistance, and the principle may be turned to advantage in every case where matter exists in a hazardous situation, and it is desirable that it should be discharged externally.—The first case of this nature on which I operated was one in which an abscess was supposed to exist in the sub-maxillary gland: the incision was made on the side of the neck, the labial artery laid bare, and pulsating deeply under my finger. From the importance of the parts situated in the neighbourhood of of the incision, and the danger of wounding some large vessel, I was unwilling to proceed; but the purpose was sufficiently answered, for the abscess burst into the wound the next day—the patient obtained immediate relief, and very speedily recovered.—Since that period I have tried a similar practice in several cases, in some of which I have cut down upon the abscess at once, and in others have left it to open into the wound, and the principle has been acted upon with the most decisive success by Doctor Graves, in a case of abscess of the liver.—The last,* and I think the most interesting case of

* See Appendix.

this nature under my care, was one in which there was no external trace of the existence of abscess, except a slight fulness on the left side of the lower part of the neck, apparently immediately over the carotid artery. From some circumstances connected with the case it was deemed inadviseable to operate low down, and by an incision in the medial line of the neck I merely laid bare the lower part of the larynx, and about the three superior rings of the trachea. Yet this answered every purpose. On the following day a profuse discharge of matter took place from the wound, which, pressure on the lower part of the neck shewed to have come from the seat of the suspected abscess, and the introduction of a curved probe, which passed downwards and backwards to the extent of two inches and a half, made it plain that the matter had been situated deeply between the trachea and œsophagus. I have added some of these cases; for although they do not exactly bear upon the question of bronchotomy, I have otherwise deemed them particularly interesting in a practical point of view.

The most usual situation of abscess is behind the broad portion of the cricoïd cartilage, where its presence exercises a very decided influence in pressing upon and obstructing the rima glottidis. The approach of the suffocating

symptoms is very gradual, and their progress slow; and it is extremely difficult either to ascertain its existence, or to apply a remedy. At first there is difficulty and pain in swallowing, with a sensation as if the part over which the morsel passed was abraded. On examining the fauces there is no appearance of inflammation to account for this soreness of the throat, and the patient refers the pain to the situation of the larynx. On pressing this part backwards against the spine it imparts a sensation of fulness and elasticity, and if seized by the fingers and moved laterally across the neck it does not give a hard feel as if two firm substances were rubbed together. I cannot say whether symptomatic fever precedes the formation of abscess here, but certainly when it bursts, which it usually does immediately behind the rima, it occasions symptoms exactly resembling pulmonary hectic. When the abscess has given way, purulent matter begins to be expectorated, and the patient experiences some remission of the symptoms of difficult respiration, circumstances which bear some resemblance to the phenomena of bronchial inflammation, and may therefore give rise to some obscurity. But besides that mucous inflammation never occasions such severe distress in respiration as abscess, I think the latter may be distinguished by the comparative ease with which expectoration is effected, and the short-

ness and looseness of the cough. It seems as if the matter was thrown on the rima and expelled by a single effort, whilst in chronic inflammation there are paroxysms of cough, and it is often with great difficulty, and only after considerable efforts. that the tracheal secretion can be discharged. The expectoration from abscess is often largely mixed with mucus: sometimes it is streaked with blood :—and sometimes it contains red or dark coloured flocculi, as if there had been flesh wasted down and dissolved in it. After some time the sputa is altogether purulent, for the lining membrane of the larynx becomes diseased, and is either ulcerated or altered in structure, assuming a thickened corrugated or granulated appearance, and having its surface partially covered with patches of unorganized lymph.

This is a disease not necessarily involving the operation of bronchotomy; for if the abscess is not accompanied by any organic derangement, an evacuation of the matter contained within it ought to be sufficient to produce a cure: this, however, is a subject attended with the greatest difficulty; for in the first instance, how is it to be exactly ascertained that an abscess exists there, or supposing this question clearly determined, how can it be known whether it is not complicated with disease of the cartilages, in which case it must be

irremediable? And secondly, supposing these points arranged, how is an abscess thus situated to be come at? If a blunt instrument be passed down the throat, with a view of tearing up or rupturing the abscess, it will probably not succeed; and if it did, it would not cure the disease; for the continual irritation is preserved when the abscess breaks naturally, in consequence of its aperture being so placed that foreign substances can gain admission into the cavity, and thus maintain the sloughy and suppurating condition within, and any opening effected by an instrument passed through the mouth will be subject to the same inconvenience. If bronchotomy has been performed, it may be possible to pass an instrument upwards through the wound, and thus effect an opening to communicate with the larynx alone; and if it be a case of simple abscess, this mode of proceeding will be likely to prove successful; for as the wound will not be exposed to so much irritation it may probably heal kindly. However, being satisfied that an abscess was compressing the larynx, I would prefer cutting on it from without, and the operation is not only feasible but easy, by making an incision down on the thyroïd cartilage, and taking it for a guide, proceeding backwards until the abscess can be felt and opened. It may be objected that there is considerable risk of hæmorrhage from this operation; and unquestionably there might be such

in the hands of a rash or ignorant surgeon, but there is none if it be performed by a man who is well informed as to the anatomy of the part, and no other should ever take up a knife to operate on the neck.

4th. *Abscess complicated with disorganization of one or more of the laryngeal cartilages.*—About the age of 32*, and varying from that to 36, we occasionally find that the cartilages of the larynx undergo a remarkable change, and are converted into bone. Previous to and during this process, the structure of these substances is highly organized, and a section of them appears red and very vascular.† In most instances the change takes place, like every other operation of the animal economy, without inconvenience: whilst in some‡ particular constitutions a morbid action is set up which termi-

* I am aware that some instances are to be found, apparently in contradiction of the idea of this disease occurring at one particular period of life, but on examination I believe it will be ascertained that most cases of true phthisis laryngea have appeared just about the age above mentioned. I think also that persons about that age are particularly liable to spasmodic dyspnœa and other teizing affections of the larynx.

† See Case No. 21, Dissection.

‡ In two cases that occurred within my own observation, I was enabled to ascertain that the patients had been strongly addicted to whiskey-drinking. I have, however, met with it in females, who could not have been suspected of this habit.

nates in an incurable disease. It commences usually in the broad posterior portion of the cricoïd cartilage, this part being now highly organized, and more capable of producing disease. At first a small earthy deposition is laid down in some part of the cartilage, probably near its centre;—it feels hard and gritty under the knife;—is white as to colour,—and perhaps may be somewhat of the same nature as the earthy degeneration in the coats of arteries.* This encreases in quantity, so that the entire of the cartilage seems to be converted into it; and as it is totally unorganized, it acts as an extraneous body. An abscess is formed which bursts in one or more places; purulent matter is discharged, frequently mixed with this earthy substance already mentioned; the patient becomes emaciated,—and worn down with the cough, difficulty of breathing, and other symptoms that attend this melancholy disease, he dies with most of the appearances of hectic fever.

Long, however, before the formation of ab-

* When the contents of an abscess here are examined after death, pieces of carious bone are always found, as if the part had been proceeding in its healthy actions, but was unable to complete them. These shells of bone, which resemble exfoliations, are white, unorganized, and abominably fetid, and lie irregularly mixed with the gritty substance already described.

scess, and whilst the morbid change seems to be only commencing in the cartilage, the mucous membrane begins to suffer, and a speck of ulceration, or of corrugation, appears upon its surface. This produces great irritation, and is probably the cause of the frequent spasmodic attacks of suffocation that a patient suffers. After this, the disease in the mucous membrane seems to keep pace with that in the cartilage; it becomes thickened and corrugated in some parts, whilst perhaps it is ulcerated in others; and when a larynx is examined that has long been the seat of this affection, very little trace of its former configuration can be discovered.

The lungs are not always affected in consequence of this difficult respiration. In one instance I could not discover any marks of disease; in others I have seen such an effusion into the bronchial cells that the trachea has been filled up with it.

This earthy degeneration of the laryngeal cartilages is an extremely insidious disease, its approach being so gradual as scarcely to alarm the patient, and its progress slow. There is usually sore throat and difficulty of swallowing, although this latter is not necessarily a constant symptom;—hoarseness—and at first but triflingly impeded respiration. These incon-

veniences in the commencement are not such as to produce much distress; for I have known one patient suffer for three months, and another nearly nine, before either applied for relief, and in both the disease had a fatal termination. Afterwards, however, the symptoms become much more aggravated, the difficulty of breathing is exceedingly distressing, and there are exacerbations that bring the patient to the point of death by suffocation. Indeed I have known one case in which dissolution took place at a very early period, and when the occurrence could only be explained by the severity of the spasm. At length, as the dyspnœa becomes extreme, the patient suddenly experiences some partial relief;—his cough, which before was teizing and troublesome now becomes softer, and the expectoration free and copious. This latter has all the characters of purulent matter; and there are mixed with it particles of that dry, gritty, earthy substance already described. Occasionally, pieces of the size of a pea of this unorganized substance are coughed up, and when they appear they leave very little doubt of the nature of the complaint. Towards the latter end of the disease the breathing becomes loud and sonorous, with a whistling noise, so as to be heard at a considerable distance. The cough is incessant; the expectoration copious, with a peculiarly fœtid, gangrenous smell; the pa-

tient's breath has this odour also, which may also be regarded as an unfavourable symptom. There is at all times convulsive struggling for breath, with occasional exacerbation. In most cases, but not in all, the chest becomes affected; there is pain in some one part of it or other, with a sensation of tightness round the thorax, as if the patient could not draw a full inspiration. His strength seems to give way rapidly under these symptoms, his body becomes emaciated, he has night-sweats, accompanied with excessive restlessness, and at last he sinks exhausted in the struggle, and dies.

Throughout the entire progress of the disease there is seldom any well marked paroxysm of fever, although the pulse is never much under 100; however, this may be attributed to the constant irritation under which the patient labours. The tongue is usually clean: the appetite good,—in some instances ravenous: and the general functions of the body, with the exception of respiration, seem to suffer but little. The countenance is always pale, with that sickly, dirty hue that characterizes hectic fever. The expression evinces great anxiety, and this is so remarkable, that patients suffering under this species of cynanche often seem to bear a strong resemblance to each other.

It is evident from the nature of this disease, and the morbid alterations of structure it produces, that it must be considered as incurable, and the only question then is, whether existence can be rendered comfortable while it endures, or prolonged when it is about to come to a termination. Medicine, it must be observed, has no power in averting its progress, and it is found that mercury, so efficacious in relieving other laryngeal affections, has a decided tendency to aggravate this. Perhaps antispasmodic medicines may sometimes be advantageously employed, with a view to diminish the violence of the paroxysms of suffocation that are so very distressing; but even in this attempt, the practitioner will too often experience disappointment. At length the disease approaches its termination, and the patient is about to perish;—even then the surgeon, if he is certain of the nature of the morbid action present, need scarcely make any attempt to save him. I have prolonged a life of misery for a month by performing the operation of bronchotomy, and others again have been even more successful; but I doubt that a small addition to existence gained on such terms is any great advantage, and the operation should not be undertaken unless under very peculiar circumstances, and at the pressing instances of the patient or his friends.

5th. *Abscess with mortification of the laryngeal cartilages.*—I have met with but two instances of this form of disease, one of which appeared in an exceedingly acute form, and ran its course through with great rapidity: it distinctly exhibited the characters of abscess in the front of the neck from the very beginning, and the difficulty of breathing caused by it was never very severe. The other was of a chronic nature, afforded symptoms of internal laryngeal derangement and never gave occasion to us to imagine what the precise form of the disease might be until after bronchotomy had been performed. This last case is peculiarly interesting, in so far as it shews that life may be prolonged for some time by the operation, even in a case so utterly hopeless, and therefore that, in the worst of circumstances, it should never be considered as adding to the patients' danger.

The cartilages of the larynx, in their healthy state, do not seem materially to differ in structure from those situated in any other part, but they are nevertheless apparently less dense, and become spongy by maceration. I have not been able to trace any distinct blood-vessels through their substance, but certainly have seen them very red and vascular about the age already mentioned; and it is worthy of remark, that both the cases which presented themselves to

my observation were in patients between the ages of 30 and 32 inclusive. It is very possible, therefore, that sloughing of the cartilages may be occasioned by over-action within the structure itself, whilst the powers of the part are insufficient to bear up against it, or else it may be the result of tumour or other irritation directly affecting the larynx and destroying its vitality.

This is a form of disease which I have not seen described by any author, and the limited experience afforded by two cases only will not enable me to speak of it without hesitation. However, the knowledge that such alteration does occur in the cartilages of the larynx, may be useful in establishing the propriety of making an early opening into abscesses situated in the neighbourhood of that organ, and thus diminishing the chance of the matter becoming deep and producing a formidable, if not a fatal disease. I cannot determine either, whether this affection must of necessity end in the destruction of the patient, but should rather suppose it must, for I am not aware of any well-authenticated instance of the regeneration of cartilage, and therefore, as the larynx must be permanently destroyed, existence could only be maintained by establishing an artificial passage for the air during the remainder of life. And even this resource is less likely to succeed here·

than under any other form of laryngeal disease; for it is accompanied with so much fever, irritation, and general constitutional derangement, as will be sufficient to produce death independent of the disturbance it causes in the function of respiration.

It is needless to enter into an enumeration of the symptoms which characterize this affection, as they may be known by reflecting on the pathological alterations that have occurred. If the abscess is prominent, the symptoms of obstructed breathing will be less developed, but then the nature of the affection is cognizable to our senses: and if the matter is more deeply seated, the features of the disease so exactly resemble other forms of chronic laryngitis that no distinction can be drawn between them.

Having thus examined into some of the pathological varieties exhibited in the different forms of laryngeal disease, it remains to consider what are those cases to the relief or cure of which an operation may be applicable, together with the symptoms that may serve to distinguish them from others in which it might be likely to prove inefficacious or injurious.

Notwithstanding the number of cases already before the public, serving to shew that acute in-

flammations of the larynx were curable without operation, it may still be questioned whether a perseverance in the attempt thus to reduce it is not in every instance hazardous, and may not in many prove fatal. Where the inflammatory action is confined to the mucous membrane alone, there is almost a certainty that bleeding and other similar measures will be sufficient; but it is equally clear that if effusion has taken place into the submucous cellular tissue, nothing short of removing the obstruction will cure the disease, and antiphlogistic remedies are unable to effect this object. This form of disease, therefore, is the one in which bronchotomy is most imperatively called for, inasmuch as in the one case it will not render the patient's condition in the most remote degree less favorable, whilst in the other it is the only means by which the patient's life can be preserved. If there existed any characteristic marks by which these two varieties of disease could be distinguished, they might render this point of surgical practice much more clear and determined; but no such symptoms can be accurately defined, and therefore where the appearances of strangulation are urgent, where they have suddenly appeared and are making rapid progress, it will be most adviseable to perform the operation without delay, and the success of the case will be in proportion to the stage of the disorder in which such pro-

ceeding is adopted. It can only fail from having been postponed until the lungs have suffered congestion, and the functions of the brain have been impaired in consequence of this viscus being supplied by a quality of blood not suited to their maintenance.

But the chronic forms of laryngeal disease present examples of such variety of morbid action, that it will be impossible to lay down any one principle applicable to all, and consequently a good deal of the surgeon's success must depend on the acuteness of his judgment in distinguishing these varieties from each other. Fortunately the progress of the disease is slow, and affords not only time for careful investigation, but opportunity for the trial of different remedies previous to its exhibiting any urgency of symptom, and therefore a careful practitioner will probably be enabled to form a just opinion of its nature, and the chance of success that may attend an operation long before he shall be called on to perform it. The form of disease in which bronchotomy has been most frequently and most fortunately employed, is the chronic thickening* of the mucous membrane, and this

* Pelletan mentions a case of chronic thickening of the mucous membrane in which bronchotomy was performed without success, "L'ouverture du cadavre a constatè le gonflement de la membrane qui enveloppe l'epiglotte portè à un tel point, que cet organe était globuleux. La membrane muqueux

would in most instances admit of relief by the internal use of mercury, if the medicine was employed at an early period. It has occurred to myself to perform the operation in a case of this description, and the patient subsequently recovered by the administration of calomel, to the extent of affecting his mouth; and it appeared to me that had the medicine been tried at an earlier period the disease would never have proceeded to extremity. In like manner bronchotomy may be useful in cases of abscess existing in the neighbourhood of the larynx, and pressing upon it to the extent of impeding respiration; and perhaps there are few cases in which it can be more decidedly indicated, provided the collection of matter is not complicated with disorganization of structure.

But cases of true phthisis laryngea present characters very similar to the affections above mentioned, and bronchotomy promises little or nothing* to a patient under such circumstances,

du larynx et du pharynx était également tumefieè, et avoit acquis une très-grande densitè. Les glandes de la base de la langue étaient dures et squirreuses; enfin la glotte était rèduite à moins du tiers de sa grandeur naturelle. Toutes ces parties étaient d'ûne pâleur remarquable."—I have not yet met with a specimen of this form of laryngeal disease.

* I had always supposed that in cases of destruction of the laryngeal cartilages and operation must be unsuccessful, and could only be undertaken with the view of adding six or eight weeks to the patient's life. There are, however, some cases on

and it is therefore important to bear in mind those symptoms which hold out a reasonable probability that the disease in the larynx either originates in, or is complicated with a morbid alteration of structure. If, then, the patient is about that age when the conversion of the laryngeal cartilages into bone takes place, say from 30 to 36—if there is considerable soreness felt when the thyroïd cartilage is pressed upon, and great pain when the larynx is rubbed laterally across the spine;—if he has the sensation as if

record which would decidedly contradict that opinion, and shew that under the most unpromising circumstances, the operation may sometimes be followed by astonishing results. I have noticed these cases, not with the view of establishing any mode of practice upon them, because a few fortunate cases can never stand in opposition to a multitude of a different character, but as a proof that the operation of bronchotomy is not by any means so formidable as has been usually represented.—See the case of Mr. Price of Plymouth, published by Dr. Johnson in the Medico-Chirurgical Review, Dec. 1820, page 422. In this instance the patient has breathed through a tube for nearly ten years.—See also a case in the Edinburgh Medical and Surgical Journal, Oct. 1823, in which tracheotomy was performed without a permanent cure, but evidently with present relief, and the prolongation of life.—In the London Medical Journal, July 1825, is a case apparently originating in a venereal taint, which was completely relieved by the operation, and the patient recovered after being obliged to wear the tube in the wound more than six months.—I understand my friend Mr. Francis White, of Dublin, had a case lately of a similar description, on which he operated with success, and the patient also used the tube for a great length of time.—I am not in possession of the details of this latter case.

an ulcer existed low down in the throat—if there is fætor of the breath*—if the pulse be always high in number, hard and irritable, without the presence of fever,—and if there is both pain and difficulty in swallowing, there will be good reason to suspect that we have an organic disease to encounter, and that we shall be foiled in the contest. If, to those are added, after some time the occurrence of cough with the copious expectoration of a fluid, yellow, puriform or streaked with blood, that sinks in a diffused cloud when thrown into a basin of water, the case becomes still more clear. And it is placed beyond doubt by the expectoration of any particles of that degenerated, calcareous substance into which the cartilages are converted. I should scarcely advise the operation when such symptoms are present, unless it was a case where the prolongation of life for a very short time might be a matter of much importance, and not even then without fully apprising the patient's friends of its probable result.

I have already stated the extreme difficulty of forming an accurate diagnosis in laryngeal diseases, and how frequently even the most accurate observer may find himself mistaken. It

* Where mercury has been previously used it may be important not to confound the mercurial fætor with that gangrenous smell observable in this disease.

may happen, then, that in a case of uncertainty the operation has been performed with a view to gain time for the trial of further expedients. We shall know that it will be successful by the gradual subsidence of the laryngeal symptoms, and the recovery of the patient's voice and power of breathing by the natural passage when the artificial opening is closed by the finger. This is perhaps the only test that can be relied on, for the anxious expression of the countenance will subside when the difficulty of respiration is removed, and the patient will often express amazing confidence in his recovery. I have known one to smoke his pipe regularly and comfortably a few days after the performance of the operation, a circumstance that proved a partial passage of the air through the rima glottidis, yet the disease never shewed symptoms of amendment, and in a very short time he died. Whenever, therefore, there is no remission of the original symptoms—when the wound exhales a putrid, gangrenous odour*—when the patient's strength gradually sinks, and he be-

* At all times when there is a communication by means of a wound or ulcer between the windpipe and the external air, a peculiar fetid smell is perceptible, which is easy to be recognized by any person who has attended cases in which Tracheotomy had been performed; but this is very different from the putrid odour that proceeds from a gangrenous ulcer existing somewhere within the larynx, and which is always horribly offensive.

comes daily less able to expectorate the mucus which is constantly accumulating, there is no chance of recovery, and our prognosis must be unfavorable accordingly.

CASE XV.

THICKENING OF THE MUCOUS MEMBRANE.

Mary Mack, a washerwoman, æt. 37, married, and the mother of six healthy children, applied as an extern patient at the Meath hospital on the 5th March, 1823. She had for some time been exposed to much hardship, being obliged to work throughout the day and a great portion of the night, and was exposed to cold and vicissitudes of temperature. She had been frequently subject to common sore throat, which had usually subsided in the course of a few days, and it was only on account of this attack having been more obstinate, and continued twelve days, that she applied for assistance. She now complained of slight difficulty of deglutition, with extreme soreness if pressure was made on the front of the neck, in the situation of the thyroïd cartilage. There was very little obstruction to respiration, and the cough was short, frequent, and without expectoration, but she did not complain of it as being troublesome. Her voice was nearly altogether lost, and her utmost ef-

forts at speech produced no more than a whistling indistinct whisper. On examination, not the smallest trace of inflammation could be discovered in the fauces. Her pulse was slightly accelerated, her tongue clean, her appetite good, and her general health not at all impaired; but she seemed frightened at the loss of her voice, and anxious as to the result of her illness.

By the use of calomel and opium in small doses, this woman was effectually relieved in the course of six days, without having her mouth so far affected as to produce pain or inconvenience; and though having frequently had opportunities since of seeing her, I have not heard of her suffering from this affection at any time subsequently.

CASE XVI.

Anne M'Evoy, a room-keeper on the Coombe, æt. 35, applied as an extern patient at the Meath hospital on the 3d May, 1823.

About a fortnight previously she was seized with shivering, head-ache, and other febrile symptoms; her throat shortly afterwards became sore, but she did not attend to it, supposing it would subside spontaneously. She had almost entirely lost her voice, and com-

plained of terrible sore throat, and nearly an impossibility of swallowing. There was great tenderness to the touch in the situation of the thyroïd cartilage. She had very considerable difficulty of breathing, and at night was obliged to maintain the erect posture. Pulse very small and quick;—tongue slightly loaded.

On examination of the fauces there was no appearance of inflammation.

This woman was bled immediately to the amount of twenty ounces, and had some purgative medicines with a view to allay the febrile symptoms. She then took calomel and opium in small doses, and in proportion as her mouth became mercurially affected, the disease in the larynx seemed to subside. Her voice had resumed its natural tone on the seventh day, and she was completely cured in the space of a fortnight.

CASE XVII.

Miss M. I. L. on the evening of the 15th June 1821, had been practising at music and singing for more than an hour and half, when she went out to walk with some friends. She remained out sometime until she began to feel chilly and uncomfortable in the air; she returned home

so quickly as to occasion some fatigue and slight perspiration, and on her arrival was surprised to find herself so hoarse as scarcely to be able to speak to be understood. She became worse as the evening advanced, but still experienced no inconvenience, excepting the loss of voice.

On the next day the hoarseness was somewhat relieved, but she complained of a slight sore throat, with some difficulty of swallowing: she took some family medicine with advantage, and remained within doors the entire day. During the night, however, she experienced a severe paroxysm of suffocation, breathed with difficulty, and with a croupy sound, and was obliged to maintain the erect posture. This symptom subsided after an hour's continuance, and she fell asleep.

On the day following it was deemed right to have medical assistance. A short, dry, frequent cough had made its appearance, but the breathing was not sonorous. The pain and difficulty of deglutition was rather encreased, and she pointed to the situation of the thyroïd cartilage as the seat of her distress. The imperfection of voice continued. Pulse natural as to character, beat about 80 in the minute, her general health good; but though she endeavoured to preserve an appearance of cheer-

fulness, it was evident she had some anxiety as to the complaint.—She said she dreaded the night, lest she should experience a similar attack of suffocation.

On examining the fauces, there was no appearance of inflammation.

Eight leeches were applied to the throat, and some purgative medicine administered, and she was directed to take a draught at bed-time, containing a drachm of oxymel of squill, a drachm of camphorated tincture of opium, ten drops of antimonial wine, and an ounce of peppermint water.

She passed the night tolerably well, but on the next morning the symptoms still continued. A solution of tartarized antimony was now ordered, and she took the sixth part of a grain every second hour, and the draught was repeated this night as on the preceding.

June 19th.—She had been under the nauseating influence of the medicine yesterday during some hours, and had been so much annoyed by it that she positively refused to take any more, particularly as she said it did her no good. The symptoms still remaining unabated, she was ordered pills containing calomel and opium.

On the 22d her mouth became affected, but only so far as to produce slight tenderness behind the incisor teeth, and to impart a mercurial fætor to the breath. The improvement in her voice was now very apparent, as she could speak quite distinctly, the soreness in her throat was diminishing, and altogether she was much improved.

In the course of a week she had completely recovered, notwithstanding that the mercury had occasioned a slight dysenteric affection, which rendered it necessary to discontinue its use perhaps a day or two sooner than would otherwise have occurred.

CASE XVIII.

Mary Carr, æt. 50, a washerwoman, applied at the Meath hospital on the 7th December, 1823.

Five weeks previous to this she had been employed in a factory where large fires were used, and obliged occasionally to quit this heated atmosphere to assist in spreading out the cloths to dry. She attributed her illness to having caught cold whilst thus occupied.

At first she had been seized with slight dry cough and hoarseness, which latter symptom

had so far encreased, that at the end of the second week she was nearly deprived of voice. She had never experienced any difficulty of deglutition or soreness in the throat, nor had she shivering, head-ache or fever, previous to the attack.

On examining the fauces, there was no mark of inflammation, but pressure externally on the thyroïd cartilage gave pain and excited cough. Her respiration was quite free from any apparent obstruction, and she could draw a full inspiration without uneasiness. Her voice was greatly impaired, and her attempts at speech with difficulty understood.—She stated that she had suffered some severe paroxysms of suffocation at night, which had frightened her a good deal, and that frequently she had been obliged to remain in the erect position during two or three hours at a time.

She had pills of calomel and opium, and it required no more than four days to relieve the laryngeal symptoms. She suffered very severely afterwards from the effects of the medicine on her mouth, and it was sixteen days before she had completely recovered.

CASE XIX.

Eliza Murphy, a servant, æt. 27, admitted into the Meath Hospital. March 1st, 1821.

She complains of difficulty of breathing, which has now continued more than six months, and which commenced without any cause that she is acquainted with. She has not cough, nor does she recollect ever to have been troubled with this symptom. There is no difficulty of deglutition, nor can any appearance of inflammation be observed in the fauces, but there is great tenderness to the touch in the situation of the thyroïd cartilage, and she cannot endure even gentle pressure in that direction. Common ordinary respiration is apparently quite free, but a deep inspiration is accompanied by a harsh, sibilous noise. Her voice is extremely indistinct. She states that she has had three blisters applied in different situations about the throat, and it was immediately after the first of these that her voice became so much impaired.—Pulse regular—appetite good.—She passes her nights comfortably without any spasmodic exacerbation.

March 2.—Eight leeches were applied to the throat, and some purgative medicine, which contained tartarized antimony, was ordered.

March 3.—No benefit derived from the treatment of yesterday, and she had pills of calomel and opium—one to be taken three times a day.

March 10.—Her mouth becoming sore with strong mercurial fætor from the breath.—There

is some alleviation of the laryngeal affection, but not so distinctly marked as to be worth reporting.

March 12. Some slight uneasiness in the bowels.—A draught of oil of castor and tincture of opium ordered.

March 15. Her voice completely restored: no difficulty of respiration, nor any soreness of the throat.

March 21. Discharged cured.

CASE XX.

PHTHISIS LARYNGEA.

March 18, 1820. Mary Smith æt. 31 years, unmarried. Has been ill with difficulty of breathing for two years, gradually growing worse during that time: applied to several medical practitioners and charitable institutions: received many different medicines: has been frequently bled and blistered but without the smallest benefit.

She is a young woman of the better order, well educated, and apparently of strong mind: she can describe accurately every sensation she has felt, and is convinced that her case is beyond

the reach of human assistance: she speaks calmly of her approaching dissolution, which she is satisfied is very near at hand.

She says that at first she experienced little inconvenience beyond a dryness and huskiness in the throat, which was very disagreeable, with an occasional attack of strangulation at night. After some time her throat became sore, and she described her pains to have been only temporary, and then shooting across the neck, as if a sharp instrument had been run through it. The next symptom was what she called a thickness in her breathing, and a frequent necessity for drawing a full inspiration or filling her chest. About this time she felt a great difficulty of breathing at night, and was at times entirely deprived of her rest.

These symptoms existed full a year before she remarked her cough: she stated it to have been very troublesome, and accompanied with a yellow thick expectoration: it was peculiar in this, that it never attacked her in any violent degree, a single cough being sufficient to bring up the expectoration. She had no pain in the side, nor ever complained of any uneasiness except a perpetual soreness in the throat.

When I saw her she was panting for breath, drawing each inspiration long and full, the expirations being comparatively easier. She

coughed incessantly, and the matter thrown up was thick, puriform, and streaked with blood. Her voice was extremely indistinct, and though fond of talking, it seemed to be only with an effort that she could articulate. She complained constantly of her throat; and pressure on the thyroïd cartilage gave her great pain; she was pale, emaciated, and had an indescribable expression of anxiety in her countenance.

On the evening but two after I had first seen her she was seized with a paroxysm of suffocation, and died after about three minutes struggling.

DISSECTION.

The body was examined ten hours after death. The tongue, os hyoïdes, and part of the trachea taken out: this was slit open posteriorly, and it appeared that an abscess had existed immediately in the situation of the cricoïd cartilage, which had burst just behind the rima glottidis, and furnished most of the purulent expectoration already mentioned. The entire of the posterior portion of the cricoïd cartilage was gone, and the sides appeared to consist of an earthy gritty substance that crumbled to pieces under the knife, mixed up with pieces of bony matter, irregular in shape and detached,

having very much the appearance of exfoliating bone. I could discover no trace of the arytenoïd cartilages.

The mucous membrane was thickened and puckered in such a manner as entirely to obliterate the natural appearance of the larynx. The epiglottis was much thickened, and seemed somewhat smaller than usual, as if a part had been removed by ulceration. This, however, was not the case, and the appearance was entirely owing to the irregular thickening of the membrane. The surface of the membrane was rough and studded with floating points of an adventitious substance, which gave it very much the semblance of having suffered from extensive ulceration. It had, however, no distinctive character of ulceration except at the spot where the abscess had burst.

The smell from the cavity of the abscess was abominably fetid.

The cavity of the thorax presented no marks of recent disease: there were a few adhesions on the left side, but they were evidently of long standing. The substance of the lungs was cut into, but shewed no marks of disease.

CASE XXI.

Patrick Killeen, æt. 33 years, admitted into the Meath hospital on the 1st December 1823.

He complains of occasional difficulty of breathing, which is aggravated by spasmodic exacerbations, particularly at night. He seldom coughs during the day, but this symptom is extremely troublesome throughout the entire night. The expectoration floats in water, and appears streaked with blood. He experiences great relief after freeing himself from this slimy expectoration. His voice is nearly lost, yet he breathes without noise; however, as he lies, the muscles of his throat may be observed in strong action. Pulse 136: tongue rather clean: appetite good.

When questioned as to the situation of his uneasiness, he points externally to the thyroïd cartilage.

The disease has been now of nine months duration, but it is only within the last month that the symptoms have become so very severe.

He was ordered pills of calomel and opium.

December 5.—No alleviation of symptoms:

he complains of great fatigue in consequence of want of sleep: he says that the violence of the cough prevents his taking rest, but he has also one or two paroxysms of difficult breathing every night.—Pulse 140, without any other accompanying symptom of fever.

The mercury was continued, together with opiates and antispasmodic medicines.

December 9.—Passed a very bad night with cough and difficulty of breating. There seems to be a great spasmodic exertion to perform the act of inspiration. Pulse 140, small and hard. The mercury has not affected his mouth.

December 10.—This evening he was seized, as usual, with a spasm of dyspnœa, which seemed to come on with increased severity. He was placed erect in his bed, and soon afterwards making signs of great distress, he struggled convulsively for two or three minutes and dropped dead.

DISSECTION.

On slitting open the larynx,* the cricoïd cartilage appeared to be highly vascular and organized. Its substance was internally as red as blood, and in three or four places there were

* The preparation has been preserved in the Meath Hospital.

specks of an earthy white substance that crackled under the knife, and was evidently of the same nature with that usually found in caries of the laryngeal cartilages. The mucous membrane was quite sound except a very small speck of ulceration beneath the left ventricle. It exhibited its usual healthy colour except just at this spot, where there was a blush of inflammation about half the size of a six-pence.

The lungs and the cavity of the thorax were both healthy.

CASE XXII.

On the 15th April, 1822, William Graham, æt. 33 years, was admitted into the Meath hospital under the following circumstances.

About three months before his application at the hospital he was attacked by sore throat, accompanied with sonorous breathing, and an excessive pain and difficulty in swallowing. He now complained of difficulty of breathing, accompanied by a hoarse hissing noise, as if the passage for the air was too small, and his respiration was so laborious, that it could be heard at the distance of several yards. He had frequent, hollow-sounding cough, and was teized with an accumulation of thick discoloured

mucus, which caused almost convulsive struggles to expectorate. The fauces exhibited no marks of inflammation, the epiglottis, however, could not be brought into view. His voice was almost lost, and when he did attempt to speak, the hoarseness and hissing of the sound rendered it difficult to be understood. He complained of oppression about the chest, but no pain in it, neither were his attempts at respiration accompanied by very violent muscular efforts. Pressure on, or near the larynx, occasioned very great pain, and he felt a sensation of burning heat within it. Sometimes he would express his conviction that an ulcer was somewhere low down in his throat. His countenance was pale, sunken, and anxious: his eyes protruded: the tunica conjunctiva suffused and of a pearly whiteness. Pulse 100: appetite good: tongue clean and natural.

Doctor Graves, under whose care this patient was admitted, had him at first bled both locally and generally, and his bowels regulated, with a view to the subsequent exhibition of mercury. During three days he took the submuriate of mercury in large doses, but it had little constitutional effect, in consequence of passing off too freely by the bowels. He had then two large blisters applied to the fore part and sides of the neck, which causing a good deal of pain and irritation, and rather aggravating than re-

lieving the dyspnœa, were allowed to remain on only a few hours. On the fifth day after his admission, he coughed up a piece of calcareous matter, apparently ossified, after which his respiration became easier, and he continued rather to improve until the 28th April, when all the symptoms of difficult respiration returned with redoubled violence. His breathing had always since his admission been harsh and sibilous: it now became so loud as to be heard below stairs in another apartment. He struggled a good deal, and was obliged to use considerable muscular exertion. His cough had subsided, but he felt pain in the chest, with soreness on pressure. He also suffered from occasional exacerbations, when the dyspnœa was so great as at times to threaten suffocation. From these he was partially relieved by the exhibition of ipecacuanha and tartarized antimony, but on the whole the disease had gained ground, and was making rapid progress, when the period of Doctor Graves's attendance on the hospital having expired, and its being proble that surgical aid would speedily become necessary, he requested me to take charge of the case.

Although this was one of the most unpromising cases that could occur, yet something was to be attempted for its relief. Bronchotomy held out but very faint hopes, and there-

fore it was determined only to resort to it as a last resource, and it was not undertaken until symptoms of distress appeared such as would have terminated the patient's existence in a few hours. I performed the operation on the evening of the first of May.

At first the great relief experienced might have encouraged strong expectations of recovery; he lay quietly, breathed freely through the wound, and expressed by signs his gratitude for the ease he had obtained. He was now ordered mercury again, and had ten grains of calomel twice or thrice a day during seven days, at the end of which time his mouth became extremely sore, but there was no abatement of the original disease in the larynx. His spirits, however, were good; the expression of anxiety entirely removed from the countenance; his appetite almost ravenous: his pulse always remained a little accelerated, but the soreness from external pressure on the throat had entirely subsided. When mercury is of service in cynanche laryngea it is so at once, and here it unfortunately promised nothing, for on the eighth or tenth day, when the external wound was stopped for a moment, it became evident, from the return of the patient's distress, that the disease had not yielded in the smallest degree. The medicine was therefore discontinued without any other being

substituted, unless occasionally an aperient draught for the purpose of regulating the bowels.

A fortnight after the operation, it was observed that he breathed partially through the glottis: he smoked his pipe and appeared to derive much pleasure from it: he spoke too, but in a rough, hoarse, indistinct tone; yet for a moment could he not endure the entire closing of the wound. He had cough, and expectorated large quantities of mucus, which passed freely through the artificial opening. The wound was healthy, appeared healing, but the air that passed through it in expiration was impregnated with an abominably fetid odour, like that proceeding from gangrene. On the 23d day his health became visibly altered for the worse. His cough encreased, whilst his strength diminished: his pulse became small and quick, always above 120: he was emaciated, and seemed sinking with rapidity. He was now sent to the country, where for two or three days he seemed to improve. He was able to walk about the roads and fields, and took pleasure in being in the open air. His cough, however, encreased, and for a day or two before death never quitted him even for a moment. At last he appeared unable to expectorate; pain seized him in the breast with great restlessness and wish to change his pos-

ture, and on the evening of the 30th he died exhausted.

DISSECTION,

Eighteen hours after death. The trachea, larynx and œsophagus being removed from the body, the lining membrane of the larynx appeared greatly thickened and corrugated; it was covered in many parts with flakes of coagulating lymph, which adhered but loosely, and floated into the larynx. Half the epiglottis appeared to have been destroyed by ulceration, but hereabouts there seemed to have been some attempt at reparation, as there was evidently a recent cicatrix in the membrane covering it. The natural aperture of the larynx seemed completely shut up by the thickening of the membrane, and its posterior part was involved in ulceration. On slitting up the œsophagus an ulcerated aperture appeared in its anterior part, about an inch below the opening of the larynx, and a piece of loose carious bone was found sticking in it. This led into the cavity of an abscess which occupied the situation of the broad portion of the cricoïd cartilage, at the posterior part of the larynx. On opening into this abscess, two portions of irregularly shaped carious bone were found loose: the entire of the middle part of the cricoïd cartilage was destroyed: the sides that remained

were denuded of their covering of membrane, and converted into a white cheesy substance, mixed with calcareous particles, soft, but gritty under the edge of the knife: these were in progress to separation also. The arytenoïd cartilages were destroyed on both sides. This abscess appeared to have burst by ulceration in two places, one immediately behind the rima glottidis, and one at its most depending position into the œsophagus: through this latter the diseased bone was making a passage, and through it that portion which was coughed up had probably come. The lining membrane of the trachea was thickened, puckered and swollen in its whole extent down to the bifurcation of this tube, beyond which it was not examined, and the windpipe was filled with serous fluid that rose in it as high as the wound that was made by the operation, through which it trickled.* The larynx, &c. is preserved in the Meath hospital.

* There was one very remarkable circumstance attending the examination of this subject, namely, the extreme rigidity of muscle that existed universally throughout the body. On removing it from the bed to the table on which it was to be examined, it was as stiff as if a stake had been driven through it. This circumstance was merely noticed at the time, but I have since learned from Doctor Macartney in the course of his excellent Lectures on Pathology, that a similar phenomenon is observable generally, though perhaps not universally, in subjects that have died of laryngeal disease.

CASE XXIII.

MORTIFICATION OF THE LARYNGEAL CARTILAGES.

Richard O'Leary, æt. 32, a sailor, admitted into the Meath hospital July 15, 1825.

The history of this case previous to admission could not be very satisfactorily ascertained; he seemed to think his illness had some connection with a venereal taint, yet denied having had any syphilitic symptom during the last five years. Has been married three years, and his wife is a healthy young woman. The disease under which he suffers appeared about eight weeks since, during which time he has been taking medicines of different kinds, principally mercury.

He appears to breathe with great difficulty and considerable muscular exertion; respiration attended with a hissing sound; voice hoarse, with a peculiar ringing tone; no cough, but there are severe spasmodic exacerbations every night.

On examining the fauces, a large broad ulceration appears on the back of the pharynx, very yellow in colour, and seemingly disposed to spread.

On being admitted he was put under a regular mercurial course, but his mouth could never be affected. He had opiate draughts each night for the purpose of allaying the spasms, with occasional warm baths and gently aperient medicines, but to no purpose; he gradually became worse, and on the morning of the 25th I was called to him, as being in danger of instant suffocation.

When I saw him, he was walking about in the greatest agony and distress, grasping at every thing he could lay hold on in order to assist the muscles of respiration. His voice was altogether gone, and his breathing could be heard at a very considerable distance. Pulse quite regular, and he did not complain of pain. There was slight soreness in the situation of the thyroïd cartilage.

As he had frequently before exhibited symptoms nearly as alarming, in consequence of spasmodic attacks, I imagined these might be of the same nature, and I only ordered a strong opiate draught, with a view of allaying present irritation.

At 12 o'clock the symptoms became still more urgent, the difficulty of breathing had greatly encreased, and the patient seemed almost exhausted; he, however, objected to the perform-

ance of any operation, and it was only when he felt he had but a few minutes more to live, that he at length consented. When his bed was wheeled into the operating theatre, his respiration was scarcely perceptible, his pulse was quick, very small and hard, and a cold clammy sweat hung on his face, neck, and chest.

I commenced the operation by an incision about an inch and half in length, extending from below the cricoïd cartilage to half an inch above the sternum: by the second stroke of the knife a large vein was wounded, and the patient lost about four ounces of blood. He was now so much exhausted as not to allow of a moment's delay, and I finished the operation by plunging the knife at once into the trachea, and dilating the wound by drawing it a little upwards. A silver canula was then introduced.

After the operation, the exhaustion of the patient continued, his pulse became weak and faltering, and notwithstanding the administration of cordials, &c. he was sinking fast. He seemed at intervals to cease respiration for more than a minute at a time, and had lost the power of swallowing perfectly. About half-past one o'clock, after a considerable struggle, he succeeded in expelling a quantity of bloody mucus and some flakes of hard coriaceous lymph, which had evidently been the products of inflammation. The pulse,

notwithstanding, continued to sink, and the debility became more and more alarming, until about half-past three o'clock, when he expectorated nearly half a pint of mucus, and was greatly relieved. A syringe was applied to the wound, and an additional quantity of the mucus removed in this manner. From that moment he rallied, and I saw him at six o'clock in the evening sitting up, and quite cheerful. Respiration through the wound free; expression of countenance changed; lips have resumed their natural appearance; pulse regular.

July 26.—Slept well during the night, and is calm and cheerful this morning; expectorates freely through the wound, but the smell is abominably fetid.

August 1.—He has to all appearance been progressively improving as to respiration, but this day I observe that any liquid he attempts to swallow is partly expelled through the wound, and deglutition, with respect to solids, is impossible. There is an appearance of considerable fullness in the situation of the larynx toward the right side, without pain or discoloration, but the tumour pits on pressure.

August 5.—The wound has a strong disposition to heal; the fullness and œdema of the neck continue. He can press a quantity of

matter into the pharynx by rubbing the tumor, and then expectorate it. Its smell is insupportably fetid.

August 7.—An incision was made into the side of the neck, which opened the cavity of the abscess without producing any discharge of matter. The abscess was now found to communicate both with the larynx and pharynx, and was excessively putrid. A large quantity of slough was removed, amongst which was a portion of the right ala of the thyroïd cartilage.

The patient bore this second operation well, and considering his sufferings, both his general health and spirits seem wonderful.

August 8.—It was now found that every thing, both solid and fluid, which he attempted to swallow, passed out through the wounds in his neck. A tube was therefore introduced through the last wound into the œsophagus, and the patient then presented the singular appearance of a man breathing through one wound in the neck, and artificially fed through another.

August 10.—In the evening of this day, he was suddenly seized with convulsion, and died almost instantaneously.

DISSECTION,

Eighteen hours after death.—A large abscess existed in front of the larynx and upper part of the trachea, in which the thyroïd cartilage lay like a foreign substance, entirely denuded, mortified, and abominably offensive. The front of the cricoïd cartilage, and of the two upper rings of the trachea, had been removed by mortification also. The lining membrane of the larynx was thickened, corrugated, and had a granular appearance: part of it was ulcerated, through which the abscess had communicated with the pharynx. The tracheal membrane was also thickened, vascular, and in many parts covered with patches of flaky lymph. The ulcer in the throat had healed, and the pharynx (except at the spot already mentioned) appeared perfectly healthy.

The preparation is preserved in the Meath hospital.

CASE XXIV.

Catherine Young, æt. 30 years, unmarried, of a weakly delicate constitution, applied as an external patient at the Meath hospital on the 21st July 1824, complaining of sore throat, difficulty of deglutition, and pain in the situation of the thyroïd cartilage. There was con-

siderable hardness and tumefaction on the front of the throat, but no discoloration of the skin. The fauces presented no appearance of inflammation whatever. There was some fever, quick pulse, furred tongue, loss of appetite, and she has had one rigor.

The tumor in the neck was poulticed, and on the 26th it burst and gave exit to a quantity of matter of an abominably fœtid odour mixed with mucus: she had attributed her illness to the swallowing of a small bone, and this was now searched for, but could not be discovered, neither could any thing of the kind be found about the neck.

On the 30th the tumor had greatly diminished in size, but the pain on swallowing or coughing had rather increased. She spoke in a low hissing voice, and with great difficulty. There were two ulcers on the neck, corresponding with the upper and fore part of the thyroïd cartilage: these ulcers were about half an inch in diameter, and communicated with the trachea; so that on coughing, the air rushing through them disturbed the flame of a candle. Large loose portions of the thyroïd cartilage may be seen at the bottom of the sores, of a dark brown colour, and the discharge is almost insupportably fetid. The cough is short, frequent, and troublesome; the expectoration

copious, respiration quick and laboured. Patient cannot lie down, and has had no sleep during the last few nights.

She said that the fluids she attempted to swallow, were occasionally discharged through the wound.

On the 1st August she died, and her friends would not permit a dissection of the body. However, whilst examining the sore in the dead body, I pulled out with a forceps nearly half the left ala of the thyroid cartilage, brown, fetid and putrid; the edges softened as if by maceration, the centre hard, but more resembling the appearance of horn than of cartilage.

FOREIGN BODIES IN THE LARYNX AND TRACHEA.

It is impossible to conceive the occurrence of an accident, more immediately distressing or more certainly followed by destructive consequences, than the admission of a foreign body into the larynx and trachea, if it be of such size and shape, or placed under such circumstances that it cannot be expelled again by the efforts of nature alone. Even a body small in size and unirritating in quality, produces considerable

distress, and excites such violent paroxysms of coughing, that death has occurred from this cause; but if it be so large that it cannot repass through the rima glottidis—if it be sharp and irritating at its edges;—or composed of a substance which acts chemically on the mucous membrane, the most formidable symptoms ensue, and death is almost constantly the result. When this accident happens, the distress is as instantaneous as it is severe, and therefore it might be imagined that its occurrence could easily be recognised; yet it will be found on considering the subject, and more particularly by referring to the cases already published relative to it, that it is one not easily distinguished by the observation of symptoms alone; and what is of more importance to the science of surgery, that most of the patients perished,* principally by the medical men in attendance not having agreed as to its nature, and resorted to the only remedy which could have proved efficacious.

When the accident has occurred to an adult, and he is aware of its nature, the surgeon has only to set about affording him the necessary relief; but it does not always happen that persons, even of advanced age, can tell distinctly

* Louis speaks in very harsh terms of the "opposition meurtrière des consultans, trop peu instruits sur une matiere aussi grave."

what it is that occasions the unpleasant symptoms with which they find themselves attacked so suddenly. In times of hurry, terror, or confusion, or under any circumstance that will induce a man to make a hasty or a violent inspiration, a foreign body held incautiously in the mouth may glide imperceptibly into the larynx, and the first notice of the accident be the terrible cough it occasions. Many persons are so addicted to the silly trick of putting extraneous substances into their mouths, and retaining them there that they are absolutely unconscious of their presence, and the mischief may so unwittingly occur, that even an adult may be unable to afford any satisfactory reasons for the symptoms under which he labours. But it is rarely amongst this class of persons that foreign bodies gain admittance into the windpipe, but rather amongst children, many of whom are unable to explain its nature or its cause, even if they were aware of it, and who moreover are so liable to be influenced by sudden fright, and the dread of surgical interference, that they would be disposed to conceal it, if it was possible.

It would appear, that this is an accident of very rare occurrence; so much so, that it has not attracted the notice of the practitioners of this country. In all the periodical works recently published, I have searched in vain for

the details of a single case. In the systematic* works of English surgeons I am not at this moment aware that it has been noticed at all. And yet perhaps a good deal of its apparent infrequency may be explained by considering that it is an accident, the real existence of which can only be demonstrated by dissection after death, and that more than ninety-nine out of every hundred persons that die, are sent to their graves without their friends permitting a post-mortem examination. The symptoms during life are not developed with that accuracy which banishes doubt from the mind of the practitioner. It has been confounded with croup, and it may be mistaken for angina laryngea, or any other affection that produces cough and stridulous breathing. A child may be playing with a bead, a bean, or any other substance that it is tempted to put into its mouth: this is passed accidentally into the larynx without its nurse knowing any thing of the matter: immediately difficult respiration sets in, with cough and other symptoms of croup,—the child is treated for this latter disease—dies,—is not examined,—and there the question is allowed to rest.

Perhaps this mode of explaining the apparent infrequency of this accident might appear

* With the exception of the Surgical Dictionary, by S. Cooper.

insufficient, if we did not know the truth of the facts already stated: first, that it has occurred and been mistaken; and secondly, that its diagnosis is extremely difficult.—Louis, Desault, Pelletan, all met with such cases, and have noticed them in their works. In the memoirs of the Royal Academy of Surgery there are several papers on this subject, illustrated with a multitude of cases. Within the last year two cases came to my knowledge, in both of which the operation of bronchotomy was performed, and with success; but it must be observed, that in both, the nature of the accident had previously been accurately known. And finally, I have personally met with the dissection of a case, which had been (I believe) considered to be difficult breathing, resulting from injury of the neck or chest, but in which, after death, a portion of an almond-shell was discovered situated within the larynx, below and partly impacted in the rima glottidis. This case I shall relate here, as it shews the uncertainty that involves the nature of the accident, and the difficulties that even the most intelligent practitioner may encounter.

CASE XXV.

In the month of July, 1822, I was requested to examine the body of a child that had died under circumstances which threw considerable

doubt on the nature of the case. On the evening of the day but one preceding her death she had been playing in the street, when the shaft of a gig or jaunting-car, in pretty rapid motion, struck her, and the by-standers declared that the wheel had passed over her breast. She was taken up, and in a few minutes so far recovered, as to be able to walk home without assistance; but from the instant the accident occurred her breathing became croupy. She was, at irregular intervals, teized with an exceedingly distressing cough, and suffered greatly from incessant restlessness, not being able to remain for any time, however short, in one position. This state continued until five o'clock in the morning of the third day, (about thirty-eight hours) when having arisen for a moment, to allow her father, who had been up all night, room to lie down in the bed, she was seized with a paroxysm of convulsive cough, flung her head in agony on the pillow, and was dead in an instant.

On examining the body, the thorax was the first part to attract attention, from the circumstance of its having been said that the wheel of a car had gone over it; however, on the minutest inspection, not a single trace either of injury or disease could be discovered. The viscera of the abdomen were also healthy, and altogether I had never examined a subject

so entirely free from every morbid appearance. The trachea was next to be inspected; and in it, or rather in the larynx, was found part of an almond-shell; its rough and broken edge entangled in the rima glottidis, and placed in such a manner that it effectually closed up the aperture for the transmission of air. The nature of the case was now made evident. The child had the fragment of shell in her mouth at the time she was struck, and either from the fright or the shock, had unconsciously swallowed it, and it passed into the trachea. It was rough and irregular on its surface and edges, and its presence must have occasioned great irritation. There were frequent paroxysms of coughing; and in one of these, the edge of the shell was thrown into the rima, choked it up, and the child died from direct suffocation.

In this case, the existence of a foreign body in the larynx and trachea* had never been suspected, nor was I aware that any symptom observed could have warranted such a supposition. However I had met with two or three cases before, which bore a very close resemblance to it, in none of which the bodies had been examined after death, and the recollection of them

* The preparation of the larynx and trachea, with the almond-shell in situ, is preserved in the collection at the Meath hospital.

forcibly impressed on my mind the advantage that might arise from endeavouring to investigate the nature of the accident, and the particular symptoms it gives origin to, with a view of enabling the practitioner to distinguish it from other affections of the respiratory tube.

It may be remarked, in the first instance, that this accident never happens at the time it is generally considered as most likely to occur, namely, in the act of swallowing. When a person is engaged in the performance of this function, the root of the tongue is depressed, whilst the larynx is elevated: the epiglottis is thus mechanically thrown as a bridge across the larynx, and so effectually closes it that the smallest morsel, or even a drop of water, can find no admission. As long, then, as the epiglottis is perfect it would appear to be impossible for any substance to pass into the trachea during deglutition; and even so completely does nature execute her work, that it would appear to be very possible for a patient,* in whom this valvular cartilage was altogether deficient, to convey sufficient nourishment into the stomach without much interference with the organs of respiration. But it is different, when a man attempts to draw a full inspiration whilst any foreign body is within reach of

* See Appendix

the current of air about to pass into the lungs. At this time the epiglottis is raised, the rima glottidis is distended, and every thing appears to favour the entrance of the air, and of course of whatever it bears along with it. Thus a person, holding a sup of wine in his mouth, to enjoy the flavour, incautiously attempts to breathe—a drop of the fluid enters the larynx—it produces great irritation,—and the spasmodic cough that ensues throws it out with great violence, perhaps even through the nostrils. The same accident happens from sucking up an egg, on the top of which some loose salt had been placed; the salt, during the act of inspiration, flies into the larynx, and I have known many persons almost reduced to the verge of death by an occurrence apparently so simple.* Thus, in like manner, a bead, a shell, or any thing held incautiously in the mouth, will naturally follow the course of the air; and in the event of a full inspiration incautiously made, will certainly pass down into the trachea.

When it has obtained admission into the trachea, the symptoms it will give birth to must depend on its size, situation, its irritating qualities, whether sensible or chymical, and per-

* In one instance I have heard of it producing fatal consequences.

haps more particularly on the peculiar sensibilities of the surface to which it is applied. Mucous membranes, lining the passages by which substances are introduced into the body for its sustenance and support, and by which others are carried off, the presence of which would be pernicious, are endowed with different sensibilities in different parts, suitable to the action each has to perform. They bear the contact of those substances, however irritating, that are natural to them, without inconvenience; but in any situation they ill endure the presence of a body truly foreign, and the part is either thrown into violent actions in order to get rid of it, or inflammation, abscess or ulceration is the consequence. Of the entire extent of mucous surfaces, perhaps the larynx is endowed with the finest and most acute sensibility: it is placed as an out-work to protect the important organ of respiration, and it rejects vehemently, and with spasmodic violence, every substance that can by possibility prove offensive or injurious. The lining membrane of the trachea and bronchiæ is far less sensible, and will endure the presence of a foreign body without more inconvenience than what its size occasions, provided its general qualities be not of an irritating nature. Thus, if the offending body be lodged in the larynx, the symptoms will be severe and almost incessant, and may within a few days cause the dissolution of the patient; or if placed

in a situation where it cannot materially interfere with the passage of the air, the membrane may, by constant contact, become accustomed to its presence, and the violent symptoms cease, only, however, to be followed by those of ulceration, marasmus and hectic, and the patient, after protracted sufferings, perishes, with every indication of phthisis laryngea.—On the contrary, when the foreign body has entered the trachea, and moves upwards and downwards with tolerable freedom, the first excitement occurs at the time of its entrance: then a calm succeeds until it is again made accidentally to approach the larynx, when the cough and spasm and suffocations return. In this state the patient may exist some days, until either the substance is forced against the rima glottidis, and mechanically blocks it up, or else effusion takes place in the lungs, and he dies with convulsions, coma, and other symptoms indicating an imperfect arterialization of the blood.

A foreign body then may exist in the larynx or trachea under four different conditions.

1st. It may be impacted in one of the ventricles of the larynx.

2dly. It may have passed through the rima glottidis, but by reason of its lightness, may be moved upwards and downwards in the trachea.

This is the most common form of the accident, for that body cannot be heavy which is acted on by the current of air which sucks it in.

3dly. It may have been introduced by accident from without, and remain in the spot into which it was first driven, as, in the instance of the head of an arrow, or a pin.

4thly. Having entered the trachea it may by its weight, by being entangled in mucus or any other cause, remain fixed in one of the bronchiæ, and give rise to a class of symptoms quite different from those attendant on the other accidents, but perhaps not less fatal.

When the foreign body is entangled in the larynx, the symptoms must vary in proportion to the degree of inconvenience it occasions, either by the mechanical interruption it creates to the passage of the air, or the local irritation produced by it, and perhaps in most instances by a combination of both these circumstances. *The jaw-bone of a mackerel, entangled in the larynx, gave rise in the course of five days to symptoms that threatened immediate dissolution, whilst a man has retained a piece† of gold in one of the ventricles for years without other inconvenience than the suppurations, &c. which

* Pelletan.

† Paper by La Martiniere in Mem de l'Academie Royale.

any foreign substance would produce, and which ultimately proved fatal. A good deal of the variation of symptoms will depend on the nature of the offending body, whether it be sharp and angular, or smooth, round and polished; and also whether from its size it shall be capable of interrupting the passage of the air. When the substance is sharp, such as a fish's bone, there is a severe pain experienced at the moment of the accident, accompanied with spasmodic cough and difficult respiration. The patient feels great distress, and points to the larynx as the seat of his uneasiness. After some time there is a deceitful calm, but the symptoms return with encreased violence, accompanied with convulsions, and in the course of a few days death terminates the sufferings of the patient, unless he is relieved either by his own convulsive paroxysms of coughing, or by a surgical operation. It may happen, however, that if the body be round and polished and small, it shall create no symptom of distress except the cough and the difficulty of breathing, and the patient may exist for a long time without the occurrence of those morbid actions which render the accident certainly fatal.

* In the course of the year 1805, a young man, aged 24 years, applied at the Hotel Dieu :

* Pelletan, Clinique Chirurgicale.

he had been suffering during six weeks from severe cough, with frequent attacks of suffocation. His face at the time was swelled: his eyes prominent and sparkling: and if the paroxysm had lasted five minutes, he must have been in the greatest peril: but the symptoms abated a little, and he passed several hours without farther distress than the cough, and a constant rattling in his throat.

This young man said that he had put a button-mould in his mouth, which in a moment of hurry he thought he had swallowed, and that a violent cough followed instantly on the accident, and scarcely allowed him any repose. He further stated, that his greatest uneasiness was felt in the region of the larynx.

The patient being placed lying down on a bed, with his head drawn back, an incission was made through the integuments and cellular structure, between the sterno-hyoïdei muscles. The trachea was soon exposed, and after the hæmorrage had been stopped, some of its rings were divided. Instantly respiration was restored; the blood and mucus were expelled with facility, but the foreign body did not appear: The incision then was extended upwards through the cricoïd cartilage by means of a probe-pointed bistoury, when it presented itself. and was extracted from the left ventricle of the larynx in

which it had been entangled. The patient stated that the extraction had caused him more pain than the incision through the parts.

In the evening the patient had some slight fever and was bled, but soon recovered his state of quietude, and no unfavorable symptom again occurring, the wound was healed completely in the course of a month.

The symptoms denoting the existence of a foreign body within the trachea, have been laid down by authors with such clearness and perspicuity, that it might be supposed there could not be any difficulty in recognizing it, if the results of their consultations, in most of which the surgeon desirous of operating was overruled by his colleagues, did not demonstrate at once the extreme uncertainty that is experienced in ascertaining the true nature of the case.—When a sharp or irritating substance slips into the trachea, an acute pain will be felt at the moment; but this symptom is not constant, and on the other hand will not be present if the foreign body is smooth and polished. There is always violent cough excited at the instant the accident has happened, which continues for some time with great distress, and then subsides, only to be renewed again at irregular intervals. It may happen that the cough shall never return, and the cessation of this symptom, and the com-

parative tranquillity* the patient experiences, may lead both his friends and his medical attendant into a false and fatal security. The respiration is always difficult, and is sometimes described as a rattling† in the throat—sometimes as whistling or stridulous,—and occasionally as resembling croup. It is however never so loud or harsh as in acute cynanche trachealis, but its violence must, in a great measure, be modified by the size of the offending substance, its shape, and other circumstances. The patient, even although ignorant of what has happened, points to the front of the neck, or the inferior part of the larynx, as the seat of his distress. There is from the first moment an uncommon degree of restlessness, and, as occurs in every case of difficult respiration, there is great anxiety, the expression of which soon becomes distinctly marked on the countenance.

The patient soon becomes convulsed; the eyes are prominent, the cheeks pale and swollen; the lips purple and the skin cold. The pulse, which at first suffered little variation, is now weak and faltering, perhaps with intermissions. In a word, there are all the symptoms of obstructed respiration, and these carry off the patient sometimes within a few hours,—some-

* "Une tranquillitè funeste fondée sur les intervalles de repos assez longs que l'enfant éprouvait." PELLETAN.

† Une râlement, signe caracteristique de la maladie.

times within the space of three or four days. Occasionally, there is an appearance of emphysema above the clavicles, but it is by no means a constant symptom,* and I should suppose it to arise from a rupture of some of the air-vessels of the lungs produced by the violence of the cough, and therefore to be more or less accidental.

When a foreign body gains admission into the trachea, it, at first, produces a violent paroxysm of coughing, which may possibly occasion instant death by a rupture of some blood-vessel in the brain, particularly if the patient is advanced in years.† After a while this subsides; the extraneous substance being perhaps entangled in mucus, or by a change of position, remaining at rest; and the only inconvenience felt is that occasioned by its mechanical interruption to the passage of the air. When, however, it again becomes loosened, it moves upward and downward in the trachea, and every

* I find this symptom to have been observed and described only in one case related by M. Louis.

† An instance of this nature was related to me on the best authority. An old gentleman, who happened to be conversing cheerfully at breakfast, placed some salt on an egg, and whilst in the act of speaking, sucked it up. On the instant a violent paroxysm of cough seized him, which lasted about two minutes, when he fell from his chair in a fit of apoplexy, and was dead in less than a quarter of an hour.

time it is brought into contact with the larynx a paroxysm of coughing is excited. Finally, in some convulsive effort, it may be thrown against the rima, block it up completely, and the patient perish by instant suffocation. An example of this may be found in the following case, which is worth attention, as bearing so strong a resemblance to that which fell under my own observation.

"A* little girl, four years old, whilst eating the kernels of apricots, happened to fall at the moment she had one in her mouth, and (as she thought) swallowed it. She was instantly seized with a convulsive cough which threatened suffocation. This, after a short time subsided; but a difficulty of breathing remained, and the child said she felt a slight pain in the throat. The next morning she was visited by her medical attendant, and the following symptoms observed:—The acts of inspiration and expiration were performed with violent efforts; the air passing through the glottis caused a loud hissing sound; there was a swelling of the trachea below the larynx, alternating with the acts of respiration, and this was very apparent to the touch, particularly during expiration. The child swallowed with facility both solids and fluids, and there was but slight disturbance

* L'Escure.

in the pulse; her voice was not at all changed; and the cough had not returned since the moment of the accident.

At ten o'clock another practitioner was called to see her; he found her in a deep sleep, so as not to be awaked without difficulty. The same symptoms continued, but with some diminution: the pain in the throat had disappeared, and the child laughed, spoke and eat at usual. She arose, walked about, and appeared tolerably well the entire day, exhibiting no symptom unless the hissing noise that was caused during respiration.

The evening of the same day (twenty-four hours after the accident) respiration became more laborious; the pulse was agitated; deglutition difficult, without being painful; and the swelling of the trachea had encreased. The child was in a state of agitation during the entire night following. Next morning her friends gave her a grain of tartarized antimony, and during the operation of the emetic the symptoms became aggravated almost to the point of suffocation. In the evening the child could only breathe with the greatest efforts; deglutition was almost impossible; the pulse small, weak and very frequent; and she died about sixty hours after the accident. Her tone of

voice had never changed, and the cough had never returned.

On dissection, about half of the kernel was found immediately below the crïcoïd cartilage, of sufficiently small size to allow of its free motion upwards and downwards in the trachea.

There was some little mucus in this tube; the lungs were in many parts in a state of congestion, and emphysematous throughout their entire extent; but this latter symptom had not manifested itself externally, at least not so as to have been observed."

It does not appear that the state of the brain had been at all examined.

In order that death should take place by direct suffocation, it is necessary that the size and shape of the extraneous body should be such as to allow of its being entangled in the rima glottidis, and held there; for otherwise a forced inspiration will throw it back into the trachea again, and for that time prevent the unfortunate event. But such is not the description of substances that persons are fond of holding carelessly in their mouths, or playing with incautiously. Amongst a great number of cases, I find a large proportion of these melancholy accidents to have been occasioned by

French beans, or the stones of fruit, which are rounded off, smooth and polished, and therefore cannot be so thrown against the rima as to be firmly held there, and cause an exclusion of the air. In such a case, life is not so quickly terminated, and the patient dies from the consequences of imperfect respiration; the brain is gorged with dark coloured blood; the lungs in a state of congestion and emphysematous, and there is serous effusion into the bronchial cells.

A child of about five or six years old, into whose trachea a bean had fallen, was brought to Pelletan. It had during four days suffered the severest symptoms of suffocation, and had been attacked with convulsions during the last thirty-six hours. A surgeon had attempted to perform bronchotomy, but cut no deeper than the skin, when he became frightened. Pelletan finished the operation, and scarcely was the trachea opened, when the bean was thrown out to more than two feet distance.

The child had been very weak, and it was feared might have died during the operation; however, by care and attention it revived, recovered its intellect, knew its parents, and seemed to be getting better. However at the end of eight or ten hours the convulsions returned,

and it died fourteen hours after the operation.

The excessive congestion of all the vessels of the brain, which was observed on opening the body, had not prevented that remarkable relief which the child experienced on the removal of the foreign body.

* A little girl six years old, whilst playing with her school-fellows, one of them threw a bean into her mouth which unfortunately passed into the trachea. The child immediately was seized with cough, and complained to her mother that she had swallowed a bean. The alteration of her voice, which had become hoarse, and the difficulty of breathing which appeared instantly, determined the mother in seeking surgical assistance without delay. The patient pointed out the superior part of the trachea as the seat of her complaint; and this circumstance, together with the urgency of the symptoms, and the account she gave of swallowing the bean, left no doubt as to the nature of the accident. Verdier (who was the surgeon consulted) explained to the mother the miserable condition of the patient, and declared that he knew no mode of saving her life unless by an operation, which would enable him to extract the foreign sub-

* Mem. de l'Acad. Royale.

stance. Another surgeon thought proper to advise a trial of some of those remedies recommended on similar occasions, but the child grew worse under such treatment: she lost her voice, and was attacked with convulsions. The mother, now really frightened, consented to the operation, and Verdier got every thing in readiness. He sent for the assistance of a surgeon of eminence on whom he relied, in order to afford the child's friends every confidence in the measures he was about to adopt, but this last gentleman was also of an opposite opinion. A young physician who saw the case, also declared against the operation, and it was abandoned. The child lived only three hours, deprived of sensibility, and dreadfully convulsed. Half an hour after its death Verdier was permitted to operate; he made an incision along the trachea, and easily extracted the bean.

It does not appear that the brain was examined after death, but the condition of the patient "deprived of sensibility, and dreadfully convulsed" sufficiently explains the morbid actions that had taken place in that important organ; and had Verdier been allowed to operate in the latter instance, he would have discovered that it had been too late, and the child would only have obtained the benefit of a wretched existence prolonged for two or three days.

It is evident that foreign substances may gain admission into the trachea by other means than passing through the natural opening of the rima glottidis. Wounds of the throat present an illustration of this species of accident, and particularly when they occur from gun-shot, by which parts of the clothing are often forced into the wound and left there, although the bullet makes its passage clearly out. The nature of this case will in general be pointed out by the particular symptoms, and it must be a rare occurrence that a foreign body should be forced through the neck, and into the trachea, without its presence being easily ascertained. However, such a case is possible, and the following relation will be useful in shewing what severe symptoms may arise from an apparently trivial cause, and what extreme difficulty may sometimes envelope the diagnosis of these accidents.

* A child, aged nine or ten years, amusing himself with cracking a small whip, was suddenly seized with extreme difficulty of breathing, and soon exhibited all the symptoms of approaching suffocation. He complained by gesture of some impediment in the trachea. The surgeons who saw him, aware that he had never been left alone, and that he could not have put any thing into his mouth, did not suspect the

* Paper by La Martiniere in the Mem. de l'Acad. Royale.

existence of a foreign body impeding respiration. A copious bleeding appeared to be the most decisive remedy in a situation that was becoming every moment more threatening and more dangerous: but it produced no relief. In an hour after the accident, La Martiniere was called to see him: he had then convulsive motions, and breathed very laboriously; his face was blue and swollen; his eyes starting, and his extremities cold; he had lost all sensation, and his death was momentarily expected. Those who had previously seen the child had not neglected to examine the fauces, they had also passed an instrument into the œsophagus without making any discovery. On examining the neck externally, a small red spot, like the centre of a flea-bite, was perceived at its anterior part below the cricoïd cartilage, and underneath this spot, at a great depth, could be perceived a kind of little ganglion, circumscribed, of the size of a lentil, corresponding to the red mark, and of an unnatural shining appearance. The sensation could not be more distinct through the thickness of the parts. It was determined immediately to make an incision in the part; and the trachea being laid bare, a salient body was found, very small, and rising about a line beyond its convexity. This was laid hold on and extracted, and to the astonishment of all who witnessed the operation, a large brass pin was drawn forth, an inch and half long, which had traversed

the trachea from left to right, and even pierced its opposite wall. The child was cured in a few days; and it was subsequently discovered that this pin had been tied to the extremity of the lash of the child's whip, and that whilst he was cracking it, it had flown off, and buried itself thus deeply in the neck.

When a foreign body passes into the trachea, and either by its weight falls into one of the bronchiæ, or becomes entangled and fixed there, it gives rise to a class of symptoms closely resembling phthisis pulmonalis, except that the patient may experience considerable intervals of ease by the substance changing its position, and life be prolonged to a very considerable extent. M. Sue relates a case of a girl who suffered from the rump bone of a chicken occupying different situations in the respiratory tube during 17 years, at the end of which time she coughed up the bone, but died eighteen months afterwards with purulent expectorations and other symptoms of hectic fever. When an accident of this kind occurs, it scarcely comes within the reach of surgical relief, and its progress must be left to the operations of nature, which in some rare instances are sufficient to work a cure. At all events bronchotomy would promise but little, unless we could be certain that the offending substance was so placed as to be easily laid hold on and extracted, and therefore the considera-

tion of this accident does not come immediately within the object of these observations.

The sole indication for the relief of this formidable accident is to extract the foreign body by operation, when once its existence is clearly ascertained, and above all things not to lose time by waiting for the operation of stimulating medicines, administered with the view of exciting coughing or sneezing, and thereby facilitating its expulsion by the natural passage. There can be no doubt that some peculiarly favorable examples may be adduced to prove, that in some instances * medicines of this description have produced the desired effect, and that in some others the efforts of nature alone have suceeded in relieving the patient; but it seems to me to be a hazardous experiment to leave a patient struggling with cough and symptoms of suffocation for any length of time, in order to try what stimulating medicines may effect. Fabricius Hildanus objected to the use

* Hagendorn relates, that a girl eating plumbs swallowed a kernel, which unfortunately slipped into the trachea: this child in a moment became in imminent danger of suffocation: her voice feeble and hoarse: sputa streaked with blood. They had immediate recourse to oily remedies, expectorants, and even emetics, but without success. At last they administered stimulants, which excited cough, and expelled the kernel from the windpipe.

Hevin mentions a case where a similar effect was produced by the operation of an emetic.

of this class of remedies on very reasonable grounds, namely, that that the accident will of itself excite sufficient cough without any necessity for the surgeon's interference. To this may be added, that a foreign body once entered into the trachea must require a number of favorable circumstances in order to be expelled again. It must be so small as to pass through the rima glottidis at a time when its size is much * smaller than when it was admitted. It must be presented to the rima in exactly the same position it held at the time it entered, and it must be smooth and polished, so as not to be caught or entangled in the larynx. If to these be added, that very often the patient expires in a paroxysm of coughing, and if he does not, that he is driving the blood furiously to his brain, or that he is rupturing the air-cells of the lungs, and producing emphysema in that important organ, few surgeons will be disposed to put much confidence in such remedies, when placed in comparison with a safe and easy operation.

* In endeavouring to repeat an experiment of Mr. Favier, which shall be detailed hereafter, I saw that the rima glottidis is dilated during a full inspiration; that it is smaller during expiration, and that when the animal coughed it became greatly contracted, so that the air was driven through it with considerable force. Hence a kidney bean, or any other substance which might easily pass at one time, could never be expelled by cough when the rima becomes comparatively greatly reduced in size.

But it would appear that there is considerable difficulty in ascertaining the existence of a foreign body in the trachea, and every man must be sensible of the disgrace of undertaking an operation for the removal of an offending substance that may not exist at all, and particularly an * operation which by uninformed persons is regarded with horror and dismay. It is therefore of importance, to consider whether any symptoms will distinguish this accident from difficulty of respiration occasioned by other causes, and if so, what they are.

Croupy breathing is one of the symptoms that indicate the presence of a foreign body in the trachea, and perhaps, from the mere character of the respiration it will be impossible to form a diagnosis: but here the croupy breathing comes on at once, without any previous illness, without fever, shivering or languor, such as precede an attack of croup. It occurs at a moment when the child is in rude health and spirits, perhaps playing about with its compa-

* I shall never forget the expressions of anger that escaped from the friends of a patient on whom I operated in the Meath hospital, when subsequently they were admitted to see him. The universal feeling amongst them seemed to be that it would have been better to let him die quietly than to cut his throat: and had he died I am convinced his death would have been attributed to the operation, and not to the disease which rendered it necessary.

nions, and it is always ushered in by a violent paroxysm of coughing that threatens instant suffocation. Besides, after croup is formed, there is always fever, indicated by heat of skin, furred tongue and accelerated pulse, symptoms by no means the necessary consequence of the accident under consideration. The patient at first is tolerably well, and may, during the intervals of coughing, be going about his ordinary business; and although his breathing is always laboured, yet he has no other unfavorable symptom. After a very little time, indeed, the case is altered, and the pulse becomes irregular and very quick, but this is independent of fever, and occurs in consequence of the lungs being loaded and emphysematous, and the brain itself becoming subsequently affected.

Cough, too, is a symptom common to both affections; but in croup it is constant: a single, short, husky cough, occurring every half minute, like the hollow bark of a dog, without any long interval, and without cessation: whilst on the other hand, when the first paroxysm excited by the entrance of the foreign body subsides, there is a long interval before another occurs. It may be that the cough is never renewed, and yet the patient may die. In croup the cough does not seem to add much to the distress of the sufferer: in the other case, its violence brings him almost to the point of death,

and sometimes it is during a paroxysm that he perishes: but allowing that it has subsided for a time, he is completely and entirely free from it until another attack is induced by the irritation in the neighbourhood of the larynx.

M. Louis, in his memoire on this subject, mentions an emphysematous swelling above the clavicles as indicative of the presence of this particular accident, but the symptom is not noticed by any other writer on the subject, or mentioned as occurring in any other case. Emphysema is an accidental symptom, and may occur in every case where there is violent and continued cough, accompanied by obstructed respiration. But independently of this symptom being of rare occurrence, it is probably useless us a diagnostic, for when it appears there will be good reason to believe that such mischief has been wrought in the lungs, and probably in the brain, that the operation will come too late. and the patient inevitably perish.

In this case, as in every other where bronchotomy may be necessary, it will be important to recollect, that the earlier it is performed the greater will be the probability of ultimate success. Every moment a foreign body remains in the trachea is pregnant with danger, and if its presence produces diseased actions in the lungs, or congestion in the brain, there will be

no use in performing the operation afterwards. Besides, a surgeon should recollect what the various accidents are to which a patient may be liable; and if there is a probability, under any circumstances, that death may suddenly ensue, he should certainly give him the chance of a comparatively safe operation, without waiting for symptoms, some of which may never occur, and all of which are liable to be mistaken. In one case Pelletan operated with success after convulsions had taken place, and when his patient had experienced some terrific paroxysms of suffocation. In another he failed under circumstances nearly similar, excepting that four days had elapsed before the operation had been undertaken. In a case which occurred last year in this country, the patient seemed to have died during the operation, but was restored, and subsequently recovered: so that very little dependence is to be placed on one symptom or another, the chief point to be ascertained being the time that has elapsed since the occurrence of the accident, and the probable injury that has been consequently inflicted either on the lungs or brain, organs, the perfection of whose functions are so essential to the maintenance of life.

As a mode of relief in case of a foreign body finding its way into the trachea, Desault speaks of the introduction of an elastic tube through

the nares into the windpipe : and he illustrates the advantages of this practice by relating the case of a child who was brought into his theatre in consequence of this accident. The operation was about to be performed, but on the first incision such a flow of blood took place that it was obliged to be delayed in order to command the hæmorrhage, and in the interval the patient died.

That a tube introduced into the trachea might afford a patient temporary relief; that it might save him from the peril of direct and immediate suffocation: that it would afford time for considering the case and making every necessary arrangement: or even, that it might possibly, by the striking of the foreign body against it, sensibly contribute to determine the nature of the accident, are points that perhaps will not be called in question—but that it can promote a cure by any reasonable means is absolutely impossible. I shall hereafter have occasion to notice this mode of attempting to relieve obstructed respiration more at large, and shall therefore at present decline entering on the subject farther than to observe, that this accident usually occurs to children, and that in persons under 12 or 13 years of age the rima-glottidis is so small that the introduction of a tube would be nearly impossible. It must also be recollected that if the foreign body is loose, it is

liable at any moment to be thrown against the rima, and thus instantly to destroy the patient. What, then, is more likely to occasion this melancholy catastrophe than the cough which the irritation of a tube would inevitably occasion; and again, what would be a surgeon's feelings if his patient died in his hands, and under the effects of an operation which he had promised would afford comfort and relief?

In the event of bronchotomy being determined on, there may possibly be some doubt entertained as to the certainty of being able to find, and to extract the foreign body after the trachea has been opened. The situations, therefore, in which such bodies may exist, must be kept in mind in order to the perfect success of the operation. If it be entangled in the larynx, the difficulty will be met by making the incision pass upwards through part of this organ, and it will come into view and be easily extracted; and indeed it obviously becomes a general rule that the incision for the removal of extraneous substances from the larynx and trachea must be much larger than where the object alone is to establish an artificial passage for the air. Or, on the other hand, if it be loose and floating in the trachea, the extraction is even more certain and without any trouble to the operator, for it will be forced out by the air as soon as the aperture is sufficiently large to allow its passage.

This fact must be familiar to every practitioner that has seen bronchotomy performed, and witnessed the force with which the tube introduced into the windpipe is expelled on its first introduction, and the difficulty with which it is subsequently retained. But it is completely established by the following experiment, performed by M. Favier, and related by M. Lescure in the Memoirs of the Royal Academy of Surgery in Paris.

A large dog was muzzled, and an incision made through the loose skin under the lower jaw so as to allow of the tongue being drawn out through the wound, and by the operator watching the moment of inspiration, a piece of horse-radish was pushed into the trachea. The animal instantly vomited; and respiration became so disordered that it was feared he would die instantaneously: however, after some minutes he appeared easier, although this tranquillity was of but short continuance. The symptoms were frequently renewed, and more particularly when he was subjected to any motion.

In six hours afterwards, bronchotomy was performed, and scarcely had the bistoury been withdrawn when a strong expiration forcibly expelled the foreign substance through the wound. It was again replaced, and again thrown

out. It was pushed even down into one of the bronchiæ, and the result was still the same. And after this had been repeated ten times, the poor brute was released, his wounds dressed, and at the end of three weeks he had completely recovered.

Some time afterwards, the experiment was repeated in a more public manner, and it was found that substances of every kind and of every shape introduced into the trachea of living dogs were forcibly expelled after the operation, no matter whether the animal was lying down or standing up, or under what circumstances the experiment was performed.

Another accident, which seems to bear some relation to the foregoing subject, is the pressure of a foreign body on the epiglottis. This occurs from hastily attempting to swallow morsels either of too large dimensions, or imperfectly masticated, which stopping in the passage and impeding respiration, occasion the greatest distress at the moment, and in some instances cause immediate dissolution. Examples of this nature are particularly frequent of occurrence in children who eat voraciously, and are not aware of the fearful consequences; but they are by no means confined to persons of an early age, and are met with in adults so often as to render the consideration of the subject interesting. Any per-

son who has had an opportunity of seeing a patient suddenly attacked with symptoms of threatened suffocation, will scarcely require an enumeration of the symptoms that characterize the accident, and it will be sufficient to mention the derangement that has taken place in order to point out the rational mode of relief.

A morsel may be lodged in consequence of imperfect deglutition in one of three situations.

1st. It may be placed so as to lie exactly on the epiglottis, shut it up completely, and of course destroy the patient almost instantaneously. This is the case which is most difficult to be ascertained, and which requires the most prompt assistance, as it evidently is a pressing instance of suspended animation.

2d. It may be lodged in the fauces in such a manner as partially to close up the epiglottis. It then produces difficulty of respiration more or less in proportion as the passage of the air is interrupted, and may also, if not relieved, terminate in asphyxia and death.

3d. It may pass the fauces, and be stopped somewhere in the œsophagus, generally at that point corresponding to the bifurcation of the trachea. This is an accident which often produces troublesome and even dangerous symp-

toms, but which rarely requires surgical interference beyond the introduction of the probang: an instrument which, it will be seen, is almost useless in either of the former circumstances.

1. * A ravenous servant, in removing a dish of which he is particularly fond, attempts to devour a part of it before he reaches the kitchen: he makes two or three convulsive efforts to swallow, and perhaps the first notice the people in the house receive of the accident is by the man tumbling down stairs, apparently dead. When taken up, his eyes appear fixed and protruded, his lips swollen, and his countenance purple and livid: there is no pulse to be felt at the wrist, and all the circumstances would lead an inexperienced practitioner to believe that the man had fallen in a fit of apoplexy and died. If the mouth and fauces be examined, they will produce no discovery, for the morsel lies below the base of the tongue, and cannot be seen. If a probang be passed into the œsophagus it will meet with no impediment, for it will pass back-

* Mr. Crampton (the present Surgeon General) used in his lectures to relate a case in which he performed bronchotomy with the most complete success, the circumstances of which very nearly resembled this. Indeed, as well as I can recollect, after an interval of 13 or 14 years, the above is an exact outline of the case, and exhibits a specimen of the decision that may be necessary in the treatment of symptoms so exceedingly obscure.

wards towards the spine, and glide over the morsel. Here, then, the epiglottis is firmly and suddenly compressed, the air is entirely excluded, and if the case be mistaken, or if, from any other cause, the patient be not very speedily relieved, he must inevitably perish. If, however, bronchotomy be performed with a view to inflate the lungs, the first breath of air will force up the epiglottis, and throw the morsel which caused all this mischief into the mouth, from which it may be easily removed by the fingers.

A woman passing along the street, and eating a piece of cake, suddenly fell, gave two or three convulsive struggles, and to all appearance died. She was taken up, and surgical aid almost instantly obtained; the fauces were examined without any appearance of an extraneous body; an elastic switch was passed down into the œsophagus, and as far as the stomach, without meeting with any impediment. Bronchotomy was proposed, but in consequence of some objection being raised, it was not performed, and the patient was lost. On dissection it was found that this woman had a deficiency in the palate, which was stuffed with rags of lint: these had gotten loose, and became entangled in the morsel she was about to swallow, which was stopped immediately over the epiglottis, and thus kept it closely shut down.

2. A child, perhaps, attempts to swallow too large a portion of meat, and it stops somewhere in the fauces: immediately he is seized with convulsive cough, his face becomes purple, his eyes protruded and swollen, he struggles violently, and either succeeds in expelling the morsel, or falls down in a state of asphyxia. This is a case closely resembling the former, except that the cause of the mischief exists not to so full an extent. The morsel has stopped in the fauces, and partially presses upon the epiglottis, so that the function of respiration is not completely interrupted; but Nature cannot long sustain the degree of distress that this accident occasions, joined to the convulsive struggles for relief which the patient makes, and he soon perishes if assistance be not at hand.

As far as I am acquainted with the nature of these cases I should imagine that the degree of danger attendant on them must always bear relation to the exact situation the morsel occupies with respect to the epiglottis. If this valvular cartilage be completely closed, death by suffocation instantly ensues: if it be only partially closed, the respiration will be affected in proportion as the passage for the air is impeded, and the patient's struggles will be successful in procuring relief in proportion to the degree of obstruction being considerable or otherwise.

I have endeavoured to place the nature of this accident in the clearest light, because it appears to be of the most vital importance that it should be understood, in order that the proper remedy may be resorted to without delay. When the patient falls down apparently dead, what should be thought of the practitioner that wastes time in passing a probang down the œsophagus, or in trying to inflate the lungs by the nostrils, whilst the epiglottis is so closely shut down that not a breath of air can pass it. Or when a child is struggling in the agonies of death, with its face swollen, and its eyes protruded, what shall we say of the surgeon who stands by inactive, perhaps slapping the patient on the back as if to beat up the morsel; perhaps looking on as much frightened as any other of the bye-standers, until the little sufferer falls into a state of asphyxia? The nurse who thrusts her finger down the child's throat and hooks up the morsel, is, in this case, the best practitioner.

This view of the pathology of the accident suggests at once the mode of practice that will be successful. If the patient is yet struggling with the morsel, all that can be necessary will be to free the epiglottis from the unnatural pressure, and this will be easily effected if its situation be borne in mind. If the patient is apparently dead, the case is still more urgent, and bronchotomy must be performed; the lungs

inflated; the requisite treatment for suspended animation adopted; and unless time, which is here most valuable, be unaccountably trifled away, the surgeon, in all probability, will be rewarded by the most gratifying result.

But, if it be ascertained that the morsel always rests upon the epiglottis, it may be asked why it should not be removed by the finger or the forceps, and the common means of restoring suspended animation subsequently resorted to without having recourse to the knife at all? The answer must depend on the manual dexterity of the practitioner, and on his acquaintance with the nature of the accident. If he can remove the morsel from its situation, and introduce a tube through the natural passage in less time than he could accomplish the introduction of air into the lungs through an artificial opening, of course he should prefer that mode of proceeding by which least time was lost.* But the question is, will the young

* A very dangerous opinion exists even amongst medical men, that persons in a state of suspended animation may be restored after a very considerable lapse of time; and this mistake is kept alive and fostered by reports from Humane Societies, &c. in which wonderful stories are related of resuscitation after a most incredible space of time. So far as these stories may induce practitioners to undertake cases apparently desperate, and to labour patiently and diligently for their recovery, they can do no harm; but the moment they are ad-

practitioner, called, perhaps, for the first time to such an accident, in the hurry of the moment, and surrounded by a crowd of anxious and agitated spectators, be equally competent to the completion of these tedious and difficult manœuvres as to the performance of a safe and easy operation? Let any man make a section of the fauces, and examine the situation which such an extraneous body would occupy placed behind the root of the tongue, and he will see that its removal may prove both difficult and tedious. And supposing the obstruction removed, the lungs must be inflated and artificial respiration maintained, which never can be accomplished with so much ease as by creating a direct passage by means of bronchotomy* I

duced as reasons why the least possible delay can be admitted, they are most injurious, and may prove the occasion of loss of life. It is impossible to say at what precise time after apparent death the action of the heart ceases, or, at least, that it is no longer capable of being re-excited; perhaps much may depend on individual idiosyncrasy, and that differences may exist in different persons; but certainly that practitioner will act most securely, and have most success, who allows the least time to elapse between apparent death and the commencement of his attempts at resuscitation.

* Desault would, in such a case, recommend an elastic tube to be passed into the trachea, and instances a case in which it might have been successfully used: "une femme avala un os avec tant de voracitè qu'il resta dans le milieu du pharynx. A l'instant meme tous les signes de la suffocation survinrent, et au bout de trois minutes la malade n'existoit plus." Does not

have seen more than one instance of suspended animation, in which by awkwardness on the part of the operator, the air intended to be introduced into the lungs passed along the œsophagus to the stomach, whilst he kept working away until the patient was blown up to half the size of an ox; and I have no doubt that the same thing happens much more frequently than we hear of. If, indeed, a tube was introduced through the nostril, and passed into the trachea, it would convey the air directly to the lungs; but even this is not an easy operation unless to an experienced hand, and I believe if we first delayed for the purpose of extracting the foreign body from the fauces, and then set about introducing a tube into the trachea, we might save ourselves all further trouble, for the inflation of the lungs at so late a period would scarcely produce much benefit.

There is another circumstance connected with this subject which should decide the surgeon in favour of bronchotomy. It is well known that the powers of life in any patient that has been apparently suffocated are extremely reduced, and that after his restoration it frequently requires the utmost care to prevent his relapsing

the place where this bone was found "le milieu du pharynx," and the circumstance of its so immediately causing death, shew that it was pressing down the epiglottis, and if it was so, how could a tube be introduced into the larynx?

into his former state again. Thus, it may happen that the process of inflation of the lungs shall have to be resumed five or six times, or even oftener, and this during a very short space of time. If such necessity should be found to exist, there are, probably, few practitioners who would prefer the introduction of a tube through the nostril every time respiration became imperfect; and as for leaving the tube, once introduced, within the trachea, producing irritation and exciting cough, it would scarcely be feaseable, and certainly injudicious. On the other hand, the operation of bronchotomy presents the easiest means of inflating the lungs at any moment, and although the necessity of resorting to this procedure may possibly not arise, yet the operator should always bear in mind that in all probability it will, and prepare in the commencement for those contingencies which may subsequently create no inconsiderable embarrassment, or perhaps render all his exertions unavailing.

3. When a foreign body stops in the œsophagus below the epiglottis it occasions severe distress, and gives rise to alarming symptoms; but they are not of a character that indicates immediate danger of suffocation, and perhaps never require the operation of bronchotomy. A man suffering from such accident will have a forced and almost an incessant cough; there will be strain-

ing to vomit: a copious flow of saliva from the mouth: his face will appear red and swollen from the constant exertions he makes to free himself from his uneasy situation: his eyes will be protruded, and there will be considerable anxiety depicted on his countenance; but there will be no difficulty of breathing beyond what must be occasioned by the absolute pressure on the posterior membranous part of the trachea.

There is scarcely any substance sufficiently small to pass into the œsophagus below the situation of the epiglottis that will not be capable of being forced into the stomach, unless it be sharp or pointed, or accompanied by some other untoward circumstance which will cause it to wound the œsophagus and stick firmly in it; and in such a case I would prefer cutting into this latter part and extracting the offending substance to any other operation whatever. If bronchotomy was performed for the relief of such an accident, it must be below that part of the œsophagus in which the foreign body is situated; and if we take into consideration the size of any substance sufficient to press severely on the membranous part of the trachea, and the situation such substance must occupy, it is evident that any operation to remove the inconvenience must be performed at the very root of the neck, where the trachea lies deep, and where very important parts may be endangered.

And next, after relieving the urgent symptoms, the difficulty of getting rid of the original cause of the mischief remains as great as ever: so that, under any view of the case, the operation will probably not be adviseable for the relief of this particular species of accident.

At the same time, I am aware, that there are high authorities amongst the records of surgery to warrant a very different opinion. One of the first of these, and probably that one to which the greatest importance has been attached is that detailed by Habicot; * but this

* Un garçon de la campagne, agè de quatorze ans ou environ, avoit oui dire que l'or avalè ne faisoit aucun mal. Ayant vendu quelque marchandise à Paris, dont il avoit reçu quelques neuf pistoles; de peur de voleurs les empaquetta dedans une linge qui'l avala. Mais ne pouvant passer le detroit du pharynx, ou gosier, la face lui devint si epouvantable et difforme, pour l'enflure et noirceur d'icelle, que ceux qui l'accompagnoient le mècoignoissoient: de sorte que l'apportant chez moi, ne pouvant lui faire devaller, ni attirer un tel obstacle dedans l'estomac, tant il ètoit serrè par l'enflure de la gorge; considerant qu'il etouffoit, apres un bon prognostic, je lui fis la broncotomie; laquelle etant faite, il ralloit si impetueusement de la violence de l'air, que cela èpouvantoit ceux qui etoient autour de lui: mais la tumeur et mauvaise couleur de la face s'etant evanouiès, les assura de la vie et nommèment apres que j'eus derechef introduit la sonde de plomb (dans l'esophage) pour achever de devaller dans le dit estomac ce tampon, lequel huit ou dix jours apres le rendit par le siege, a diverses fois et son or ne fut perdu, ne si avanturè que sa vie, qui lui fut restituée par la plaie de la trachée artere de laquelle il recut prompte guérison."

is, probably, not a fair specimen of the accident immediately under consideration, for it appears the foreign body stopped somewhere very high up in the throat, probably so high as in some measure to press upon the epiglottis; and at all events, as it was subsequently forced into the stomach, there seems to be no sufficient reason why this was not done at first, and the pain and inconvenience of the operation spared altogether.

I believe an examination of most of the other cases in which mention is made of the necessity of this operation will be found to exhibit nearly similar circumstances.

It has been supposed, that in such accidents a considerable degree of spasmodic action sometimes takes place, sufficient in some instances to produce a constriction of the glottis, and thus occasion the patient's death. That this organ is subject to the occurrence of spasm, and that too from causes apparently trifling, can scarcely admit of doubt; but still I should hesitate to place the presence of a foreign body in the œsophagus amongst the list of its exciting causes. When a patient dies instantly it is from direct suffocation; when in a short space of time, it is from partial interruption of the air; and in both instances the pressure on the epiglottis is mechanical. When death ensues

after a longer interval, it is either from some uncommon or untoward combination, or from a rupture of a vessel in the lungs, or in the brain, occasioned by the cough or other violent efforts to get rid of the offending substance. Thus, if a patient is seen struggling in mortal agony, and liable to fall down in a moment dead, the danger to be apprehended is not from spasm, but from some pressure more or less directly on the epiglottis, and the surgeon's efforts should be to remove this pressure rather than waste his time in endeavouring to relieve an affection which does not exist. Besides, if there are violent or spasmodic actions of the glottis, their tendency and direction are to expel the morsel by coughing, not to close up the rima; and, moreover, when spasm is excited, it must* be in consequence of some irritation applied to the larynx itself, and not external to or at a distance from it. Thus, inflammation, deficiency of secretion, the presence of a foreign body may create spasmodic actions of the glottis; but perhaps the mechanical pressure of a morsel of meat in the œsophagus can

* This assertion may, perhaps, be considered as too general, for any irritating substance taken into the nose will produce sneezing, and other distant irritations will in some instances create cough; both of which actions are accompanied by spasm of the glottis. But these I consider as examples of sympathy, and very different in their nature from the accident under consideration.

scarcely be considered as likely to produce that effect.

WOUNDS OF THE LARYNX AND TRACHEA.

THE OPERATION OF BRONCHOTOMY.

It is rather an uncommon occurrence to meet with a wound of the larynx or trachea requiring the operation of bronchotomy to be performed in order to save the patient's life; however such an accident is possible, particularly if the injury be such as to cause considerable swelling, or if it be situated in the larynx, or so high up in the trachea that the consequent tumefaction shall interfere with the free passage of the air. For this reason, a short review of the consequences attendant on injuries of these parts may not prove uninteresting, particularly as they bear a strong similitude to the operation itself, and illustrate the symptoms that may be expected to result from it. At the present day, and in the present state of chirurgical improvement, it is curious to reflect on the unaccountable dread which many of the older practitioners, men otherwise well informed and skillful in the practice of their profession, entertained of injuries of the windpipe: a dread

which always made them regard any operation in which this part was interested as little short of murderous. Cælius Aurelianus, in speaking of bronchotomy, after ridiculing the operation as fabulous, reserves all the bitterness of his rebuke until another occasion, lest that he might possibly not speak of it in terms sufficiently severe;* and Aretæus, whose authority must be considered in a very respectable light, expresses himself most fearfully respecting it, because (as he says) the parts being cartilaginous were incapable of subsequent re-union. But amongst a number, whose opinions on this subject are nearly alike, the most curious both in his ideas and his practice is Magatus, for he would leave his patients to their fate at once. This surgeon wrote a large work on the subject of wounds alone; and he states, that injuries of the aspera arteria are desperate: that they should only be stitched up in order to afford the patient an opportunity of confessing his sins; but if there was a loss of substance in these parts, then the case was altogether hopeless, and the surgeon had no more to do than to make his prognostic and go his way.†

It was of no consequence that other surgeons

* Ne tantum scelus angusta oratione damnemus.

† Si penitus præscissa sit aspera arteria, quamvis desperatus sit casus attamen quoniam multum refert, num ægrotus loqui

continually saw wounds of the trachea heal, and patients recover under such circumstances; and that some of the boldest and most sensible amongst them would have undertaken an operation founded on this irrefragable testimony of facts. In opposition to this it was observed, that most persons who had committed suicide, by cutting their throats, had divided the windpipe; and also that when animals were butchered, this part was also almost invariably wounded. Hence, it was easy for a man who merely knew that the air which we breathe passes through this tube to attach an undue importance to it, and to imagine that all injuries of it must be attended with inevitable destruction. Thus it came, that a prejudice was raised against any operation that could interfere with parts concerned in the vital process of respiration. It was by some surgeons regarded as a matter of cruel speculation, and by others would not be sanctioned until every other hope had failed, and the patient was absolutely ready to expire.† It is easy to conceive that opinions thus speciously supported and ratified by professional authority could not be easily eradi-

potest saltem ut propria peccata confiteatur, diligenter consuendum est vulnus. Si autem vulnus cum defectu substantiæ asperæ arteriæ contigerit quoniam nullus potest esse suturæ usus, facto prognostico esset discedendum.

† Nisi cum mors fuerit indicata.

cated. Uneducated persons looked on a wound of the wind-pipe as certainly mortal; and surgeons, although they had seen decisive instances to the contrary, were obliged to shut their eyes against conviction, and absolutely suffer themselves to be persuaded that bronchotomy was a fearful and dangerous operation, only to be attempted as a last resource, and when all other curative means had failed.

Louis says that the ease with which the most complicated wounds of the trachea have been treated and cured, has always appeared to furnish a decisive argument in favour of bronchotomy: an argument which the supporters of the operation have seldom failed to bring forward. But if bronchotomy rested either on the experience of surgeons relative to the cure of wounds of the throat, or even on the successful results of the operation itself, I fear there would be but slender grounds on which to recommend it in future. The fact is, that in four out of every five cases the operation does not procure the patient's recovery, and that attempted suicides, who furnish us with the greatest number of examples of this kind of wound, perish in a much larger proportion. But when we reason on the nature of these cases, the cause of the fatality becomes obvious. Bronchotomy does not succeed, because it does not yet rank amongst those surgical operations which may

be performed as preventive of future and greater evil. It is too often undertaken in a hurried, hasty or desultory manner: it is passed by as unnecessary at the very time when its performance would save the patient's life, and it is generally resorted to as an "ultimum remedium" at a time when it is utterly hopeless, when the powers of life are nearly exhausted, and when diseased actions have commenced in organs, the perfect and unimpaired functions of which are necessary to existence. Let a patient who is suffering under œdematous swelling of the larynx submit to operation within six or eight hours after the commencement of the attack, and his safety will be ensured; but if it is delayed until the second or third day his destruction will be nearly as certain. The same observations may be made with respect to cases of foreign bodies that have obtained admission into the trachea, a few hours making all the difference of success or failure in the performance of the operation. It may also be taken into account, that bronchotomy is often resorted to in cases of organic alteration of structure that are absolutely incurable; and under such circumstances, then, no argument can be established on the number of unsuccessful cases, until it be first ascertained whether is was possible in each, that the operation could have had a different result.

In like manner, the number of intended suicides that succeed in accomplishing their desperate purpose, is infinitely greater than of those that are subsequently saved, although it rarely happens that the wound * is, from its own nature, necessarily mortal. When an unfortunate being lifts a razor against his own life, he throws back his head as far as possible in order to expose his neck to the blow, and probably to bring the windpipe forward, as he imagines that wounds of this organ must be fatal. This position changes the relative situation of all the parts, in the neighbourhood of which he is about to strike. In the generality of cases of suicide, the wound is inflicted above the thyroïd

* It it very well known that in most instances of suicide, the patient perishes rather from lying a long time undiscovered, and the want of instant assistance, than from the importance of the blood vessels or other parts included in the injury. I have seen the most desperate efforts at self-destruction fail of immediate effect, although it must be confessed that in their results they were but too successful. I have met with a patient who contrived with only a blunt and rusty penknife to divide the windpipe and œsophagus down to the spine without wounding a large vessel, and he lived for three days after the infliction of so dreadful an injury.—A celebrated but unfortunate character, who committed suicide in order to avoid a more ignominious death, and whose anxious desire to terminate his existence at once cannot be doubted, was unable to effect his purpose, and languished until the sixth day before he died. It appeared by the evidence given on the inquest that three-fourths of the circumference of the windpipe had been cut, yet the blood vessels escaped.

cartilage, between it and the os hyoïdes, and as the head is at the same time thrown back, the direction of such wound will be upwards into the mouth rather than across the neck, and must be carried deeper than the angle of the jaw before it can interest the carotid artery. It would be otherwise if the incision was made at the side of the neck, for there the artery is comparatively superficial, but so seldom is this point chosen, that when it does happen the perpetrator is suspected to have possessed some knowledge of anatomy, and his selecting it would almost afford sufficient grounds for believing that he could not have been deprived of reason at the moment. Ought it to be inferred then that the fatal event ensues in consequence of the windpipe being so severely injured? I should conceive not; for there is nothing either in the structure or functions of this organ to render its injuries so extremely perilous; and, besides, there are collateral circumstances that will very well explain the fatality that attends the majority of those cases. * We have a wretched being to manage, who is, or at least has been anxious for his own destruction;—we have a state of mind to combat that is as bad as the injury done to the body;—we have the patient,

* It may be here remarked that few patients of this description ever recover by compulsion, and that the most favorable symptom in such a case will be sorrow on the part of the patient for the rash act he has committed.

perhaps, struggling to render all our efforts unavailing;—restless—feverish and tossing himself about—often he is a raving maniac. We have a transverse wound in the neck, the lips of which will be gaping wide, and which every the slightest motion will be likely to separate still farther,—and we may have a wound in the œsophagus, or some other complication that cannot have place as a result of the mere operation of bronchotomy. Under such circumstances, a comparison between the two cases cannot prove any thing against the operation, but may do much in its favour; for if even one patient in such a disastrous condition should recover, how much more likely is it that a person anxious for his own restoration, with a mind full of hope and expectation, submitting to every regulation prescribed for his welfare, preserving calmness and quietude of body, and only the subject of a comparatively trifling wound, should be considered as in a condition comparatively free from danger.

In endeavouring, then, to form a just estimate of the peril to which a patient may be exposed by submitting to the operation, all adventitious circumstances and unfavorable combinations should be placed entirely out of the question, and the decision should rest on the known qualities of the parts interested by it, both as to structure and function. It is next to

impossible that an accidental wound should bear an exact similitude to one inflicted by the surgeon's knife, and it is therefore not just to institute comparisons between them; but even in this point of view it can stand the test of rigorous investigation, for it is always undertaken for the relief of mortal affections, of diseases that will otherwise sooner or later bring the patient to a miserable death, and therefore even supposing it to be attended with tenfold the peril that it really is, it would form no argument against the operation, unless it be decided that it is better a patient should certainly die, than run the risque of an attempt which has both reason and experience to recommend it.

At the instant that an aperture is made in the larynx or trachea, either by operation or by accident, the patient experiences a sensation of uneasiness and distress that cannot be explained. If lying down, he suddenly starts up, or writhes and tosses himself about, and almost immediately is seized with a paroxysm of cough. The expectoration is streaked and stained with blood, and if a blood vessel happens to be injured, the quantity of this fluid poured into the wind-pipe and subsequently thrown off, may be so considerable as to create great uneasiness to the patient, and occasion some alarm to the surgeon. This symptom, combined with the

almost convulsive struggles which the patient makes to relieve himself, presents a frightful appearance, but in general his own efforts are sufficient, and very rarely does any bad consequence ensue from blood being poured into the larynx, unless where some very large vessel is wounded and the hæmorrhage is so profuse as to suffocate the patient almost instantaneously. The air passes through the wound with a peculiar hissing noise, and this will be louder or not according to the proportion the new aperture bears to the natural size of the rima glottidis. Frothy mucus is expelled through the wound with a gurgling sound, and the blood is often expectorated in this way. The patient's voice is lost, and he can only express himself by signs.

After a little time, perhaps in the course of six and thirty hours, the process of inflammation begins to be set up; the wound now is puffed, swollen, and its edges turned outwards; it is tender to the touch, and its surface is dry from the passage of the air through it. There is a quantity of inspissated mucus round the edge of the opening into the trachea, which if allowed to accumulate interferes with the passage of the air and occasions considerable distress. The mucous expectorations are thrown out through the wound, and sucked back again if not instantly removed, so as to produce a troublesome

and teizing cough. It may be remarked here that mucous membranes very seldom inflame in consequence of a wound, and as far as I can recollect I never met with an instance of bronchial inflammation occurring as a consequence of injury inflicted on the membrane in this manner. The danger of such a wound is to be estimated always by its collateral and accompanying circumstances, such as the opening of important blood-vessels, or the inflammation of the surrounding parts in consequence of the peculiar nature of the injury. Thus there may be erisypelatous inflammation of the sub-mucous structure; there may be abscess in some of the neighbouring tissues: or if the wound be by gun-shot or any similar cause, there may be very high inflammatory action and consequent tumefaction in all the parts subjected to the injury; but the mere fact of bronchotomy having been proposed and practised for the relief of this latter species of accident, proves that the membrane has no great disposition to inflame. On the contrary, simple-incised wounds of the trachea generally heal with great rapidity, so that in cases where it is an object to the surgeon to keep them open, such intention is often attended with considerable difficulty. When the trachea of a person who had been the subject of bronchotomy is examined, the loss of substance in this organ is found to be replaced by the formation of a new structure, ligamento-cartilaginous in its nature,

and in some respects resembling that which forms the connecting medium of fractured bones when the divided extremities are far removed from each other.

Wounds of the larynx and trachea, then, become troublesome or dangerous only from collateral circumstances, and these may be arranged as occurring immediately or soon after the infliction of the injury, or as being the results of inflammation, and consequently appearing at a period somewhat more remote. Thus, foreign bodies may be left remaining in the trachea; or blood may flow into it with great rapidity; or in the event of the œsophagus also being wounded, any substance swallowed may be forced through the corresponding wound into the wind-pipe; or if the epiglottis be separated from the thyroïd cartilage, every attempt to swallow must be imperfect, and substances will be constantly falling into the larynx, producing a teizing cough, harassing the patient, and preventing the wound from healing if they cause no greater injury.

1. When foreign bodies have been forced through a wound into the trachea, or when such have been left fixed and impacted therein, they should be extracted with the least possible delay, for their presence always excites troublesome and dangerous symptoms. If they are

loose and floating within the cavity of this tube, their extraction will be easily effected by dilating the original wound, and allowing room for their expulsion in the act of expiration. There may be some little difficulty experienced by the operator in removing a foreign body, such as a bullet, the head of an arrow, &c. which is firmly fixed in the trachea, and perhaps occupies a situation where it cannot be easily come at; but as the danger of permitting such foreign substance is always urgent, and must be greater than that likely to result from any additional wound, there should be no hesitation in undertaking its removal wherever such operation is practicable.

2. Hæmorrhage into the trachea, I have already mentioned as an extremely distressing symptom, and one which may possibly prove embarrassing to the surgeon. In order, however, to appreciate the danger likely to arise from this accident, several circumstances must be taken into consideration, amongst which are the size and situation of the wounded vessels, the size of the wound in the trachea, and the possibility of the vessel being secured either by ligature or otherwise. If there is a wound of a large vessel, and consequent profuse hæmorrhage accompanied by an extensive injury of the larynx or trachea, there is seldom much time to apply for professional aid, and in such a case, and thus

circumstanced, the patient must be singularly fortunate if he escapes at all. In most cases of attempted suicide the wound is situated between the thyroïd cartilage and the os hyoïdes, and fortunately there are no vessels in that space likely to give rise to a fatal hæmorrhage: here, however, some branches of the superior thyroïd artery may be wounded, or in some circumstances even of the lingual, and these will pour forth a sufficient quantity of blood to render the patient's situation both distressing and alarming. It is easy for a practitioner to talk of tying the bleeding vessel, and thus restraining the hæmorrhage, but it is sometimes a difficult matter to do it, and the young surgeon should be prepared to encounter cases of the most teizing and perplexing nature. The patient is anxious, agitated and restless: perhaps he is tossing about in the frenzy of delirium; the blood is flowing freely into the larynx, and there is incessant cough, and sometimes convulsive struggling to maintain respiration: every plunge of the needle or tenaculum causes the patient to start away, and thus it becomes almost impossible to pass a ligature around the bleeding vessel. Perhaps the patient faints, and this is a fortunate circumstance, for then the surgeon, guided by the oozing of the blood, is enabled to take up the vessel without disturbance, or he seizes the moment to unite the wound, trusting to the formation of a coagulum and external pressure for

restraining future hæmorrhage. In all cases, except where some very large artery is wounded, it is better at once to close the wound, for the air passing through it acts by suction on its sides, and draws a quantity of blood with it into the wind-pipe, and thus creates and maintains a constant source of irritation. I have seen this latter occurrence to take place even where no artery was wounded, and the hæmorrhage and all its accompanying disturbance thus continued for a considerable length of time.

3. But in those cases where the substances intended to be conveyed into the stomach find a ready passage into the windpipe, it will be necessary to remedy the inconvenience by preventing every natural attempt to swallow on the part of the patient. This is easily effected by the introduction of an hollow elastic tube into the stomach, or into that part of the œsophagus which is situated below the wound, through which the requisite food and medicine may be safely conveyed. The annoyance that this would occasion by lying in the mouth, independent of the retching it produces on its introduction, must always determine us on passing it by the nostril; and here it is requisite to observe the greatest caution, and to be perfectly certain that the instrument is in the œsophagus before any liquid is injected, for instances of fatal mistakes have occurred from not

attending to this precaution. Any elastic substance introduced by the nostril will strike the spine nearly behind the uvula, and its point will thus be directed forwards and downwards, instead of backwards and downwards, so that its natural tendency will be to pass into the larynx, and not into the œsophagus. Nor will a lighted candle held before the orifice of the tube, which is the best criterion we have to judge by, prove a certain test, unless it be persevered in for a given time, so as to shew the regular alternations of inspiration and expiration. It is very easy to conceive, that air may pass through a tube from the stomach, particucularly at its first introduction; and on the other hand the instrument might be in the trachea, and yet no air pass through it, in consequence of its being choked with mucus, or lying entangled in a fold of the lining membrane. The cough excited on its introduction will be no criterion; for it is impossible to pass the instrument without more or less irritating the larynx, and thereby exciting its sensibility.

In cases where it is probable we should be obliged to resort to this measure, it will be most advisable to do so at once, and at the first dressing; and when the tube is introduced, and we are certain it is in the proper situation, it should be suffered to remain there as long as possible; for every successive introduction will

produce irritation similar to the first, although not to the same extent, whereas our chief object should be the attainment and maintenance of the most perfect quietude. When two tubes have been introduced, one into the œsophagus and the other into the larynx, it will be necessary to mark them by threads of different coloured silk, so as to prevent the occurrence of any unfortunate mistake.

The second period of danger occurs when inflammation has commenced, and the rima glottidis becoming obstructed the patient may either perish by rapid suffocation, or from diseased actions taking place in the lungs in consequence of an insufficient supply of air. To counteract the baneful effect of these accidents there have been three modes of proceeding recommended, all having the same object, namely, the artificial admission of air to the lungs, and all calculated under particular circumstances to answer the end desired; so that the only enquiry is, what may be the particular case to which each may be most judiciously adapted. These are—

1. The introduction of a hollow tube through the original wound.

2. The performance of the operation of bronchotomy.

3. The introduction of an elastic tube through the nostril into the trachea.

The last has the advantage of the authority and recommendation of Desault.

The first can only be applicable to that species of injury in which there is no hope of union by the first intention: such as lacerated, contused, or gun-shot wounds. In accidents of this description, the parts which are torn or struck, are killed, and must be subsequently thrown off: there will be extensive loss of substance, and consequent suppuration; and if the introduction of a tube through the original wound can be executed with facility, it would be absurd to undertake any other operation. But it must be recollected that the introduction is not called for in the first instance, and immediately after the receipt of the injury; but after an interval of two or three days, when inflammation has not only commenced, but proceeded to the extent of nearly excluding the air. The parts are then swollen and tense and painful; and the mere existence of the tumefaction will render the introduction of a tube difficult, if not impossible. There can be no doubt that in some particular cases this mode of procuring relief may appear reasonable and judicious; but they must be few in number, and can only be of that description already noticed.

Whenever it is of importance to attempt the union of the external wound, such practice would be inadvisable, and our choice must rest between bronchotomy and Desault's elastic tubes.

That it is at all times desirable to avoid the pain and danger of an operation, is a question completely settled by the modern practice of surgery, and now no man thinks of employing the knife until every other rational hope has faded away, and nothing else appears likely to preserve the patient's life. Guided by this principle, we should be disposed at once to give the preference to the elastic tube, and to say that it was a decided improvement in the treatment of wounds of the throat, if we did not at the same time recollect that the introduction is an operation in itself by no means free from danger;—that it is extremely difficult to be performed;—that awkward and reiterated attempts produce inconceivable distress;—and that even when performed with the greatest dexterity, it must invariably excite cough and restlessness, symptoms most disagreeable and often disastrous, particularly where it is desirable to maintain the edges of the wound in contact, or where arteries have been secured by ligature. We must therefore candidly examine the arguments by which the expediency of either operation is supported, in order to be able to de-

cide on that which will appear most beneficial to the patient.

Desault states the disadvantages of bronchotomy to be as follow:

1. The danger of superadding one wound to another, and of a new inflammation occurring in the recent wound, the effect of which might be as injurious as those of the original one.

2. The effusion of blood, either externally or into the trachea.

3. The having another wound to cure.

4. The fear of the wound created by the operation, not perfectly uniting, and an aërial fistula remaining.

1. It is one great objection to the use of the elastic tubes, that the mere circumstance of their being called for at all, indicates a closing-up of the rima glottidis, and of course a proportionate difficulty of introducing them. Notwithstanding this, however, there cannot be a doubt of the possibility of their introduction in some instances, and the pathology of mucous membranes in general teaches us, that after some time the uneasiness at first created will subside, and that each successive introduction will be

performed with more facility. They may, therefore occasionally supersede the necessity of bronchotomy; but at the same time it cannot be allowed that they are capable of so extensive an employment, or that they can be so easily introduced by an unpractised hand as might be, at first, imagined. When a wound occurs in the larynx, the inflammation may be such as to interfere rapidly with respiration, and we are called on to do something immediately in order to restore so important a function. Let us suppose a man who had seldom or perhaps never undertaken such an operation before, attempting to introduce an elastic tube into the trachea; every time the instrument touches the larynx the patient becomes anxious and restless; he tosses himself about and coughs convulsively, and each motion, whilst it encreases his own distress, renders the performance of the operation more difficult. Can any man with a recent wound, with dreadful dyspnœa, with some blood-vessels just secured, and others perhaps ready to burst out on any exertion; can such a patient endure the irritation that a few moments unsuccessful poking at the rima glottidis will inevitably occasion? And, if he cannot, may not the present distress be more intolerable, and the future consequences more destructive than those which would result from an operation, the only fearful part of

which is, that it is performed with a cutting instrument.

These observations were necessary before the consideration of Desault's first objection could come fairly into view, because it would seem that where inflammation had occurred in the mucous membrane it would be disposed to spread, and that a new source of irritation would be only an addition to the danger. The objection, then, must be considered as just, if there be reason to suppose that such inflammation is present, but experience proves that the fact is directly the reverse: the membrane is not inflamed, and the obstruction of the rima glottidis depends on the tumefaction of the neighbouring parts: an obstruction, which if it interferes with the passage of so subtile a fluid as air, must of course impede the introduction of any tube, but which by no means implies the existence of a disease that is disposed to spread. Let it be considered too, that if the mucous membrane of the larynx is inflamed, it will probably be as likely to spread in consequence of the irritation created by the presence of an extraneous body, as by an additional wound; and moreover, that in either case the patient will in all probability eventually perish. These circumstances will enable the surgeon to form a just estimate of the relative importance that should be attached to each operation.

Desault calls bronchotomy "une plaie toujours facheuse," and therefore it might seem to be an operation pregnant either with difficulty to the operator, or danger to the patient. That it is sometimes troublesome in the performance is certainly true, particularly in children, but it is equally so that its difficulty is exaggerated, and can always be overcome, if the operator is only aware of the inconveniencies he has to encounter. It must also be conceded, that there may be some possible risque to the patient; but then, in order to an unfortunate result, there must be a combination both of untoward circumstances on the part of the patient, and either of ignorance or want of caution on that of the practitioner. But we are, here, to speak of the operation properly performed, and there can be little doubt that if it be so, it adds nothing to the patient's danger beyond that which might accrue from the introduction of an elastic tube, whilst in the hands of most surgeons it is far more easily accomplished.

2. The effusion of blood, either externally, or into the trachea, is a circumstance so embarrassing, that it has been advanced as a strong argument why the operation should not be resorted to, if any other mode of relief was at all practicable. A child was brought to Desault in order to have the operation performed, and at the first incision, so great was the flow of blood that he was obliged to desist for some

time, and in the interval the patient perished. That such an unfortunate occurrence should have made a due impression on the mind of the operator, and induced him to consider hæmorrhage as a most powerful objection to the performance of the operation, is only natural; but certainly such an accident ought not to influence our minds too strongly, if it can be proved that where hæmorrhage does occur, it is generally the consequence of a want of caution. There are many sources from which it is supposed that blood may be furnished in considerable quantity, but of these some are irregular vascular distributions, seldom to be met with; and others, however constantly present, may always be avoided by an operator who is aware of their existence.

One of the last operations of this kind which I had an opportunity of being present at, was performed by Mr. Hewson. At the very first incision a large superficial vein was exposed, lying directly under the knife, and which, if it had been wounded, must have poured forth a considerable quantity of blood. When perceived, it was easily drawn to one side by a curved probe, and the operation was completed without the loss of more than two ounces of blood, although the patient was a child rather under five years of age. In like manner, hæmorrhage of every description may be avoided, if the

operator proceeds with caution, and examines the part previous to each successive stroke of the knife. The thyroïd veins, when regularly disposed, are seldom within danger of being wounded, but in some instances they unite into one large trunk about half an inch below the cricoïd cartilage, which passes down the neck, deeply seated, and exactly in front of the trachea. This large vessel will be very probably wounded by an incautious operator, but can always be drawn aside and avoided if care be taken in examining whether it is present or not.

It generally happens that a large branch of the external jugular vein passes down on each side, along the anterior edge of the mastoïdeus muscle, and unites with its fellow at the lower part of the neck, immediately above the sternum, somewhat resembling the figure of the letter v. In performing the operation of tracheotomy, if the knife be carried too low down, the junction of these vessels may be injured, and a very profuse hæmorrhage ensue. It is also said that the vena innominata might in like manner possibly be wounded, but this is an accident of which I can scarcely conceive the occurrence, this vessel lying behind the sternum, and being protected besides by the inter-clavicular ligament. An operator must therefore be strangely intent on mischief who could plunge his knife

down in such a manner as to wound a vessel thus placed so completely out of the way.

The ascending branch of the thyroïd artery is, in some rare instances, found to come off from the arch of the aorta, and to proceed upwards in front of the trachea. This might be wounded, and although it is by no means a large artery, yet being a branch of so considerable a vessel as the aorta, it might be expected to bleed profusely. This would prove a most embarrassing circumstance from the difficulty of passing a ligature round the vessel, and thus securing it in a satisfactory manner. The trachea, as it passes down the neck, seems to retreat backwards, so as to get behind the sternum, and at that part where it is opened in tracheotomy it is nearly an inch and half from the surface. Let not a young practitioner then conceive that it is easy to turn a needle in such a cavity as this, where the external incision is of necessity so small, and morever where the patient is restless and uneasy, or perhaps struggling under the horror of impending suffocation. These difficulties, however, are only mentioned for the purpose of inculcating the advantages of proceeding slowly and with caution, for the vessel, if wounded, must be tied, and the delay and inconvenience attending it would add considerably to the patient's sufferings, and might perhaps render the whole operation unavailing. It

is fortunate that this irregular distribution is of very rare occurrence. It might never be met with in a patient requiring the operation: but the knowledge of the possibility of its existence will be decidedly useful if it renders the operator cautious in his proceedings.

A wound of either of the lobes of the thyroïd gland will most certainly be followed by profuse bleeding, and I have seen some embarrassment occasioned by this accident. If an assistant, in drawing aside the edges of the external incision in order to expose the deeper parts of the wound drags them unevenly, the bottom of the incision will no longer correspond to the central line of the neck, and if the operation is proceeded on, it is very probable that the gland may be wounded deeply. Hence the importance not only of commencing at first exactly in the centre of the neck, but of carefully preserving the same direction until the operation is concluded. In some subjects the lobes of the gland advance farther across the trachea than in others; and I have met with some instances in which the connecting slip between the two lobes was thick and broad, so as to have lain exactly under the stroke of the knife. In ordinary cases this part is almost always divided, but it is evident that the inosculating branches which lie within it must be very small, and will contract without pouring out more than a few drops of blood.

It is said that the thymus gland in young children might be wounded, and a troublesome hæmorrhage ensue. This is an accident very unlikely to occur, for this part is not much exposed to danger, and if it was even injured, it would not furnish much blood. The real fact is, that the operation of tracheotomy performed on a child is almost always attended with considerable bleeding, for the superficial veins of the neck are turgid with blood, and the very cause which would render the operation necessary, namely, obstructed respiration, tends to maintain them in this condition. And there are so many real difficulties to be encountered with young subjects, that the surgeon should scarcely burden his mind with this one, which is, perhaps, little more than imaginary.*

* There are other irregular vascular distributions noticed by authors, which however infrequent of occurrence, ought still to be borne in mind by a cautious operator. Allan Burns saw the arteria innominata mount on the fore part of the neck as high as the inferior edge of the thyroïd gland;—and the right carotid cross the trachea in such a direction as would inevitably cause it to be wounded in tracheotomy. In cases where both carotids come from the arteria innominata, the left crosses the trachea high up in the neck.—I have not myself had an opportunity of seeing such irregular distributions, but in a case of abscess seated deeply in the neck, which occurred lately, there was such strong arterial pulsation in front of the trachea an inch and a half above the sternum, that I was afraid of cutting for the matter, in the exact point in which it was situated. Possibly this was a case of one of those arterial irregularities.

Desault mentions that the carotid was opened in an opera-

3. The circumstance of having another wound to cure is an objection which can only have place where the operation is called for in consequence of extraneous bodies being lodged in the trachea, or inflammation resulting from the previous violence. If a foreign body has been driven into the trachea it must be removed, either by dilating the old wound, or inflicting a new: and so as the object is accomplished with the least inconvenience to the patient, it is not worth quarrelling about the means. But where inflammation has occurred, the new opening must be somewhere below the cause of obstruction, and if this can be effected by dilating the original wound, and introducing a tube, there can surely be no objection to the practice. However, in either case, a clean incision of the surgeon's knife will be much more likely to heal than an injury caused by violence; and as it will give little trouble, and not add one hour to the confinement the patient must undergo, it can scarcely be advanced as an argument against an operation which may possibly be deemed necessary to preserve his existence.

4. It might almost be doubted that Desault had ever advanced such an objection to bron-

tion, in consequence of the trachea not being firmly fixed, and the patient was lost: he does not state whether it was an irregular distribution.

chotomy as the fear of an aërial fistula remaining after the operation, if it was not distinctly stated in his works edited by his friend and pupil Bichat.* There is too much of the old ideas of pathology,—too much of leaning towards ignorant prejudices, in this, for us to suppose that Desault could have seriously imagined that from the cartilaginous structure of the windpipe it would not heal, but that the air would continue for a long time, or for ever, passing to and fro through the aperture. It is probable that this great French surgeon had performed bronchotomy more than once, and that he had seen many instances of wounds of the windpipe, and he must have known that this organ, considering its general deficiency of organization and its want of vascularity, would heal as well as any other part of the body of similar structure; and that it would really be more difficult to keep such a wound open for any length of time than to heal it up. It was probably advanced as a theoretic argument in favour of his own elastic tubes, but that it has no foundation in fact, may be inferred from the circumstance that Desault himself states no case to warrant a belief in the existence of these aërial fistulæ, and if a single one had occurred within his knowledge which could have answered

* Œuvres Chirurgicales de Desault, par Xav. Bichat, vol. ii. page 242.

this purpose, it is more than probable he would not have passed it over in silence.*

In considering, then, the relative advantages of these two operations, it is obvious that they are adapted to cases of a totally different nature.

* From having seen a vast number of wounds of the trachea, the results both of operation and of accident, heal not only kindly but in some instances with too great rapidity, I entertained an opinion, when these remarks were put together, that such an occurrence as an aërial fistula was next to impossible. However I have since met with the following case, which proves its possibility in the event of a large portion of the larynx or trachea being destroyed or carried away. Patrick Kenny, ætat. 32, a soldier in the East India Company's service received a wound from canister shot on the 3d January, 1825, and on his return to Ireland, applied at the Meath Hospital, on the 10th April, 1826.

The wound seems to have occupied the upper and forepart of the neck, comprising the whole length of the thyroïd cartilage, the cricoïd and two or three rings of the trachea: it is all healed by an irregular cicatrix resembling that succeeding a burn, except one spot corresponding to the space between the thyroïd and cricoïd cartilages, where there is a fistulous opening large enough to admit a goose quill, through which he breathes and occasionally expels mucus by coughing. Its edges are quite callous and there is no discharge. Patient can speak, but if he wishes to articulate very distinctly he must close the aperture with his finger.

I made an attempt to cure this man, by detaching some of the new-formed adhesions, scraping the edges of the fistula, and endeavouring to unite them by the twisted suture, but it did not succeed, and the patient would not remain in hospital for a second trial, as he wanted to go to London to prosecute his claim for a pension.

Thus, in cases of enlargement of the tonsils and of the tongue, of the swallowing of water from a boiling tea-kettle, or of attempts at self-destruction by taking any of the stronger acids, it is very possible that the introduction of an elastic tube into the trachea may be of use, provided it be employed in the earlier stages of the accident, and before the respiration has become much disordered. In the later stages I cannot believe in the advantage said to be derived from this mode of operation, inasmuch as it is difficult to conceive that a firm or solid substance could pass freely where air would be excluded.

When foreign substances are lodged in the larynx and trachea, a tube may be introduced in order to maintain respiration until arrangements are made for extracting them: but at the same time it must be recollected that this mode of proceeding is attended with a certain degree of risk, and that it may, under some circumstances occasion the loss of life.

When a morsel is stopped in the pharynx and rests upon the epiglottis, it is obvious that a tube cannot be introduced into the larynx, and therefore that our only remedy is bronchotomy.

Wounds of the larynx and trachea admit of some variety, according to the importance of other parts injured, and the urgent symptoms

that are present. But wherever there was anxiety, restlessness, and pain, or where there were large or important blood-vessels wounded, I should prefer the simple operation of bronchotomy to the vexatious and irritating process of introducing a tube by the nares.

When the larynx itself is inflamed, either in consequence of injury or idiopathic disease, I fear the introduction of a tube would only add to the existing mischief, and as a general rule, wherever instant decision and celerity of operation might be required, I would give a decided preference to the relief afforded by opening the larynx or the trachea.

Having endeavoured to determine those cases in which it might be adviseable to make an artificial opening into the windpipe, I shall proceed to offer a few observations on the different modes of effecting this object, and on the symptoms which usually follow the operation.

Bronchotomy, as a generic term, is subdivided into laryngotomy and tracheotomy, operations essentially different as to the facility attending the performance of each, and as to the subsequent phenomena resulting from them. They take their names from the part of the res-

piratory tube into which the artificial opening is made.

Laryngotomy consists in opening into the inferior part of the larynx, in that small triangular membranous space which lies between the thyroïd and cricoïd cartilages. It is an operation unattended either with difficulty or danger, and will answer every purpose when the cause of obstruction is seated in the rima glottidis, or above it. It is accomplished by a small incision extending along the centre of the neck, about an inch in length, and exactly over that part of the wind-pipe which it is intended to open. The incision is then carried deeper, between the sterno-hyoïdei muscles, the sterno-thyroïdei, and the crico-thyroïdei; and the larynx being exposed, it is either punctured with a bronchotomy trochar, or a piece of the tube is cut out. If a canula be introduced, the patient at the moment experiences some distress, and if the instrument is not firmly held, it is thrown out again with violence to a considerable distance. This state of irritation soon subsides, and after a few minutes, the instrument is suffered to remain quietly in the wound until inflammation occurs, after which period, its presence creates so much distress that it can seldom be longer endured.

Tracheotomy is performed much lower down in the neck, the incision is of necessity longer

and deeper, and it is not always an operation easily to be performed. In children it is particularly difficult, as the depth of the parts to be cut through is encreased by the accumulation of fat generally met with in patients at this period of life, and besides, previous to the age of thirteen or fourteen years the trachea is comparatively of a small size.* The greater vascularity of children too, adds to the difficulty by producing a troublesome hæmorrhage, and their struggles and general unmanageability tend to embarrass the operator. It must therefore always, and under every circumstance, be an unpleasant operation to perform on a patient much under the age of puberty; but after that period it is completed with more facility, and very seldom, indeed, occasions any trouble worth remarking on.

In performing the operation, it is always desirable to have the patient lying down on a low bed or sofa; his head thrown back as far as he can bear it, in order to extend the neck and render the parts tense; and he should be so placed that the operator might stand at his head. The first incision should be from two to three inches in length, extending from about

* I have known an instance in which a surgeon attempted to perform the operation on a child, and was obliged to give it up, as he absolutely could not find the trachea!

half an inch above the centre of the sternum to a little above the cricoïd cartilage, and should occupy the exact central line of the neck.* The skin and cellular substance should now be drawn to each side by means of bent probes, and if any vessel appears exposed to the knife, it may be withdrawn in a similar manner. The incision is then to be carried deeper between the sterno-hyoïdei muscles, and so on until a fascia is discovered lying before the trachea, which must be carefully removed. Behind this membrane, the wind-pipe is seen, moving upwards and downwards according to the degree of disordered respiration and the patient's efforts to relieve himself; and if an attempt be made to open the trachea without removing this fascia, the aperture in the one will not correspond with that in the other;—the patient will not be relieved, and the introduction of a cànula will be difficult if not impossible. This membrane is easily laid hold on by a pair of dissecting forceps, and may be removed either by the knife or a pair of scissors. The trachea then comes into view,

* Desault mentions an awkard accident that probably occurred from inattention in this particular, "un étudiant tombe, en se baignant, dans un prècipice, dont il est retirè sans connoissance. Un de ses camarades veut, pour le rapeller a la vie, faire la tracheotomiè; le canal est mal assujetti: la carotide est ouverte; et le malade pèrit victime des hasards d'une operation inutile dans tous les cas, mais qui pratiquèe au larynx n'auroit eu sans doute que cet inconvenient."

and the large thyroïd vein (in the event of an irregular distribution) should be looked for in order to be avoided. Hæmorrhage should now be completely commanded; and if the symptoms of the case will admit of delay, the surgeon might wait a few minutes in order that even the oozing of blood from the sides of the wound may cease. A small slit is then to be made in the trachea at the point where it is intended to be opened, so as to permit the introduction of a hook or forceps in order to lay hold on the part to be removed, which should be cut out as nearly as possible to the size and shape of the canula that is to occupy it afterwards.* At the instant that the first puncture is made in the trachea, the patient seems to experience some extraordinary sensation of distress, he starts up and struggles for a moment, but it soon subsides and the operation is finished without much trouble. He is in general greatly relieved, and in a few minutes falls into a calm and refreshing slumber. In order to prevent the canula from falling out, it is usually secured by tapes passed through its rings and tied behind the patient's neck, and a light thin muslin cloth may be thrown loosely over it to prevent the

* It is obvious that this does not apply to operations performed for the removal of foreign bodies from the trachea.—In cases of this description a long slit will be sufficient, which after the extraction is completed may be closed immediately and healed.

admission of dust or any other extraneous substance.

Many surgeons recommend the removal of a circular portion of the trachea to the extent of the length of two or three rings, and that it should be left so, without the introduction of any canula whatever. If the operation be performed on the larynx there can be no objection to this mode of proceeding, for the wound is not extensive, and the hæmorrhage must be trivial. But the trachea lies deep; there is more likelihood of meeting with a troublesome or embarrassing flow of blood to delay the operation; and even supposing that no vessel of consequence is wounded, the patient at every inspiration sucks in a quantity of blood from the open sides of the incision, and the cough, expectoration of bloody mucus, and other harassing symptoms are thus continued for a length of time. It is evident that if a canula occupied the entire space of the aperture in the trachea a drop of blood could not enter, notwithstanding the existence of even a profuse hæmorrhage; and therefore if this instrument is employed it will be necessary to be accurate in opening into the windpipe, so that it should occupy the entire wound. This object would be well answered by performing the operation with a trochar,* which might be employed in perforat-

* In the last operation I performed, the symptoms appeared

ing the windpipe; but this requires some dexterity, and might possibly be the cause of an unpleasant accident. However, under every circumstance requiring instant decision, I would endeavour to make use of the canula; for it has happened that a patient has been lost whilst the surgeon delayed the opening into the trachea in order previously to control an alarming hemorrhage. Besides, the objection that the presence of the instrument causes irritation is not valid with respect to the trachea. It is true, that introduced into the larynx it might create uneasiness, and be with difficulty retained; but the sensibility of the lining membrane of the trachea is much inferior, and a canula can be easily endured in the latter for the first thirty-six or forty-eight hours after the operation.

When this time has elapsed the wound begins to inflame; its edges are turned out, its surface is dried up from the action of the air, and its bottom round the edges of the opening into the trachea is covered with a tough, adherent and inspissated mucus. These symptoms may be alleviated by smearing the wound over with a feather dipped in oil of almonds. At this

so urgent that there was only time to make an incision through the skin and cellular substance, and then to plunge the knife at once into the trachea. I found this mode of operating to answer extremely well.

period, too, the presence of the canula may cause great irritation, and as it is no longer necessary it ought not to be permitted to remain. It sometimes happens (and particularly when the operation has been performed with a trochar), that either from tumefaction or an accumulation of mucus, the aperture in the trachea becomes slightly obstructed, and is no longer capable of transmitting a sufficient supply of air; the patient's distress partially returns, and it becomes necessary to remove another portion of the trachea so as to enlarge the aperture. This may be effected with the greatest ease, and produces no inconvenience whatever to the patient.

Amongst the most annoying symptoms both to the patient and his medical attendant, may be mentioned, the accumulation of mucus in the trachea, and the difficulty of expelling it. When the patient coughs, this mucus is thrown out into the wound, but sucked in again at the next inspiration, so that he becomes wearied with these repeated efforts, and sometimes appears to sink into an alarming state of debility. The assistant must be constantly on the watch to catch the expectoration, and remove it with a probe immediately on its being expelled; and I have known two instances in which a far more disagreeable service was requisite in order to preserve the patient's existence. When a

which surgical aid may be available, and those to which it is altogther inapplicable. Nothing is more common than to see a patient languishing with laryngeal disease until life is nearly extinct, and then undergoing the pain and inconvenience of an operation that must of necessity be hopeless; and hence it happens not only that bronchotomy is considered as uncertain in its results, but that surgeons are unwilling to undertake it unless they can justify themselves by considering it as a last resource. I believe that most of this uncertainty in practice arises from a want of arrangement: from not having those cases separated in which operation may prove serviceable, from those which must inevitably have a fatal termination; and therefore it will be found that I have rather endeavoured to demonstrate the inutility of operating when particular symptoms are present, than even to encourage the employment of the knife under other circumstances. In pursuit of the views which I had long since taken of the subject, I have, as far as opportunity served, endeavoured to ascertain the morbid appearances that occurred in the several forms of laryngeal disease, and connecting them with the symptoms which I have observed, or which have been described by others, I have come to the following conclusions:

1st. Assuming, as a general principle, that

where alteration of the natural structure of the part has taken place, a recovery must be impossible, I wish the surgeon to avoid all unprofitable interference with such cases.

2d. As we know that in almost every instance of chronic disease in which the parts have not undergone that alteration already alluded to, a cure may be effected by active medical treatment, I would have every reasonable effort of this nature made, consistently with the safety of the patient.

3d. I have endeavoured to point out those cases in which the operation of bronchotomy is our only resource—to shew that it must be resorted to not as an " ultimum remedium," but early in the disease, and with a view to avoid incurable morbid actions—and to prove that in the event of delay, both the lungs and brain suffer so much in consequence of obstructed respiration, as to render a recovery impossible.

How far I may have succeeded in explaining these facts, it is not for me to determine; but as I know from experience that these forms of disease are not sufficiently understood,—as I have witnessed the vaccillating opinions and undecided practice which are exemplified whenever any of these cases occur,—as I have seen the utmost uncertainty prevail amongst men of high professional attainments even in the treat-

APPENDIX.

THE following cases and experiments, which have been referred to in the preceding work, but which could not well have formed a part of it, I have added here, and I hope they will prove both useful and interesting. Those which relate to deep-seated abscesses in the neck proved very satisfactory, and afford a safe and easy mode of giving exit to matter, when situated in a part supplied extensively with large and important blood-vessels, or otherwise so circumstanced that it might be injudicious to cut immediately upon it. For that one immediately following, which purports to be a case of croup occurring in the adult, I am indebted to a particular friend, who was a student in Edinburgh at the time it occurred.—See note, page 9.

Paul Biancha, a strong muscular looking man, æt. 20 years, was admitted into the Edinburgh Infirmary on the 17th of November 1823, with continued fever, and was pronounced convalescent on the 27th of December. On the 29th he complained of cough and slight sore throat, for which he was ordered to have a pediluvium and solution of sulphat of magnesia to open his bowels, which were costive. On the 30th he complained more of the throat, with tenderness of external fauces, hoarseness and cough: his pulse was 90 and soft; the bowels had not been moved; he was ordered one drachm of the compound powder of jalap to be taken immediately, and an anodyne draught with antimonial wine to be taken at bed time. On the 31st of December he had very hoarse cough, with sonorous respiration (which began about 4 o'clock in the morning); his

pulse 108, and full; fauces inflamed with an appearance of ulceration on right tonsil, and tenderness on pressure over the larynx; leeches were now applied to the throat, and a solution of tartarized antimony ordered to be taken every hour, also the vapour of hot water to be inhaled. On the 1st of January 1824, the breathing not being relieved, although the leech-bites had bled well, venesection was ordered, which produced fainting; the solution had produced vomiting and purging. The symptoms of the 31st were increased in severity, with copious pretty easy expectoration, partly yellow and tinged with blood: the pulse 114, full and soft: the leeches were now ordered to be repeated, and the solution and inhalation to be continued. On the 2d emphysema appeared at the root of the neck; the leeches had bled well, and the solution had caused vomiting, and gave temporary relief to the breathing, which again became difficult, sonorous, and the countenance livid; two blisters were applied, and caused a profuse discharge: pulse 124, and small; great restlessness; he was now ordered a hot bath, with five grains of calomel and one of opium, to be taken immediately. At 5 o'clock P. M. his breathing continuing very laborious, and no relief having been derived from the bath, leeches were applied to the throat, and a large emollient poultice over the leech-bites. At 8 o'clock his hands and feet became cold, breathing very hurried and laborious, and the countenance evincing great anxiety. An opening was made into the larynx that seemed sufficiently large for the purpose of respiration; a quantity of mucous was ejected from the opening, but no benefit derived from the operation; very little hemorhage took place: he became extremely restless, and died in half an hour after the operation.

DISSECTION.

On opening the chest the cellular substance at the inner side of the sternum was found emphysematous, as well as the tissue in the mediastinum. Previous to the further prosecution of the dissection an incision was made from the sternum to the symphysis menti, when the following appearances presented them-

selves: the left tonsil considerably ulcerated, fauces much inflamed, glottis highly vascular, its aperture almost closed; the larynx and trachea bore marks of violent inflammation, and an effusion of reddish coloured tenacious matter extended from the upper part of the thyroid cartilage to the third of the tracheal rings, by which the diameter of the larynx was much diminished. The operation was performed about the middle of this space.

The following are the experiments performed by Schmidt, referred to in note, page 12.

EXPERIMENTA.

Si quærimus, num in animalibus arte anginam membranaceam producere possimus, quæstio illa affirmanda est. Jam antea *Duval*, *Brest*, *Saissy*, *Albers*, *Jurine* experimenta in animalibus instituerunt, et eadem meis congruentia resultata obtinebant; attamen *Jurine* in experiendo haud diu satis perseverebat, necans animalia jam ante pseudo-membranæ formationem. Dicet aliquis fortasse hæc experimenta ipsemet instituere haud indiguisse: at persuasus sum, semper aliquod emolumenti erui posse, partim convincendo memetipsum de hac re, partim comparando mihi propriam experientiam de his rebus ab aliis quidem jam observatis; paucis ideo verbis referam, quid e meis experimentis intellexerim. Quamquam larynx tracheaque organa persensibilia sint, attamen inveni interdum perdifficile, imo impossibile esse, in iis tantam inflammationem producere, quæ a membrana mucosa et glandulis muciparis usque ad systema vasorum sanguiferorum hujusce membranæ se extendat et tantam exsudationem efficiat, quanta ut animal vitam omittat, opus est. Experimenta quidem in mensibus Junii et Julii institui, quod tempus ad effectum fortasse aliquid contulit, cum aëris tempestas percalida, aridaque esset. Præterea experientia me etiam docuit, animalibus jam aliquid provectioribus minorem huic morbo producendo dispositionem esse, et perdifficile in eo gradu in illis

morbum producere, ut eo interirent, suadeo igitur si arte in animalibus anginam membranaceam producere velis, adhuc juniora animalia eligere, quia iis organa receptiora et major totius organismi plasticitas. Denique etiam inveni, remediis pereficacibus ad inflammationem illam producendam opus esse.

I. Cani duorum annorum colli crines tondebam, tunc cutem longitudine duorum digitorum incidebam, cultro ligamentum conoideum perforabam et per fistulam aliquas tincturæ jodinae e granis sex jode in drachma una spiritus vini rectificatissimi solutas guttulas in foramen infundebam, tunc vulnus tegumentorum communium sutura cruenta claudebam. Canis subito tussiebat, aucta salivae secretio statim ex ore fluebat, vox rauca et per totum diem nil edebat. Die insequenti tristis, permolestus erat, semper humo jacebat, nasus aridus, calidus, respiratio sibilosa, lingua muco albido tecta erat. Circa meridiem symptomatum remissio apparebat, aliquid vegetior erat et nunc aliquid lactis bibebat, sed latratus sonus raucus, sibilosus erat. Tertio die post operationem canis sæpius tussiebat et massam mucosam vomitu ejiciebat, ceterum sanus erat, appetitus melius redibat, quamquam usque ad diem octavum pluries tussiebat, illa incommoda tamen sensim evanescebant.

II. Gallinæ tres cartilagines, seu annulos tracheæ infra cartilaginem cricoideam aperiebam et per fistulam aliquas guttas emulsionis, constantis e granis sex mercurii sublimati corrosivi in drachma dimidia aquæ distillatæ solutas et cui scrupulum unum gummi mimosæ et drachmam unam olei terebenthinæ addidi, infundebam et vulnus sutura statim claudebam. Respiratio subinde statim sibilosa erat, vox omnino sistabat, salivæ secretio aucta ex ore effluebat. Sequenti die crista per calida tactu sentiebatur, rubra erat, sic symptomata fere ad vesperum continuebant, quo tempore adhuc augebantur et quarto die post operationem decumbebat. Totum corpus œdematose tumebat, crista cœrulea, tunica interna laryngis colore coccineo induta usque ad bronchia, et a rima glottidis fere duos digitos in tracheam pseudomembranam formatam se extende-

bat, attamen haud tanti volumnis erat, ut plane eam clauderet; bronchia ut pulmonum substantia sana erant.

III. In feli tres mensium duas cartilagines infra cartilaginem thyroideam insecabam et per fistulam aliquas tincturæ jodinæ guttulas infundebam et vulnus sutura claubebam. Subito salivæ aucta secretio ex ore fluebat, vox statim rauca, sæpius sternutabat et tussiebat, respiratio ipsa sibilosa. Sequenti die aliquid lactis bibebat, respiratio nunc autem molestissima, semper capite et collo protenso decumbebat, in eo verisimile, ut tracheam dilataret, nam illum situm in sequentibus experimentis sæpius observavi. Ad vesperum symptomata omnia vehementiora erant, respiratio admodum difficilis, ut solis abdominis tantum musculis perageretur, et sibilum illo inspirante fortius audiretur. Tertio die mane post operationem mortua erat et sectio postea instituta est. Totum corpus adspectu œdematosum apparebat, venæ jugulares externæ, cava superior et inferior, atrium venarum cavarum sanguine valde tumebant, tracheæ externa superficies haud rubra, dissecta autem, pseudomembrana a cartilagine cricoidea ad bronchia se extendens ostendebatur, quæ facile ab annulorum tracheæ lateribus solvi poterat, sed pariete musculari firme adhærebat, tunica intima tracheæ substantiaque pulmonum vero sanæ erant.

IV. Tribus hebdomadibus post in eodem cane denuo experimentum institui, dum tres tracheæ annulos infra cartilaginem cricoideam incidebam et aliquid jam memoratæ solutionis mercurii corrosivi per fistulam infundebam, tum vulnus autem sutura cruenta claudebam. Vox postea statim rauca, sæpius tussiebat sonitu peculiari anginæ membranaceæ simili. Sequenti die nil edebat, nec bibebat, ut jám tertio die melius se habebat, symptomata nunc denuo meliora erant, quamquam octo dies leviori gradu remanebant, nam sæpius tussiebat et vomitu massam mucosam ejiciebat. Cum nullum dispositionem pro aug. membranacea arte producta habere videretur, remedium fortius infundere statuebam; ideo quatuordecem die-

bus post cum satis jam sanatus esset, iterum experimentum eodem modo institui, sed per fistulam mixtionem acidi sulphurici diluti cum aqua muriatico-oxygenata ana infudi, sed effectus iste etiam momentaneus erat.

V. In alio cane quatuor menses nato, lege artis laryngotomiam instituebam et aquam muriatico-oxygenatam per fistulam infundebam, sed absque ullo alio effectu, quam ut vox per aliquot dies raucior, quam in statu sano erat. Octo diebus post ubi jam plane restitutus erat, tres cartilagines infra cartilaginem cricoideam incidebam et aliquas guttas tincturæ jodinæ per fistulam infundebam. Animal illico valde eo afficiebatur, ut vox subito perrauca et statim diarrhœa et convulsiones orirentur et magna salivæ quantitas ex ore effluëret. Sequenti die nasus aridus, calidus erat, nil bibens nec edens, pæne semper decumbebat, sub vesperum respiratio difficillime erat et sequenti nocte vitam finiebat. Sectione instituta membranam tracheæ internam ab epiglottide usque ad minima bronchia valde inflammata inveni, ramuli vasorum sanguinem vehentium veluti fluido artificiali inflati erant, præcipue in trachea et in tota superficie usque ad bronchia lympha fluida, spumosa, substantia sana erat, venæ jugulares, cavæ, cor ipsum sanguine impleta erant et pseudopolypi in iis apparebant.

Permulta adhuc experimenta adferre possem, quia plura adhuc institui, sed sufficientia jam credo esse, ad meam opinionem comprobandam: nam ex his experimentis sequitur, quod modo artificiali angina membranacea in animalibus produci possit et quod pseudomembranæ formatio et in hominibus et in animalibus a præterita semper inflammatione dependeat; denique quod in provectioribus, ut experimentum I. et IV. docuit difficilius sit, talem inflammationis gradum producere, partim quia ampliora, nec totus organismus tanta plasticitate præditus; et eo etiam evenit, ut morbus noster rarius in adultis appareat et necet, quam in infantibus.

CASES OF ABSCESS IN THE NECK IMPEDING RESPIRATION.

See page 129.

John M'Dona, æt. 37, admitted into the Meath hospital 7th March, 1824. There is extensive tumefaction and hardness of the upper part of the neck, more particularly at the right side, with great soreness and tenderness to the touch, and excessive difficulty of breathing. The respiration is laboured and heaving, but there is no croupy sound; however he can only breathe easily whilst in the erect position. He cannot open his mouth more than to separate the teeth about ¼ of an inch. The tumor is not discolored, and it pits on pressure. Its formation was preceded by very considerable fever, shivering—heat of skin—head ache—and costiveness of the bowels.

The patient suffered so much distress that I resolved on opening the abscess if possible, and I made an incision deeply into the neck, a little anterior to the course of the labial artery; but for a full inch in depth the cellular tissue was œdematous, and filled with a substance of a pale sea-green colour, and of a consistence a good deal softer than cheese, but not fluid. Having cut through this and carried the incision a little deeper, I could feel the labial artery pulsating distinctly at the superior part of the wound, and there was apparently a large branch crossing about its centre. In this state, where an artery wounded in so deep a cavity must have given a great deal of trouble, I was unwilling to proceed, and the patient was put to bed, the whole of the front of the neck being enveloped in a poultice. The patient felt immediate relief, from the tension of the parts being removed, and breathed with much greater facility. He was ordered some common purgative medicine.

On the following day, when the parts were examined, I was agreeably surprized to find the tumefaction of the neck reduced to nearly half its size: the patient could open his mouth so far as to allow his tongue to be examined, and he

breathed quite freely. The abscess had burst into the wound, and discharged an immense quantity of pus of an abominably fetid odour, mixed with patches of sloughy cellular substance. From this moment he began to recover, and left the hospital in three weeks with the wound nearly healed.

Soon afterwards another case occurred of exactly a similar nature, and for the purpose of trying what the result would be, I made the incision exactly in the central line of the neck, so as to lay bare the thyroid cartilage. In this case, the matter was somewhat more tedious in making its appearance, but at the end of 30 hours it had burst into the wound. The ease afforded by the incision in the first instance was as remarkable in the one case as in the other.

Margaret Henessy, æt. 40. Admitted into the Meath hospital June 19, 1826. Complains of a sense of suffocation, particularly at night: there is very little cough, but there is considerable soreness on pressing the thyroid cartilage and windpipe, and she has a sensation of something very foul coming up with her breath. The breathing is evidently oppressed, but not in the least degree sonorous, and there have not been any febrile symptoms.

She had some aperient and antispasmodic medicines without relief, and on the 21st a slight fullness and œdema appeared on the lower part of the neck, nearly in the centre, and inclining to the left side; but there was strong arterial pulsation, evidently that of a large vessel to be felt in that spot. There did not appear to be very great distress in respiration; but as she complained so much, and said she must be suffocated if something was not done, I resolved to attempt opening the abscess, which I was quite satisfied existed deeply in the neck.

I made an incision along the central line of the neck (of course avoiding that part where I suspected a large artery to

lie) down to the trachea, which laid bare the three superior rings. Not a drop of purulent matter followed the incision, but she expressed herself relieved, and shortly after fell into a sound sleep, such as she had not enjoyed during several preceding nights.

On the 23d I found that the abscess had burst into the wound, and there was a large discharge of very fetid pus on the poultice. On introducing a probe into the opening, it passed obliquely to the depth of three inches or more from the surface, apparently round the trachea, and behind it. Pressure on the lower part of the left side of the neck caused the discharge of a quantity of matter mixed with bubbles of putrid gas.

This woman was discharged from hospital quite recovered on the 20th July; but she complained for a long time afterwards of soreness in the throat, and difficulty of swallowing, in the situation the abscess had occupied.

Catherine Miller, admitted into the Meath hospital July 13, 1826, with great tumefaction at the upper and fore-part of the neck, accompanied by difficulty of breathing, short cough, pain and difficulty of swallowing, excessive restlessness, and some symptomatic fever. The tumor was hard, but pitted on very firm pressure being made.

An incision along the central line of the neck carried deeply, discharged the matter, which seemed at first to have lain on the thyroïd cartilage, but on closer examination it was found that this structure was not denuded. The discharge was very fetid, and small in quantity, but the handle of the knife could be turned an inch all round in the cavity, which seemed to contain a dark-coloured slough.

The wound was poulticed, and she had some aperient medi-

cines. In the course of three or four days the discharge became healthy, and the sloughs were coming away, when she was seized with dysentery, which at that time was very prevalent in the hospital, and the wound again assumed an unhealthy aspect, its edges became dry, and the discharge ichorous. On the subsidence of this attack she was teized with hysteric symptoms, and suffered an attack of cynanche tonsillaris, and it was only after an interval of two months that she was discharged.

The cicatrix in her neck was large, red, and slightly puckered; not very unlike what would have been the result of a scald or burn.

Pat. Reilly, æt. about 40, was admitted into the Meath hospital Sept. 11, 1826. Had shivering on the 4th, with cough, sore throat, and difficulty of breathing, for which he took some medicine without relief, and has since had nothing until his admission.

There is a very large swelling on the right side of the neck, extending from behind the angle of the jaw, forwards nearly to the centre of the larynx, and more than a hand's breadth downwards. Its colour is dark red; it is very hard, but retains the mark of the finger if firmly pressed upon it. There is very great difficulty of breathing, with constant teizing cough, and incessant attempts to expectorate without effect. The paroxysms of cough at night are very severe, making him retain the erect position: high symptomatic fever; quick, full pulse; skin hot, &c. &c.

The abscess opened by an incision $1\frac{1}{2}$ inches long, a little in front of the anterior edge of the mastoid muscle, and a quantity of very fetid pus discharged. All the cellular tissue about the wound seems dark-coloured, ragged and sloughy. He has had some opening medicine, and an opiate draught.

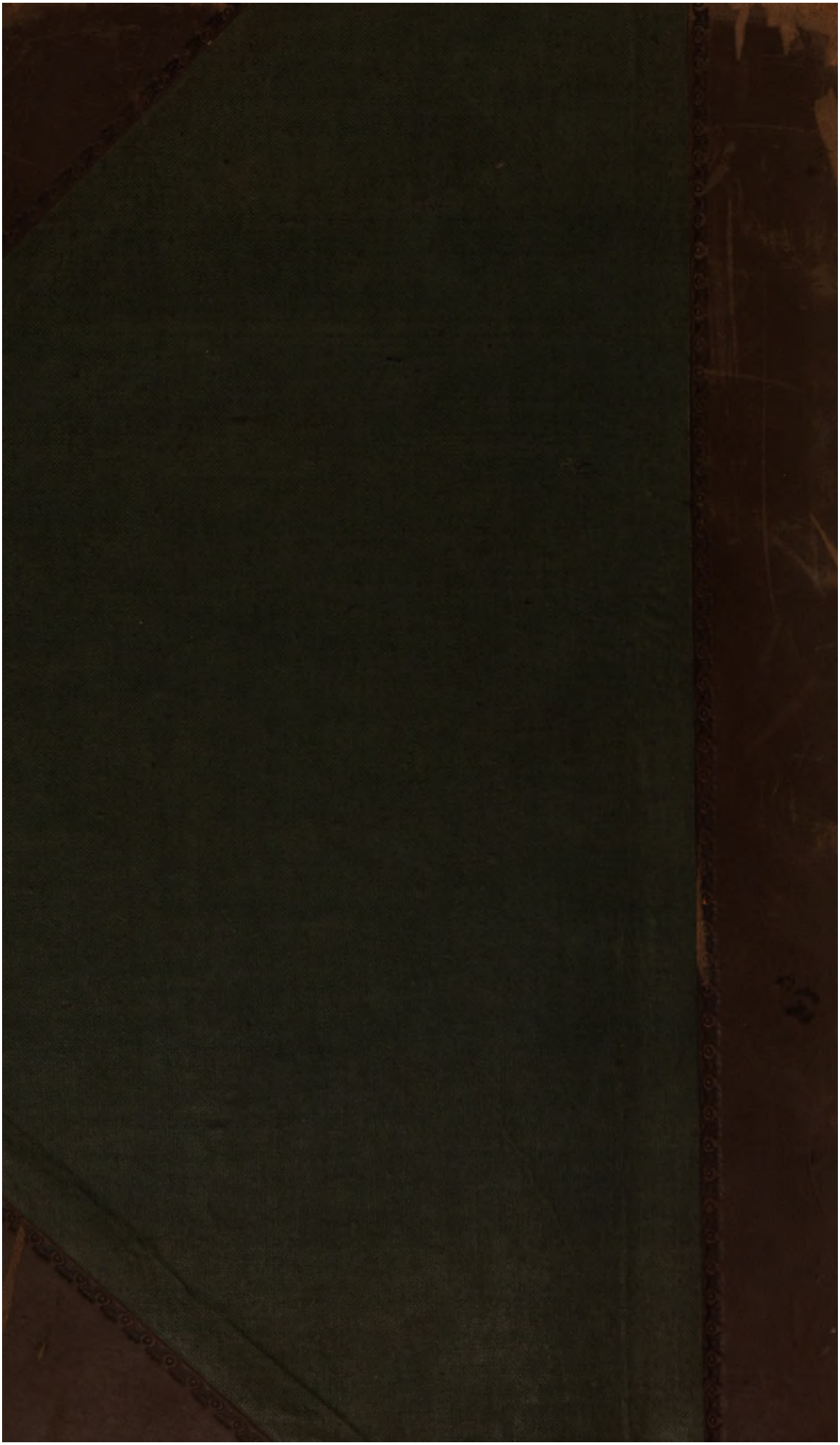
Sept. 12. Not so much relieved as might have been expected; the opening into the abscess enlarged.

Sept. 14. Swelling not much diminished in size; wound looks sloughy and unhealthy. Patient, by stopping his mouth and nose, can blow air mixed with pus out through it. He has spit up a quantity of dark-coloured blood mixed with pus. Pulse very full, 96; tongue loaded and white, notwithstanding that his bowels are very open.

During the night he was seized with a paroxysm of cough. Blood spouted from the mouth, and oozed in small quantity from the wound, and after a struggle of a few minutes he died.

DISSECTION.

The sac of the abscess extended from an inch above the angle of the jaw to the root of the neck below, and inwards so as to compress the larynx, and push it, the œsophagus, the carotid artery, and the jugular vein, towards the left side. There was a communication between it and the mouth, above the os hyoïdes, large enough to admit the finger.

The blood had come from the lungs,—the cellular tissue of the lungs was loaded with it. There was some in the trachea, in the œsophagus, and even in the stomach. There were several large clots in the sac of the abscess. The carotid artery and jugular vein were quite sound, and every branch that could be traced was examined, to see if any bleeding had come from above, but all were sound. It was curious to see such an immense loss of blood without the possibility of discovering any vessel whatever from which it directly proceeded.

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