On diphtheria : its nature, varieties, pathology, diagnosis, and treatment / by Robert Hunter Semple.

DIPHTHERIA

SEMPLE

ON DIPHTHERIA.

ITS NATURE, VARIETIES, PATHOLOGY, DIAGNOSIS, AND TREATMENT.

Works by the same Author.

MEMOIRS ON DIPHTHERIA (Bretonneau, Guersant, Trousseau, Bouchut, Empis, Daviot), Sydenham Society.

ON DISEASES OF THE HEART, Their Pathology, Diagnosis, Prognosis, and Treatment.

MEMOIRS OF THE BOTANIC GARDEN AT CHELSEA.

ON

DIPHTHERIA.

Its Nature, Varieties, Pathology, Diagnosis, and Treatment.

BY

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PREFACE.

THIS little work is again presented to the Profession for the simple reason that the first issue is exhausted. It is reprinted exactly as it stood when it was first written, with the exception of a few verbal and typographical corrections, because I have deemed it only fair to myself to show that the doctrines which are now beginning to be recognised on the subject of Diphtheria were published by me many years ago. Nothing therefore is altered or retracted, but, inasmuch as more information has been gathered, and more confirmation has been afforded of the principles laid down, some new matter has been added in the shape of foot-notes, and in an Appendix, and many references are given to British and foreign authorities on the subjects discussed. Most of the matters contained in the Appendix including the Section on Treatment, were written several years ago but not published.

8, TORRINGTON SQUARE,
LONDON, *Jan.* 31, 1879.

CONTENTS.

FIRST MEMOIR, 1871.

SECOND MEMOIR, 1872.

APPENDIX.

(FIRST MEMOIR, 1871.)

ON DIPHTHERIA, AND THE DISEASES ALLIED TO IT, OR WHICH MAY BE MISTAKEN FOR IT.

About the year 1857 it began to be mentioned in medical and general circles that a new disease had made its appearance in some parts of France, and especially at Boulogne, where it had attacked and carried off some of the English visitors. Before the alarm and surprise occasioned by this unwelcome news had subsided, it was announced that the same disease had appeared, although in a sporadic form, in many parts of Great Britain, beginning near the coast of England, as in the counties of Kent, Essex, Suffolk, and Norfolk, and gradually extending to the interior of the island. At first, it was thought by the medical profession that the disease was not really new, but only a severe form of some well-known complaint, and I can testify, from actual conversation with some distinguished physicians at that period, that the existence of any special or peculiar malady as a visitor to this country was almost entirely disbelieved. But so many cases continued to present themselves that attention was at length awakened to the subject, and in the year 1858 I was appointed to collect together and to edit, for the New Sydenham Society, whatever memoirs were in existence on the subject of this peculiar affection, attacking the throat, and exhibiting an extraordinary and rapid fatality in many cases, and which had spread alarm over the country.

On entering upon the task, I found that the literature of the subject was exceedingly meagre, and unquestionably none of the English text-books on the Practice of Medicine, existing at the date to which I allude, made any mention of an affection corresponding in its features to the newly-described epidemic; and even among the works specially devoted to the diseases affecting the throat and air-passages, no descriptions could be found which exactly represented its symptoms and appearances. Among scattered monographs, it is true that some epidemics were described, which bore, in many respects, a resemblance to the new disease, and some of their symptoms were noted; but, as will be hereafter mentioned, the descriptions were too vague to be accepted as accurate representations of any special affection, or they were so obviously superficial and imperfect as to merit very little confidence. In fact it was only in France where anything like accurate definitions of the unwelcome visitor had been laid down; and subsequent information proved that the French physicians had really understood and described a disease which had existed some years on the other side of the Channel, but which had not, up to the year 1858, been known, or at least been recognised as a distinct malady in our own country.

The most important, and the first in point of time, of the French contributions to our knowledge of this new disease, consisted of a series of memoirs by Bretonneau, a physician practising at Tours, who had observed several epidemics of the malady which had occurred in that town. So little, however, were Bretonneau's researches appreciated or understood in this country, that not a copy of his work could be procured for the purpose of my edition from any of the usual sources of supply; none of the foreign booksellers had the book, nor were they able to procure it; and even the French physicians in this country to whom application was made had no copy in their libraries. It was only by the kindness of the Royal Medical and Chirurgical Society that I obtained the loan of the single copy which its library possessed, for the purpose of my collection of memoirs. The College of Surgeons of England has a copy of Bretonneau's Memoirs, but I very much doubt whe-

ther a copy exists anywhere else among the public or private libraries in this country, and, as far as I know, the collection of 'Memoirs on Diphtheria,' edited and translated by me for the New Sydenham Society, and published in 1859, constitutes the first complete contribution to the knowledge of the French doctrines on the subject in the British language.* During the preparation of that work, however, the study of the newly-described disease was pressed upon the mind of the medical profession by its increasing prevalence, and since the publication of the New Sydenham Society's volume, the contributions by British writers to the history of the affection have been both valuable and numerous.

The transition from the extreme of undue scepticism to that of excessive credulity is by no means uncommon, and while in 1858 and 1859 I found that only few people, professional or lay, believed in the existence of Diphtheria as a special disease, it would seem, on the contrary, from public records and from private conversation, that no malady is more common at the present day. Diphtheria now forms a most important entry in the General Registry of mortality, and if we may believe the statements of patients, an enormous number of persons have suffered from this disease, from which, however, the greater proportion have entirely recovered.† As I neither

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* This volume contains five memoirs written at different periods, by Bretonneau, the first having been published in 1826, and the fifth in 1855. It also contains a treatise, by Guersant, on Croup ('Tracheal Diphthérite'); one by Trousseau, on 'Diphthérite;' one by Bouchut, on Croup ('Tracheal Diphthérite'); one by Empis, on 'Diphthérite;' one by Daviot, on 'Diphthérite;' together with an appendix of bibliography and an Index.

† Before 1859, the word Diphtheria never appeared in the mortality returns; but after that year a great number of deaths were assigned to that malady, and the name has ever since appeared in the reports of the Registrar-General. It is a remarkable but by no means inexplicable fact, that while the number of deaths from Croup has in late years appeared greatly to diminish, the deaths from Diphtheria have enormously increased. The number of persons, again, who, after the introduction of the word Diphtheria into British nosology were said to suffer from the malady, was so multitudinous as almost to provoke ridicule. Only a few

disbelieved in the existence of Diphtheria in 1858, nor believe in its very general prevalence in 1871, I have written the present Memoir to point out as clearly and as briefly as possible what the disease really is, and what are the other affections with which it is often confounded, and with some of which, perhaps, it occasionally co-exists. I may at once state my opinion that Diphtheria, although a distinct form of disease, is still comparatively rare, but that, when it occurs, it is a malady of the most dangerous and often fatal character.*

In this country Diphtheria has lately almost always assumed an epidemic character, and, although it is no doubt contagious under certain circumstances, the instances of its actual communication by contagion are not very numerous.† It cannot be said that the occurrence of the disease in any given locality can be traced to any known conditions of insalubrity, and indeed some of the most apparently healthy spots have been among those where Diphtheria has shown itself in its most fatal form. Looking at my own experience, which I believe will be confirmed by the evidence of other physicians who attend large numbers of

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days since, a patient informed me in all sincerity, that she was such a sufferer from Diphtheria, that on the average she had had the malady twice a year for many years past!

* This opinion has been fully borne out by subsequent experience. The great epidemic of the disease which prevailed in this country in 1859, 1860, 1861, was succeeded by a long interval of comparative immunity, although limited outbreaks were reported from time to time, and single cases now and then occurred, in which no contagious or endemic influence could be detected. One such case was attended by myself, an undoubted instance of Sporadic Diphtheria, in which I made the post-mortem examination, and presented the specimen to the Pathological Society, in the year 1865. I have met with other similar instances, which have been also reported by me at the Medical Societies. ('Proceedings of Royal Med. Chir. Society, 1875.')

† This apparently paradoxical statement is supported by facts. In several instances observed by myself, I could not find, even after the most diligent inquiry, any evidence whatever of contagion; but the reported cases bearing on the contrary view are so well authenticated as to leave no doubt as to their truth, and to justify the utmost precaution in giving directions as to the isolation of patients suffering from Diphtheria.

patients, especially in hospitals and dispensaries, the close, confined, and ill-ventilated abodes of the poor in this metropolis by no means offer any large proportion of cases of Diphtheria, while the disease very often develops itself in the open parts of the country, where the hygienic position is unexceptionable. While, too, the poor contribute their supply of cases of the disease, they do so in by no means large proportions; and the better classes, who are surrounded with the necessaries and comforts of life, have often suffered grievously from the ravages of the malady. For myself, I may state that although I have been engaged for many years in extensive dispensary or hospital practice, and have been watchful to note every case of Diphtheria which might present itself, I have seen comparatively few instances among the poorer class of patients, while most of the cases which I have attended have been among the better classes, who come under notice in private practice.*

The first cases of Diphtheria which I myself observed occurred at Bagshot, in Surrey, in the year 1858, while I was preparing the volume on Diphtheria for the Sydenham Society. The chief features of this epidemic visitation were the following, stating the facts in as condensed a form as possible, and noticing both the positive and the negative signs of the disease. The persons chiefly attacked were children; the onset of the malady was insidious; there were none of the usual symptoms of fever; there were certainly none of the distinctive marks of scarlatina; the only distinguishing character on which reliance could be placed was the existence of a pellicular exudation on the tonsils and soft palate, and death was frequently sudden and unexpected, sometimes apparently from syncope. I made post-mortem examinations of the cases which proved fatal, and I exhibited the specimens to the Pathological Society, where specimens were also shown by other members.† Since that time I have seen many cases of the disease, and very many more cases

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* It is unnecessary to point out how painfully these opinions have been confirmed by recent occurrences.

† 'Transactions of Pathological Society of London,' vol. x.

which were said to be Diphtheria, but which were not really so, and the following remarks are intended as a contribution to the history and diagnosis of the malady in question.

HISTORY OF DIPHTHERIA.

Bretonneau has devoted much research and exhibited great learning in tracing the descriptions of disease found in various medical writings and compiled at different periods, and which he refers to Diphtheria, although not described by the authors under that name. He conceives, for instance, that Aretæus has depicted it in an account which that writer has given of an affection occurring in Egypt and Syria, and called the Egyptian or Syriac ulcer, and which seems to have chiefly attacked the tonsils. But Bretonneau does not maintain that, with this exception, any authentic records of the existence of a disease resembling Diphtheria can be found before the end of the sixteenth century,* since which time he thinks that it has constantly shown itself in every region of the old or new continents.

The disease continued for a long time in Spain, and subsequently it prevailed in Italy, and a large number of persons died of it in Naples. Towards the middle of the last century the epidemics of the disease occurred more or less frequently in France, Sweden, and America, and it is said that Washington lost his life from an attack of the malady. The authors who have entered into details undoubtedly show that the pellicular or pseudo-membranous exudation existed in many of their cases, which Bretonneau would include under the head of Diphthérite, but still the descriptions in several instances are meagre and unsatisfactory, and leave us in some doubt whether they really refer to the same affection as that described by Bretonneau; and it is even

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* The descriptions of Hippocrates and Celsus, supposed to refer to Diphtheria, are too vague to lead to the belief that those writers had really seen the disease. The passages in question might apply to any severe affections of the throat.

doubtful whether the scorbutic gangrene of the mouth, and the malignant angina, both of which Bretonneau himself seems to consider as identical with Diphtheria, are not different and distinct affections from those which are now included under that term. It is now generally admitted that the disease which was elaborately described by our countryman, Fothergill, was not Diphtheria, but a form of malignant scarlatina, a distinction which is clearly pointed out by Bretonneau.

Bretonneau first observed the disease at Tours, where he resided, and where on several occasions it occurred as an epidemic, the first outbreak being from 1818 to 1821; and in the last-named year, Bretonneau read two of his memoirs on the subject before the Académie de Médecine, but these communications were not published till 1826. Other epidemics succeeded, and were described by him in subsequent memoirs, in which he developed his views relating to the pathology, diagnosis, history, and treatment of the affection. He called it Diphthérite, from the pellicle (*διφθέρα*) which characterised the disease; but English writers have adopted the word Diphtheria, as a corresponding expression, avoiding the termination in *itis* as probably implying an inflammatory origin, a point which is not at present proved.

Since the publication of Bretonneau's memoirs, the disease which he describes as diphthérite appears to have prevailed very extensively, though at different intervals and in different localities in France, and many French authors and a few German ones have written monographs and treatises describing the affection under the name proposed by Bretonneau; but, as I before observed, hardly any English writer alludes to the disease under the new name. Dr. Conolly, however, in a review of Bretonneau's memoir, in 'The London Medical Repository' of 1826, relates some particulars observed by himself at Tours, when watching an epidemic of the disease, and Dr. Mackenzie, in an article on 'The Symptoms and Cure of Croup,' published in the same year, although he does not employ the word diphthérite, describes a condition of the throat and windpipe corresponding to Bretonneau's definition of that affection. It may be stated, therefore, in general terms, that diphthérite, as a distinct

affection, was not recognised in this country until about the year 1857; although many French writers had adopted Bretonneau's views, some had partly contested them, but all had admitted the facts which he had described. That a peculiar epidemic had broken out at Tours in 1818, and that a similar outbreak had frequently occurred in France, was incontestable, but it was not universally conceded that gangrenous sore-throat was, as Bretonneau maintained, the same disease as diphthérite, nor was even his proposition that croup and diphthérite were identical, received in all quarters without hesitation among French physicians.

But while the opponents of the identity of croup and diphthérite in France, were very few, those who admitted this identity were numerous, and their authority was very great. Trousseau, in particular, who was a pupil of Bretonneau, entirely adopted the views of the physician of Tours; Guersant, in the 'Dictionnaire de Médecine,' in 1835, writes of croup as synonymous with tracheal diphthérite; Bouchut, in his 'Traité Pratique des Maladies des Nouveaux Nés et des Enfans à la Mamelle,' in 1852, regards croup as the 'diphthérite of Bretonneau,' and describes it as such; Empis, in an article of the 'Archives Générales de Médecine,' in 1850, who had witnessed an epidemic of the disease in the Hôpital Neckar in 1858, also completely endorses the views of Bretonneau as to croup and diphthérite being the same disease; and Daviot, in an historical account of an epidemic observed by himself in the Department of the Saône-et-Loire, and in that of La Nièvre, in the years 1841, 1842, 1843, and 1844, also regards croup as a form of diphthérite, and calls it croupal diphthérite. Rilliet and Barthez, the well-known authors of the work on 'Les Maladies des Enfans,' in the article, 'Angine Pseudo-Membraneuse,' published in 1853, consider croup and the form which follows pseudo-membranous angina, or sore-throat, as identical; but they dispute Bretonneau's accuracy, and I think justly, in confounding diphthérite with gangrenous affections. On the other hand, the French writers who denied the identity of croup and diphthérite were very few, and those appear to have had very little, if any, practical knowledge of the affection. I cannot, at

present, find any French writer of authority, whose objections against the identity of the two affections are worth recording. But the objections against admitting the identity of diphthérite with gangrene of the throat are very strong, and in this respect Bretonneau's views are not generally received by his compatriots.

In Great Britain, among the numerous medical writings which appeared between 1826 and 1857, the name of Diphtheritis hardly ever occurs. Among the exceptions to this observation, however, are the reference to the diphthérite of Tours by Dr. Conolly in 1826, and occasional monographs regarding local outbreaks of the affection by some medical writers in the English and Dublin journals. Among the systematic treatises on medicine published in Great Britain up to the later period just alluded to, diphtheritis finds no separate place, and the authors of those works, when they allude to diphthérite at all, usually argue that it is not the same disease as croup, and they sometimes point out the diagnostic marks which they regard as distinguishing the two diseases.

Since 1857, however, the disease has become so prevalent in Great Britain that its special features have been almost universally recognised, and the points at present open for consideration are its exact nature, its causes, its mode of propagation, and its treatment, on all of which some uncertainty still prevails.

PATHOLOGY OF DIPHTHERIA.

It may be stated in general terms that the essential feature of Diphtheria consists in the production of a pellicular exudation on some part of the surface of the mucous membrane or of the skin. The disease generally begins in the throat, the tonsils, the uvula, and the soft palate being the parts on which it is usually first observed. From this region the disease often spreads in different directions, either downwards into the œsophagus, the larynx, the trachea, or even the bronchial tubes; laterally into the Eustachian tubes; or upwards into

the nose. It has also occasionally been observed on those portions of the mucous membrane which are situated near one of the outlets of the body, as near the anus, on the vagina, or on the end of the penis; but it is remarkable that it does not appear in the interior parts of the body, as in the stomach or intestines.* It is also occasionally, although rarely, found upon the skin, and then only under circumstances where the skin has been exposed to some irritation or abrasion, and during an epidemic of Diphtheria. It never occurs upon the skin when the epidermis is entire, but only when the latter has been removed by the occurrence of ulceration, or by the infliction of a wound, or by the application of a blister, or by the friction of one part of the skin against another, as at the fold of the thigh or behind the ear. Putting out of consideration, for the present, the existence of cutaneous Diphtheria, which occurs only as a secondary or concomitant phenomenon during an epidemic, the primary disease almost always manifests itself at the back of the throat.†

This being the primary seat of the pellicular exudation, and the region where it must always be looked for, the nature of the pellicle is the next important subject for consideration. It seems to be formed by the effusion, from the diseased surface, of a peculiar fluid of a mixed serous and mucous nature, and concreting into a kind of thin membrane of considerable tenacity and consistency. As soon as one pellicle is formed, another is generated below it and extends beyond its borders, and this second pellicle is raised by a third, which likewise passes beyond the borders of its predecessor, and so on in succession, so as to give rise to a somewhat tough membrane, having a stratified arrangement, in which one plastic layer is superposed upon another. The membrane thus formed is in

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* Some German writers, as will hereafter be mentioned, have extended the meaning of the word Diphtheritis to include many diseases of the stomach and intestines, and even of the uterus and gall-bladder, and have thereby introduced great confusion into the whole subject.

† The exceptional cases, in which the disease primarily manifests itself in the trachea, are alluded to in a subsequent note.

general easily removed from the subjacent mucous membrane, leaving the latter red and congested, but without any solution of continuity. The separation of the diphtheritic membrane may be readily effected by means of a pair of forceps.

The nature of the membrane itself is not yet very clearly ascertained, and neither general theoretical considerations of pathology nor accurate microscopical examinations have hitherto thrown much light on the subject. At first sight it would seem that the false membrane is identical in its character with that which is effused from serous membranes in a state of inflammation, as, for instance, from the pleura or pericardium; but, in the first place, the diphtheritic exudation is poured out from mucous membranes only, or from abraded skin, and secondly, it is very doubtful whether inflammation is really the agent of the diphtheritic dyscrasia. There are one or two exudations which bear considerable resemblance to the pseudo-membrane of Diphtheria, as, for instance, the buffy coat of the blood, the fibrinous exudation of pleurisy, and the membrane of a blister, and it cannot be affirmed that as yet either chemistry or the microscope has sufficiently distinguished one from another.

But the fibrinous or buffy coat of the blood, besides its fibrinous element, contains some blood corpuscles, both red and white, and is destitute of epithelial scales and pus-globules; the fibrinous exudation of pleurisy, besides its fibrinous network, contains a great quantity of pus-globules, and is destitute of blood corpuscles; and the membrane of a blister, though containing fibrine, is destitute of blood corpuscles, although it comprises epithelial scales.

The pseudo-membranous pellicle of Diphtheria has been very carefully examined microscopically both by French and English observers. It contains fibrinous filaments closely interlaced together, some pus-globules, and very numerous epithelial scales. Dr. J. S. Bristowe, in a very elaborate Report on the 'Morbid Anatomy of Diphtheria,' in the Tenth Volume of the 'Transactions of the Pathological Society,' regards the diphtheritic exudation as being essentially composed of epithelium and coagulated lymph, the latter resembling that poured out

on serous membranes, and consisting of a network of fibres. The only distinction he can draw between the fibres of the diphtheritic exudation and those of a false membrane on a serous surface, is, that in the former the fibrillæ are more minute; but even this distinction he thinks more apparent than real. He always observed, he says, that the free surface of the diphtheritic membrane is made up chiefly of epithelium, and the deep almost exclusively of fibrine: from which it would appear that the effusion first poured out from the mucous surface entangles the epithelial scales, and that the subsequent effusions accumulate between the true epithelial layer and the basement membrane, becoming successively more and more free from entangled cells, and more and more purely fibrine. Dr. George Harley, however, who also has made microscopical examinations of the diphtheritic exudation, denies the existence of fibrine, and regards the membrane as essentially composed of cells. On the whole, while admitting that the diphtheritic exudation contains abundant epithelial cells and scales, with some plastic material binding them together, I think it very doubtful whether microscopic research throws much light on the true nature or pathology of Diphtheria.*

Another question of equal or greater importance in reference to this disease is, whether it is to be regarded as an inflammation. The French writers all answer the question in the affirmative, but in Great Britain the inflammatory character of Diphtheria appears so doubtful, that, as has been mentioned, the word *diphthérite* has been discarded as possibly indicating its inflammatory nature. It is, however, so difficult, in the present day,

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* At the present time (1879) this remark is nearly as much applicable as when it was first written; for notwithstanding the acute intelligence which has since been brought to bear on the investigation, and the excellent construction of modern microscopes, it cannot be said that the minute examination of the false membranes of Diphtheria has as yet led to any very definite conclusions. The fungoid or bacterial theory of Diphtheria will hereafter be noticed. The attempt to form a microscopical distinction between the membrane of 'membranous croup' and that of 'laryngo-tracheal diphtheria' has turned out, as might have been expected, an utter failure.

to define inflammation at all in precise terms, that none of the usual or ordinarily accepted tests of that condition can be safely applied to the solution of the present question. If it be admitted that the diphtheritic false membrane is essentially similar to that thrown out in pleurisy, one argument in favour of the common inflammatory origin of both might fairly be drawn; but if the former be made up only of epithelial scales, with a connecting plasma which is not essentially of a fibrinous nature, then the analogy fails. On the whole, it must be said that the inflammatory character of the deposit itself is not yet established. If, again, we regard the symptoms of the disease, we equally fail to discover the usual signs of inflammation. The premonitory symptoms are in general by no means well marked, nor is there heat of skin, or thirst, or several of the other ordinary signs of inflammation. The pulse is usually rapid, but very weak, and the symptomatic fever is sometimes so slight that the patient scarcely seems ill at all in the early stages of the complaint, and in the more advanced ones the signs are usually only those of local, though very severe, suffering. While hesitating, therefore, to deny altogether the inflammatory origin of Diphtheria, I can by no means admit it to be of such a nature. It seems to me to be a disease *sui generis*, consisting in some peculiar morbid condition of the mucous membrane, and occasionally of the skin, but not necessarily characterised by the phenomena generally classed under the head of inflammation.*

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* Subsequent experience has all tended to confirm the opinions here expressed; but although I believe it to be impossible, with our present knowledge, to recognise Diphtheria as a distinctly inflammatory disease, its analogy with the fevers, both continued and eruptive, has become more and more clearly manifested. The first accurate records relating to the rise of temperature in Diphtheria were made, I believe, by an Italian physician, Dr. Faralli, in a paper of his reviewed by me at the time, on the 'Ciclo Termico della Difterite' in the journal *L'Imparziale*, 1872; and in a case lately observed by myself, in which the temperature was accurately recorded from day to day, and where the patient recovered, the highest degree reached was 101°2. Fahr. Dr. Faralli found that in some of his cases the temperature rose generally to 104°, and he is convinced that fever is a constant phenomenon in Diphtheria.

Again, Is Diphtheria a local or a constitutional disease? Its almost constant presence on the soft palate, tonsils, and uvula would at first seem to indicate its local nature, but its appearance in other and often remote parts forbids us to entertain such a supposition; and its rapid propagation to adjoining surfaces from those which it originally attacked, indicates the presence of some constitutional morbid action rendering contiguous organs liable to its invasion. Its appearance on the skin also, on raw or blistered surfaces, during a diphtheritic epidemic, clearly indicates the presence of some specific deleterious agent introduced into the blood. The fact that epidemics of the disease have broken out in many places, quite irrespective of any causes acting directly upon the tonsils or soft palate, points very clearly to the presence of a poison existing in the air and acting on the human system. None of the usual agencies which give rise to the affections usually seated at the back of the mouth and throat can be said to produce Diphtheria; locality appears to have no influence upon the origination or the disappearance of the disease; the weak and the strong seem to be pretty equally liable to its attacks; and the want of sanitary precautions does not tend materially to develope its presence, nor do the most carefully devised hygienic precautions prevent its appearance.*

THE DISEASES FOR WHICH DIPHTHERIA HAS BEEN OR MAY BE MISTAKEN.

Although the history of Diphtheria, properly so called, dates only from the year 1818, when the epidemic observed and recorded by Bretonneau broke out at Tours, it is very pro-

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* These observations are, unhappily, nearly as true now, as when they were written. Nevertheless, it is the duty of every one to make further and more stringent inquiries into any local causes which may seem to favour the spread of the disease, and, if possible, to devise precautionary measures. While I am writing, an attempt is being made to show that Diphtheria may be propagated through the medium of the milk-supply in certain districts.

bable that it existed long before, although its true nature was mistaken. Bretonneau himself has collected together in his memoirs a great amount of historical evidence to show that, at various periods, epidemics resembling that which he described have appeared in various parts of Europe, but the descriptions are often too vague to be depended upon, especially in the absence of well recorded post-mortem examinations and of accurate observation during life. The diseases attacking the visible parts of the throat, it must also be observed, are so numerous, that the peculiar character of Diphtheria may have been very frequently overlooked, and the suddenness of the fatal catastrophe in very many of the cases has probably almost exclusively attracted the attention of observers. Since, however, the features of the disease have been more carefully studied, an opposite fault has perhaps prevailed, namely, to comprise under the general term of Diphtheria very many affections which have no claim to the title. Thus even Bretonneau, as has been observed, seems to have considered it as identical with gangrene of the throat, although he carefully distinguishes it from the malignant ulceration of the tonsils which often occurs in the worst forms of scarlatina.

The essential character of Diphtheria, then, being the exudation of a false membrane, almost always appearing first upon the soft palate, and possessing such tenacity and consistency that it may be removed in strips by a pair of dressing-forceps, it is not very difficult to distinguish the disease from other local affections; and yet the mistake has been so often made, not only in former times, but, at more recent periods, that the diagnosis demands the most careful inquiry.*

The following are the affections from which Diphtheria ought to be carefully distinguished, but it must be premised

* I have very little doubt that the mistake is made even now in many cases. When I find it recorded, as it is very often, that many hundred cases of Diphtheria have been all cured by some simple remedy, and that not a single death has occurred, I cannot help suspecting that the writer who records such a marvellous amount of success may have made some error of diagnosis.

that some of them, although distinct from Diphtheria, may occur as concomitants of that malady.

1. In inflammation of the tonsils, there are very often observed a number of small whitish or yellowish masses spread over one or both tonsils, and sometimes exhaling a very fœtid smell. But these masses are only sebaceous secretions formed in the follicles which abound on the surface of the tonsils. They never cohere into a consistent membrane, and they never extend either into the nasal cavities, or into the larynx. In fact, this common tonsillar affection presents so few points of actual resemblance to Diphtheria, that it scarcely deserves more than a passing notice, and yet it is to be apprehended that the mistake has sometimes been made.

2. Muguet, or Aphthæ, or Thrush, presents at first sight a considerable resemblance to Diphtheria, but its pathological characters and its physical conditions are totally different. This affection, as is well known, occurs both at the beginning and at the end of life, and is popularly regarded as an indication of failing vital power; and this view of its nature is not altogether unfounded. But it never can be considered epidemic, nor is it in any way contagious. Muguet presents itself in the form of a multitude of small white points, coalescing together so as to form very frequently a continuous layer, which invests the mucous membrane at the back or sides of the mouth, and appears like a false membrane. But if an attempt be made to detach this membrane by a pair of forceps, this object cannot be attained, because the points of which the membrane is composed adhere too slightly to one another to allow of their being brought away in strips. But the whole may be easily removed from the subjacent mucous membrane by means of a sponge, because there is not, as in the case of the diphtheritic membrane, any close adhesion to the underlying surface. In Diphtheria there is very considerable cohesion, and so much so that, when the false membrane is removed, blood is often effused, which is never the case with muguet. Again, muguet often affects the inside of the cheeks, and never extends to the larynx or trachea, while Diphtheria very frequently extends to the latter structures.

3. Scarlatina, in its local manifestations on the tonsils, presents several points of resemblance to Diphtheria, and the affinity between the two affections is the more marked, because there is a kind of pseudo-membranous exudation in both. The general resemblance is indeed so obvious, that mistakes have very frequently occurred, and there can be no doubt that the description of some epidemics in former times, referred by some recent writers to outbreaks of Diphtheria, really referred to epidemics of scarlatina. But the two affections are quite distinct, and probably depend upon totally different pathological conditions. Nevertheless, it is certain that the two diseases have in a few instances occurred simultaneously. But in the false membrane of scarlatina, as in muguet, it is impossible to obtain strips with the forceps, because the particles which compose it are held together by a very slight cohesion; and, on the other hand, the adhesion of the scarlatinal membrane to the subjacent surface is very slight, so that the membrane can be very readily scraped off. The scarlatinal membrane again, does not spread as that of Diphtheria does, but remains localised, and there is no instance of its propagation to the air-passages. In addition to these special characters, the general symptoms, progress, termination, and sequelæ of Diphtheria and scarlatina respectively, present very well-marked contrasts; the onset of the latter being recognised by well-known symptoms of fever, which are often and indeed generally absent in the former; the eruption so characteristic of scarlatina being absent in Diphtheria; death from scarlatina being due to general exhaustion or to the violence of the febrile paroxysm, that from Diphtheria generally occurring from suffocation; paralysis often supervening on Diphtheria, albuminuria generally following scarlatina.*

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* The progress of experience in Diphtheria has led me in some measure to modify the statements here made, though their general truth is by no means invalidated. The occurrence of death in laryngeal Diphtheria is, indeed, due in most cases to suffocation, but it is also due to the general poisoning of the system; and even in cases of the laryngo-tracheal form of the disease, when the false membrane has been successfully removed, and the danger of suffocation obviated, the patient has

DISEASES ALLIED TO DIPHTHERIA.

While many affections which are really distinct from Diphtheria have been mistaken for it, some others which are either closely allied to it, or identical with it, have been excluded from the appellation. The most important illustration of this remark is afforded by the disease called Croup, which, in this country, has hitherto been always considered a specific inflammatory disease of the larynx and trachea, characterised by all the symptoms of inflammatory fever, and terminating by the exudation of a false membrane from the surface of the mucous membrane. I myself formerly always regarded croup in this light, but I have now very strong reason to believe that the disease usually known and described in England as 'croup,' comprises two very distinct affections, one of a decidedly inflammatory nature and not attended by the formation of a false membrane, and the other essentially consisting in the development of a false membrane, but not attended by distinctly febrile or inflammatory symptoms. The first is called by the French writers, and I think correctly, *laryngite striduleuse* (laryngitis stridulosa),* and the other is Tracheal or Laryngo-tracheal Diphtheria. This is no imaginary distinction, but one founded upon the observation of the two affections; and I think that in practice it is most important to draw a line between them as a guide to treatment, for the remedial measures which would be advisable in the one case, are quite inapplicable and might be very injurious in the other. I have endeavoured for

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unexpectedly sunk from syncope. I ought also to mention, that while the occurrence of subsequent paralysis in Diphtheria offers an important feature of distinction from scarlatina, the existence of albuminuria is not so distinctive, for albuminuria very often accompanies Diphtheria, although it *follows* scarlatina.

* Some French authors divide the inflammatory laryngitis of children into two categories, one of which they call *laryngite aigue*, and the other *laryngite spasmodique*, according as what are considered by French physicians to be *nervous* symptoms predominate. This question is considered in a subsequent page. Both these varieties of laryngitis are quite distinct from laryngo-tracheal Diphtheria.

many years to draw the distinction between the two, and I will, in the first instance, sketch from my own experience what I conceive to be two typical instances of the respective maladies.

(1.) A child, aged three years, was brought to me at the St. Pancras Dispensary, suffering from some difficulty of breathing, stridulous cough, and febrile symptoms. The case did not appear to be a very severe one, but some medicine was prescribed containing a little antimonial wine. The case indeed attracted very little attention, even from the parents of the child, which improved so much that it began to play about the streets, till four days after I saw it, when the difficulty of breathing suddenly increased, with cough and symptoms of suffocation, and, before medical aid could be procured, the child died. I wish to emphasise the fact, that, from the first time I saw the child until just before its death, no application for medical assistance was made, the symptoms being so slight as to attract very little attention. But after death I found a tubular false membrane (which I exhibited to the Pathological Society)* occupying the cavity of the trachea, and easily detached from the mucous surface, a similar membrane being also found lining the inner surface of the larynx. This case was distinctly one of tracheal or laryngeal Diphtheria, and it not only illustrates the pathology of the disease, but also the insidious manner in which the malady often makes its attack and hurries on to the fatal termination.

(2.) Some little time afterwards I was sent for late at night to see two children (private patients), whose parents were in great alarm in consequence of the children being seized rather suddenly with stridulous cough, great difficulty of breathing, great heat of skin, thirst, and all the symptoms of inflammatory fever. They were in fact affected with what would have been described, and is described still, as croup or tracheitis. I remained several hours with the patients in order to watch the progress of the cases and the effects of the remedies. These consisted in the administration, at frequent intervals, of

* 'Transactions of Pathological Society of London,' vol. x.

ipecacuanha wine, and the use of the warm bath. In process of time, vomiting was produced, the pulse was lowered, the skin became moist, the cough was relieved, and the breathing became quiet, and the next day the patients were much better. But the next night the symptoms returned, and were treated in the same manner and with the same success, and eventually the children entirely recovered. Now these last cases—and I and all other practitioners have seen very many such—were instances of laryngitis stridulosa (acute laryngitis of children). If croup is an inflammation of the mucous membrane of the larynx and trachea, *attended or followed by the exudation of a false membrane*, then these cases were not instances of croup; and I believe that most of the so-called cases of croup are not attended with the presence of a false membrane at all, and that the danger of such a membrane being formed is imaginary.* It must be observed also, that, while the symptoms of tracheal Diphtheria are often very insidious and but little marked, those of laryngitis stridulosa are very prominent, and it may almost be said that the danger of the two affections is in the inverse proportion to the violence of the symptoms. †

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* Since this passage was written I have had abundant proofs, both of a positive and negative character, of the truth of the position advanced. I have never myself seen any case where the inflammatory symptoms (or those generally regarded as such) were strongly marked, and where a false membrane was subsequently found in the larynx or trachea. I have asked many of my friends who held prominent positions in large hospitals, to be good enough to point out such a case to me, if they should ever happen to meet with one, but I have never had any response; and I may state a still stronger fact, that the committee lately appointed by the Royal Medical and Chirurgical Society to investigate the relation between croup and Diphtheria, sent out a great number of circulars into every available quarter for inquiry on the same point, and have also, up to the present time, failed to elicit the particulars of a single case, or to procure the sight of a single specimen.

† This opinion, offered by me in 1871, has been expressed still more strongly by Dr. Sanné, of Paris, in an excellent and elaborate treatise on Diphtheria, published in 1877. That author (op. cit. p. 287) states that the stridulous or spasmodic laryngitis of children is the terror of parents and the night-mare (*cauchemar*) of the doctor, whose sleep it disturbs

How then is the erroneous opinion as to the nature and pathology of croup to be explained? I think that it is not very difficult of explanation when we recollect that in the great majority of cases, namely, those of infantile laryngitis, the patients recover, and that there is therefore no method of determining in such cases whether any false membrane has been formed, or has been in progress of formation; while, on the other hand, the cases of Diphtheria attacking the larynx and trachea are generally fatal, unless when the false membrane is vomited by the use of emetics, or is mechanically removed, as has been often done in France, by the operation of tracheotomy and extraction by the forceps. In short, I believe that in laryngo-tracheal Diphtheria the false membrane is the essential and pathognomonic feature of the disease; while in laryngitis stridulosa there is no false membrane, and no more tendency to exude it than there is in ordinary acute bronchitis. Tracheal Diphtheria, again, is epidemic and perhaps contagious; laryngitis stridulosa is not epidemic, and not contagious, but is certainly due, at any rate in part, to atmospheric causes, as cold and wet, and is connected with certain constitutional conditions, as, for instance, teething.

Bretonneau, as is well known, strongly urged the identity of tracheal Diphtheria with so-called croup, and most French writers on medicine adopt this view. Guersant, in his article in the 'Dictionnaire de Médecine,' of 1835, while arguing that croup is not a new disease, points out that nearly all the former descriptions of it are imperfect, owing to the absence of post-mortem examinations; and he shows, as I have indicated, that the affections classed at present under the name of 'croup,'

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more than all other maladies taken together. Dr. Sanné's description is so humorous and so strikingly true that I present an extract from it. 'Nineteen times out of twenty, a doctor who treats children's complaints is awoke suddenly by a woman in great distress, who demands his immediate presence: "Run, doctor," she exclaims, "my child has got the croup!"' This introduction, Dr. Sanné goes on to say, 'ought to comfort the doctor, and convince him that there is probably no real danger, and he will be right, on his way, to comfort the messenger also, and the event will justify the prognosis in the great majority of cases.'

comprise two very different diseases; namely, one, in which the internal surface of the pharynx, and also of the larynx and trachea, is covered with pseudo-membranous exudations, and another, in which all these parts are simply reddened, or very slightly swollen, and in which no plastic exudation is discovered. He calls the first, membranous or pseudo-membranous pharyngo-laryngitis, or true croup, and to the other he gives the name of laryngitis stridulosa.

Bouchut, in his 'Traité Pratique des Maladies des Nouveaux Nés,' while admitting the similarity of the symptoms of croup, or tracheal Diphtheria, and laryngitis stridulosa, agrees entirely in the opinion given by Bretonneau and Guersant as to the essential difference between them, and he urges the necessity of establishing a precise distinction between the two affections, which require entirely different therapeutical appliances. The following is his diagnosis: 'Stridulous laryngitis is accompanied, like croup, with a dry, hoarse, sibilous, and more or less sonorous cough. The difficulty of breathing is extreme; the child appears as if about to perish of suffocation; still the larynx is free, and there cannot be any expectoration of false membrane. The phenomena observed are purely nervous, they soon subside, and their progress is altogether peculiar. They appear suddenly, and in a very high degree of intensity, in subjects who are otherwise in good health, or slightly affected with cold. They manifest themselves in the middle of the night. The paroxysm lasts about two hours, and is reproduced on the following two or three nights in succession; but it gradually becomes more feeble, and at last disappears. Croup presents nothing like this; for the symptoms increase gradually, and suffocation presents itself only at the end of several days. The fits appear by day as well as by night, and they are reproduced as long as the false membranes inclosed in the larynx are not thrown up. Far from diminishing gradually, the fits become, on the contrary, more alarming every moment, and they terminate by carrying off the patient.'

Trousseau, both in his writings and in his practice, adopted entirely the views of Bretonneau as to the identity of croup with tracheal Diphtheria; he considers the formation of the

false membrane to be the distinguishing character of the disease, and his most valuable contributions to its treatment are perhaps those relating to the propriety of performing tracheotomy for the removal of the false membrane. He tells us, in an article in the 'Dictionnaire de Médecine,' of 1835, that he had then performed the operation thirty-six times in cases of croup, and that nine children recovered.

Empis, in his very elaborate and able treatise on Diphthérite, in the 'Archives Générales de Médicine,' observes that he has never found any remarkable difference between Diphtheria of the mucous tissues, and that developed on the skin, but he describes 'croup' and 'Diphtheria of the trachea' as synonymous terms. He gives a careful diagnosis between Diphtheria and other affections of the tonsils and soft palate, and of the mouth, but he gives none between croup and diphtheria, for the best of all reasons, namely, that they are identical.

Rilliet and Barthez, in their 'Traité des Maladies des Enfants,' second edition, published in 1853, draw a clear distinction between croup, or, as they term it, laryngite pseudo-membraneuse, and laryngitis stridulosa, which they term laryngite spasmodique. I do not adopt the names given to these affections by Rilliet and Barthez, because the first is not proved to be an inflammation, and the second is so distinctly inflammatory that the epithet 'spasmodique' might lead to misconception as to its true nature. But the two affections, which Rilliet and Barthez call respectively 'laryngite pseudo-membraneuse' and 'laryngite spasmodique,' correspond exactly to the two described by other authors as tracheal Diphtheria or croup, and laryngitis stridulosa. Strangely enough, MM. Rilliet and Barthez state that in France the two affections are often confounded together, whereas in England they are carefully distinguished; a statement exactly contrary to the fact, for in France the laryngeal affection, attended with the pseudo-membranous exudation, is always referred to Diphtheria, while in England, the tracheal Diphtheria and the laryngitis stridulosa are generally confounded together. Without entering at length into the details of the two affections given by Rilliet and Barthez, it may be stated that while the production of the

false membrane is the essential character of the one disease, it is never found in the other.*

RELATIONS BETWEEN CROUP AND DIPHTHERIA.

In English medical writings and among British practitioners, I am aware that the identity of croup with tracheal Diphtheria, on the one hand, and the essential difference between this pseudo-membranous disease and laryngitis stridulosa, on the other, are not generally admitted.†

° I must here observe that some of the best French writers comprise under one name both the purely nervous affection known in Great Britain as *laryngismus stridulus* and the inflammatory disease called *laryngitis stridulosa*, and this is a source of very great confusion. Nevertheless, I agree with Sir John Cormack,° that a case of pure laryngismus may in its course become catarrhal; and on the other hand, that inflammation of the larynx is a common cause of spasm of the glottis. Still, this distinction has very little bearing on the question of the relation between 'croup' and 'laryngo-tracheal Diphtheria,' for neither laryngismus stridulus nor laryngitis stridulosa can be regarded as in any way forms of Diphtheria.

† Although this statement was perfectly true at the time when it was written, it is now far less applicable to the existing state of medical opinion and medical literature. The identity of the so-called croup and laryngo-tracheal Diphtheria is perhaps not even now universally admitted, but the weight of opinion and of authority is very different to what it was in 1871. At that period, to the best of my belief, all the text-books and the standard works on the Practice of Medicine in Great Britain insisted upon the absolute difference between croup and Diphtheria, although a few scattered monographs and articles in the medical journals gave expression to an opposite view. Among these latter were papers by the late Dr. Hillier, published in 1859 and 1862, and by Dr. George Johnson about the same period. I myself in 1864, in presenting a recent specimen of fatal Diphtheria to the Pathological Society, expressed my opinion that the word 'croup' really comprised three different diseases—namely, tracheal Diphtheria, infantile laryngitis, and laryngismus stridulus; and that the case of tracheal Diphtheria which I presented was identical with what was usually described as 'croup.' The then President of the Society kindly informed me that I was entirely mistaken. The same views which I had expressed were, however,

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° 'Clinical Studies.' By Sir John Rose Cormack, M.D. Vol. ii. p. 308.

But if we examine some of the best English medical authorities we shall find, that, while drawing a distinction between pseudo-membranous croup and pseudo-membranous (tracheal) Diphtheria, the authors unconsciously admit their identity, or at any rate fail to point out any real points of difference. In Dr. Copland's well-known Dictionary (a perfect wonder of labour and industry), in the article 'Croup,' the great medical lexicographer has brought together all that was known, at the time he wrote, of the disease called croup in England, and all that was known of diphthérite in France; but, as if to show that he did not consider the two diseases as distinct, he makes no mention of 'diphthérite' as a separate affection at all, the heading 'Digestive Canal,' in the Dictionary, being immediately succeeded by the heading 'Disease.' Now as Dr. Copland was quite aware of, and was conversant with the literature of diphthérite, he would have undoubtedly devoted an article to its elucidation if he had considered it to be a distinct disease; and yet we find that all his information concerning diphthérite is comprised in the article 'Croup,' and

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announced by Sir Thomas Watson in the edition, in 1871, of his well-known 'Principles and Practice of Physic,' who therein states his belief 'that croup, accompanied by false membranes in the larynx and trachea, is always Diphtheria.' Sir William Jenner, in the *Lancet*, in 1875, announced his abandonment of the opinion he had formerly held, that 'croup was a different disease from laryngeal Diphtheria, and he now declared his inclination 'to the belief that there is no such disease as idiopathic, simple, membranous inflammation of the larynx;' and he goes on to state that he thinks 'that the two diseases (membranous croup and laryngo-tracheal Diphtheria) are really identical, that the so-called croup is really Diphtheria.' Sir John Rose Cormack, in his 'Clinical Studies,' published in 1876, adopts the same view, and supports it by a number of well-arranged facts and conclusive arguments; Dr. Bristowe, in his 'Theory and Practice of Medicine,' also published in 1876, thinks that the identity is so well established as hardly to require any elaborate argument, and in the latest work on Diphtheria, by Dr. Morell Mackenzie, in 1879, the author entirely adopts the same view, which indeed he had advocated in his Jacksonian Prize Essay in 1863. To crown all, the *Times*, in a recent leading article, admits the existence of a growing tendency among physicians in favour of the identity of 'croup' with laryngeal Diphtheria.

in the bibliographical references at the end of that article, the works of Bretonneau and others of his school are distinctly referred to.

On perusing the article itself, it is quite evident that Dr. Copland, while apparently drawing a distinction between croup and the tracheal diphthérite of Bretonneau, is really describing the same affection, while on the other hand he draws no distinction between the pseudo-membranous affection of the larynx and trachea, and the inflammatory disease without any pseudo-membranous exudation, which is laryngitis stridulosa. But although he does not specifically point out these affections to be distinct, he really indicates that they are so, for he admits that there are very different forms of croup, the disease producing in one case only simple inflammatory irritation, in another case a thick, viscid, mucous exudation, 'and *in many, particularly in young animals, a complete false membrane.*' It is thus obvious that Dr. Copland has got the key to the real nature of the two diseases (or rather three), which he comprises under one head, and he proceeds in his article to mix up the views and researches of Bretonneau, which distinctly refer to epidemics occurring in France, with the dubious utterances of other writers, ancient and modern, and the more definite clinical experience of very recent days.

Now there can be no doubt that the disease which I term laryngitis stridulosa (infantile laryngitis) has always been, and still is, a very common affection in this country; and I think it is very probable that tracheal Diphtheria, or what is called true croup, has also prevailed in this country, although only at intervals, but that its diphtheritic nature has been misunderstood. Thus the fatal cases, in which the false membrane was found by post-mortem examination, were referred to croup, and the cases which were not fatal, and in which there was no false membrane, were referred likewise to croup; and energetic measures of an antiphlogistic nature were resorted to in cases of tracheal inflammation, in order *to prevent the formation of the false membrane.* I may express, in passing, my belief that the antiphlogistic treatment of the laryngeal inflammation was

perfectly justifiable, although not for the reason assigned; while in cases of laryngeal or tracheal diphthérite, it was entirely unjustifiable, and certainly it was generally unsuccessful. Thus then, no doubt, it happened that in the successful cases practitioners believed that, by the adoption of bleeding and the administration of calomel and tartar emetic, they had arrested the formation of the false membrane; and that in the unsuccessful ones, where the false membrane was actually found, they lamented that they had not carried the antiphlogistic treatment far enough. My opinion now is that they were treating two different diseases; one they cured, as it may be cured now, by antiphlogistic remedies, and the other they did not cure, because it was incurable, at least by the remedies employed.*

As an illustration of the misconception into which Dr. Copland appears to have fallen in reference to the distinction I am now endeavouring to draw, he gives, in a note to the article 'Croup,' a case taken from his own practice. The patient was a child, aged five and a half years, who was seized with all the symptoms usually considered to denote croup, and Dr. Copland prescribed bleeding to the approach of syncope, and afterwards ordered full doses of calomel and tartar emetic. It is unnecessary to pursue the case in its details, further than to observe that, after several vicissitudes, the child eventually recovered completely; but not one word is mentioned of any false membranes being thrown up in the course of the malady, and it is totally contrary to our present

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* Of the whole of the above passage I have not one word to retract or alter, and further experience and reading have confirmed, in every respect, the truth of the remarks here made. Dr. Cheyne, who, in his well-known monograph on 'Croup,' has distinctly described cases of tracheal Diphtheria, and has caused them to be delineated and coloured by no less an artist than Sir Charles Bell, strongly inculcates in such cases the necessity of the copious abstraction of blood, the use of tartar emetic every three or four hours, and the administration of brisk purges; and he attributes the deaths, in the fatal cases, to the omission or the inadequate employment of these remedial (?) measures.—'Essay on Cynanche Trachealis or Croup,' pp. 25, 26.

experience to suppose that bleeding and calomel would cause the disappearance of these membranes, although the tartar emetic might have induced their expulsion by the mouth. My conclusion, therefore, is that Dr. Copland's case was not one of croup at all—that is to say, if croup is attended by the production of a false membrane—but that it was one of laryngitis stridulosa, and that the treatment was perfectly correct, as was proved by its success.

In order, moreover, to prove that the case just referred to was not one of croup, I quote Dr. Copland's own definition of the disease :—'Inflammation of the trachea, sometimes of the larynx and trachea, *occasioning albuminous and membranous exudation.*'*

In another very able, but more recent work, on the 'Practice of Medicine,' namely, Dr. Austin Flint's treatise on that subject, published in 1868, it seems to me that a similar mistake is discernible. On turning to the article 'Laryngitis with Exudation of Lymph,' Dr. Flint states that this affection occurs for the most part in children, and is commonly known as true croup. He goes on to say that 'the laryngitis is *essentially the same in Diphtheria and in the affection called croup*, yet, *taking other circumstances into account*, diphtheria and croup are quite different diseases.' But on looking through the rest of the article, Dr. Flint has not specified any of the 'other circumstances;' and on the contrary, he entirely agrees with the views which I have expressed. Under the head 'Diagnosis'

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* In thus criticising the article 'Croup,' in Dr. Copland's Dictionary, I have done so in no spirit of detraction towards that distinguished physician, (whose friendship I enjoyed during his lifetime, and for whose great abilities I always entertained the highest respect,) but because I found that all the authors on medicine, during and after his time, had derived their ideas of the so-called croup from the article in question. I myself once regarded it as a most instructive and exhaustive treatise on the subject; but for reasons I have fully explained, both in the present work and elsewhere, I consider that it can no longer be regarded as presenting an accurate description of the different diseases grouped together under the name of 'croup,' which is only a vague and comprehensive word, implying any disease attended with hoarse breathing or cough.

it might be expected that the distinctions between croup and Diphtheria would be specified, but so far is this from being the case that Dr. Flint proves croup and diphtheria (of the larynx) to be the same disease. Those who advocate the identity of the two rely upon the fact that the diphtheritic exudation occurs first upon the fauces, and Dr. Flint quotes Dr. Ware, as showing that 'out of thirty-three cases of true croup, *i.e.* laryngitis with exudation, a pharyngeal exudation was observed, *in all save a single case.*' On the other hand, 'of forty-five cases of the affection included under the head of false croup, an exudation within the pharynx was sought for, and found wanting in every case.' Dr. Flint is so emphatic in explaining that the false membrane is the essential character of true croup, that he tells us, that, 'in the progress of the disease, if it do not destroy life, the discovery of patches of false membrane in the matters expectorated should be considered as the only reliable test of the correctness of the diagnosis.' This is precisely what I advance; and this is the reason why I do not consider Dr. Copland's case quoted in a previous page to be one of croup. Now on turning to the article 'Diphtheria,' in Dr. Flint's treatise, we might expect to find the differences pointed out between that disease and croup; but on the contrary, we are told that 'the chief danger of Diphtheria consists in the extension of the disease into the larynx;' and he then continues, 'the disease *involves the morbid conditions which exist in true or diphtheritic croup.*' Dr. Flint therefore sets out by declaring that croup and laryngeal Diphtheria are quite different diseases, and then goes on to prove that they are the same.*

If we regard croup and laryngeal Diphtheria as being one and the same affection, there are still some diseases or conditions which are allied to it; and prominently among them stands of course the laryngitis stridulosa, or infantile laryngitis, which

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* I have criticised the articles in Dr. Flint's well-known work in great measure for the same reason as I have noticed Dr. Copland's, namely, that the great reputation of the author causes his opinions to be widely read and generally adopted, and that authors of less repute, and teachers of medicine in general, are led to inculcate doctrines which they conceive to be correct, because they are guaranteed by high authority.

has now been sufficiently referred to, and which is a dangerous affection, though it is not so dangerous in itself, and is more amenable to treatment than laryngeal Diphtheria, chiefly because the great source of danger, namely, the pseudo-membranous exudation, is absent. But besides laryngitis stridulosa, which appears to be specially a disease of childhood, there is also the ordinary form of laryngitis, common enough in adult life, and which may be called Laryngitis Acuta Simplex. But this affection is not accompanied by stridulous breathing, and it is almost unnecessary to point out the circumstances in which it differs from croup, because the mistake has never been made. Still less is it necessary to specify the distinctions between croup or tracheal Diphtheria and chronic laryngitis, the diagnosis being very easy.

But Dr. Copland has committed a very grave error in describing the laryngismus stridulus of Good under the head of croup, with which it is in no way connected, except in the accidental circumstance of the stridulous breathing which is common to both affections. Laryngismus stridulus (which I need hardly state is to be carefully distinguished from laryngitis stridulosa) is not an inflammation at all in any sense of the word, and is never attended by the formation of any false membrane, being thus clearly distinguished from both laryngeal Diphtheria and laryngitis stridulosa. Laryngismus stridulus is in fact a mere spasmodic closure of the glottis, caused by reflex action operating on the adductors of the vocal cords; no pathological local lesion can be detected; and an error in diagnosis as to its real nature might lead to very serious errors in practice.

As a summary of the remarks and arguments I have adduced in the above paper, I would beg to draw the following general conclusions.

(1.) That Diphtheria is characterised essentially by the presence of a peculiar false membrane, deposited in successive layers, and possessed of such tenacity that it may be removed in strips, leaving the subjacent tissue swollen but entire.

(2.) That the seat of Diphtheria is most commonly on the posterior part of the fauces, and that it first appears in this region, but that it may extend to the nose, to the œsophagus, to the larynx, to the Eustachian tubes, to the trachea, and even to the bronchial tubes.

(3.) That Diphtheria may be developed on the skin when any abrasion of the surface has taken place, as upon blistered portions of the skin.

(4.) That Diphtheria may be distinguished according to its seat as tonsillar, nasal, œsophageal, laryngeal and tracheal, Eustachian, and cutaneous.

(5.) That laryngeal and tracheal Diphtheria are the same affection as that usually described as croup.

(6.) That the word 'croup,' as having no meaning, and as comprising at present (see Dr. Copland's Dictionary) such widely different diseases or affections as (*a*) Tracheal and laryngeal Diphtheria, (*b*) Laryngitis stridulosa, or infantile laryngitis, and (*c*) Laryngismus stridulus, ought to be abolished in medical nomenclature, and that the three terms just mentioned should be substituted.

(7.) That Diphtheria generally occurs in an epidemic form and is probably contagious, while laryngitis stridulosa and laryngismus stridulus are not epidemic, are not contagious, and depend upon either climatic and local influences, or upon idiopathic and constitutional conditions.

(8.) That the inflammatory character of Diphtheria is not proved, but that laryngitis stridulosa is undoubtedly an inflammation, and that laryngismus stridulus is only a spasm.

(9.) That the local affections of the mouth and fauces most likely to be mistaken for Diphtheria are muguet or aphthæ, the false membrane of scarlatina, and follicular inflammation of the tonsils, and that this mistake has perhaps ofteno ccurred.

(10.) That Diphtheria is not a new disease, and that many cases classed formerly under the head of croup have really been instances of Diphtheria.

(11.) That, in reference to treatment, it is essential to form a correct diagnosis of Diphtheria, a disease which is epidemic, but is local in one of its chief manifestations, and constitutional

in its effects on the system. That the indications of treatment should be to prevent, if possible, the extension of the false membrane, to support the strength of the constitution, and to promote the removal of the false membrane from the respiratory passages, if the disease has attacked them. That in laryngitis stridulosa the treatment should be antiphlogistic, and should include the use of tartar emetic or ipecacuanha, or even the application of leeches; and that in laryngismus stridulus the cure should be sought by the use of those remedial measures which correct the morbid affections by which the laryngeal spasm is induced.*

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* On looking most carefully over the above conclusions, after an interval of eight years, and after reflection on the experience and the reading which have since fallen in my way, I find nothing whatever to alter or retract, although something may be added to certain passages by way of explanation or amplification. Thus, in conclusion (2), while still maintaining that the seat where Diphtheria first appears is on the posterior part of the fauces, I may now add, what was only accidentally omitted before, that in a few cases the disease first manifests itself in the larynx and trachea. This circumstance, which has been relied upon by some writers as a diagnostic mark between croup and tracheal Diphtheria, was well known to Bretonneau, who found it to occur in one out of fifty-five cases of Diphtheria examined by him and Velpeau, and it is fully discussed by Sanné, who gives the present statistics of this form of Diphtheria and calls it *croup d'emblée, i.e.*, croup coming *all at once* (which is the nearest translation of the French expression) without any previous affection of the fauces. In conclusion (7), where it is stated that Diphtheria generally occurs in an epidemic form, it should be added (as indeed is evident in the context) that it is often sporadic. In conclusion (10), I may add that daily experience only adds to the truth of this statement, and in one of the latest contributions to the history of Diphtheria (Dr. Thorne Thorne's Report on an epidemic of Diphtheria in Essex) the author shows, from examination of the local records, that before his investigation the cases of throat disease were entered as 'croup,' and afterwards the same class of cases were entered as 'Diphtheria,' and Dr. T. Thorne expresses his opinion that 'these so-called *croup* cases formed part of the Diphtheria epidemic' (op. cit. p. 2). This instance, however, is only one out of a multitude of others, showing that what was formerly called 'croup,' is now described as Diphtheria. The conclusion as to treatment (11), although very short, may of course be amplified, as will be hereafter done, but it admits of no correction.

(SECOND MEMOIR, 1872.)

ON CROUP AND DIPHTHERIA.*

THE word 'Croup,' as applied in a medical sense, is very vague, but is employed by the public to express any kind of cough attended with stridulous inspiration. It is not to be found in Johnson's Dictionary as indicating a form of disease, and the only information we have as to its etymology is that it was employed as a provincial term, in the last century, in some parts of Scotland, to indicate the cough just referred to. It was adopted, however, by some Scotch physicians as a medical term, and the disease it represented was first distinctly described, as will be presently shown, by Dr. Francis Home, of Edinburgh. Since his time the word has become acclimatised in our language, and has been used also on the Continent and in America; and the French writers, in particular, have adopted it as being synonymous with that form of Diphtheria which attacks the larynx and trachea. This view, after much consideration, I have been induced also to adopt, and the reasons for my doing so I shall endeavour to develope in the present paper.

° The first memoir having been written in order to give a general description of Diphtheria, the second was intended more particularly to point out the relations existing between Diphtheria and the so-called Croup, and to prove that laryngo-tracheal Diphtheria and membranous Croup are one and the same disease.

The word Croup really means nothing, and conveys no definite idea to the mind, but the word *Diphthérite*, or Diphtheria, being derived from the Greek *Διφθερα*, a skin, at once presents an image which may be seized by the understanding. The difference in the terminations, *diphthérite* and diphtheria, is caused by the doubt as to the inflammatory or non-inflammatory nature of the affection, and as the preponderance of evidence shows that the disease is not really inflammatory,* the latter name is now almost universally employed in this country.†

In the early half of the present century the word Croup was

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* Perhaps it would be more strictly correct to state that sufficient evidence has not yet been adduced to prove that Diphtheria is really inflammatory. 'Inflammation' is now so vague a term that it is almost impossible to define it, and hence each author forms his own opinion as to the affections to which the term is really applicable. I myself do not consider Diphtheria to be an inflammation, any more than I consider typhoid fever in that light.

† It is very much to be regretted that the above plain and obvious distinction between the words 'Croup' and 'Diphtheria' should have been obscured by some German writers, who employ these terms in a sense entirely different from that in which they were used by their respective originators. It is shown above, and it is sufficiently known, that both etymologically and colloquially 'Croup' signifies only a hoarse, noisy cough or breathing; and it is equally well known that Bretonneau devised the word 'Diphtheria' from the existence of a removable pellicle on the affected parts. Yet a few German writers, at the head of whom I regret to find the distinguished pathologist Virchow, have so distorted the meaning of these words as to render their use, in the sense they employ them, absolutely ridiculous. Thus they apply the words 'croup' and 'croupous,' from a vulgar Scotch word, to the fibrinous exudation of plastic pneumonia; and the word 'Diphtheria,' which implies the existence of a skin or pellicle, they apply to *ulcerations* of the intestines and other organs in the abdomen, thus including under the head of Diphtheria such diseases as metritis, nephritis, typhoid fever, dysentery, and cholera.° It might be thought a superfluous task to controvert such manifest extravagances, and yet such is the slavish subservience to what is thought to be authority in medical matters, that we find students describing the anatomical characters of 'croupous' pneu-

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° Virchow's 'Pathologie und Therapie.'

used, by British medical writers, to indicate what I consider to be several different diseases: namely, one which is purely spasmodic, another which is characterised by the presence of a false membrane, and a third which is distinctly inflammatory, but which presents no false membrane. While this confused notion of what was called 'Croup' prevailed in this country, the throat affections of a similar nature occurring in some parts of France attracted the attention of French practitioners, and were at first either confounded with one another or were made the subject of false pathological analogies.* But in process of time Bretonneau and his followers discovered that his *diphthérite* of the trachea was the *Croup* of Francis Home, and the claim of *diphthérite* to the title of a new disease was disavowed.†

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monia! It would be hardly more ridiculous if our students were taught to describe 'asthmatic' meningitis or 'pellicular' hepatitis, or to use any other utterly unmeaning or inappropriate adjective to define some well-known form of disease. The distinction drawn by Virchow that croup is a superficial malady and Diphtheria a deep-seated one, the latter being attended by necrosis of the subjacent tissues, is entirely untenable, and is, I believe, now abandoned by Virchow himself.

* In the year 1807 the granddaughter of the French Empress Josephine died of the throat disease then called croup. The child's mother contracted the disease, and Josephine herself died of the same malady. This curious fatality in one distinguished family, which vividly calls to mind a recent tragical history of the same nature, was no doubt due to a visitation of tracheal Diphtheria, for in the process of embalming the remains of the Empress the false membrane was actually found by the celebrated pathologist Béclard in the pharynx. The circumstances, however, made so great an impression on the Emperor Napoleon that he offered a large prize for the best essay on 'Croup,' the chief object being to establish some method of cure. A considerable number of competitors presented themselves, and most of their essays are still in existence. The prize was divided between Albers of Bremen, and Jurine of Geneva. The other competitors were Double, whose essay was printed in 1811; Vieusseux's appeared in 1812; Valentin's in 1812, and there were a few others. The whole of these authors confound together, under the name of 'croup,' the three different diseases above indicated, and most of them strongly advocate the employment of bleeding and purging.

† It is a strange circumstance that Bretonneau, who had made such extensive inquiries into the history of 'croup,' makes no mention of the work of Cheyne, whose 'Essay on Cynanche Trachealis, or Croup,' ap-

I have a full recollection of the impression made upon the medical profession in this country by the news of the arrival of a throat epidemic in 1857, and I can assert that the general feeling at first was one of disbelief in the existence of any such disease as that which was described. While admitting that several persons had died of some throat affection in a very rapid manner, most practitioners regarded the disease as nothing more than either an exaggerated form of sore-throat, or a peculiar and abnormal development of scarlatina. It was not considered as 'Croup,' for Croup was said to be a disease of infancy and childhood, whereas the disease in question attacked all ages indiscriminately.*

But the French practitioners at once recognised the unwelcome visitor as the disease which had often been observed in various parts of France, and had been especially described by Bretonneau, under the name of *Diphthérite*. The history of the malady, however, did not extend, even in France, to a very remote antiquity, for the first recorded epidemic occurred at Tours, from the years 1818 to 1821, and Bretonneau's first

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peared in 1801, while Bretonneau's first memoir was not published until 1826. But, besides the general ignorance of the English language and of English medical literature on the part of most French authors, I doubt very much whether Bretonneau really understood the purport even of Home's little work, which he quotes only to disparage. Bretonneau, in fact, accuses Home of having, by the publication of his treatise on croup, 'suspended the progress of observation,' whereas Home did nothing of the kind, for he promoted it by giving the records of his cases and post-mortem examinations. The only reproach that can be brought against Home is that he was apparently not much acquainted with foreign medical literature, and therefore did not recognise in his 'croup' the disease which had been described under different names by Herrera, Villa Real, Ghisi, Nola, Carnevale, and others.

* Although it is true that Diphtheria may occur at any age, especially during epidemics of the disease, yet it may be regarded as an established truth that children are the chief victims. In Sanné's elaborate 'Traité de la Diphthérie,' the author gives a tabular view of 1,512 cases of Diphtheria occurring in the wards of Barthez at the Hôpital Sainte Eugénie, in Paris, from which it appears that the largest number of attacks occurred between the ages of two to three years, and that the number was very high up to the age of five years (op. citato, p. 349).

memoirs on the subject were published in the year 1826.* The pupils and friends of Bretonneau, among whom was Trousseau, and a few English physicians, including the late Dr. Conolly, who happened to visit Tours at the time of the epidemic, were well acquainted with its features; and a few systematic writers on the Practice of Medicine in England, among whom was the late Dr. Copland, were also well acquainted with the literature of the subject, although none of them described the disease as a special malady.

The article 'Croup,' in Dr. Copland's Dictionary, most clearly and indisputably describes two different diseases, which, although they are both very often fatal, and both affect the larynx, have no pathological relation to one another. One of these diseases is the affection now known as laryngismus stridulus, and which, in point of fact, is not a special disease at all, but a spasmodic malady due to causes remote from the actual structures involved, and affording an instance of reflex nervous action. That Dr. Copland really included this affection under the head of 'Croup,' there can be no doubt whatever, for he defines it as 'Croup with predominance of spasmodic and nervous symptoms,' and he gives as its synonyms 'the laryngismus stridulus of Good; the spasmodic croup of Wichmann, Michaelis, Double, etc.; and the acute asthma of infants of Simpson and Miller;' and he goes on to describe it as a purely nervous affection, unattended with any marked premonitory symptoms or with fever.

It is clear, therefore, that laryngismus stridulus, although it is sometimes called popularly *false Croup*, has no relationship whatever with Croup, in which there is evidence of distinct structural changes. But after I have thus eliminated laryngismus stridulus from Dr. Copland's 'Croup,' I contend that he and other writers have confounded two other diseases under

* An epidemic of what must have been Diphtheria, in Picardy, about the year 1768, has been exceedingly well described by Marteau de Grandvilliers, in a work entitled 'Déscription des Maux de Gorge Epidémiques et Gangréneux, qui ont règné à Aumale, et dans le Voisinage.' In this treatise the false membrane characteristic of tracheal Diphtheria is clearly described.

the same head as Croup, namely, *tracheal Diphtheria*, and *laryngitis stridulosa*, or *infantile laryngitis*. Tracheal Diphtheria, as at present known to medical practitioners, is distinctly and characteristically marked by the exudation of a false membrane upon the larynx and the trachea; infantile laryngitis is distinguished from tracheal Diphtheria by the absence of false membrane. Tracheal Diphtheria is a disease in which the symptoms of inflammation are, to say the least, very obscure; infantile laryngitis is a distinctly inflammatory affection.*

I am fully aware that many modern English writers on medicine consider Croup and tracheal Diphtheria as distinct diseases,† and yet there is not one of them, so far as I know, who, in describing the pathology of the one, does not, while denying the identity, include in it the pathology of the other. Dr. Copland, for instance, in his article on Croup, in the Dictionary, says, under the head 'Pathology of Croup,' that in the complicated cases, and in those of an apparently epidemic and infectious nature, the throat is equally affected, constituting the *diphthérite*, or the *inflammation pelliculaire* of M. Bretonneau; and in the bibliography and references at the end of the article he adduces the writings of Bretonneau, Trousseau, Guersant, and Bricheteau, as authorities on Croup, although every one of those authors regards Croup only as a form of *diphthérite*.

The French writers are, in fact, and long have been, almost unanimous in considering that croup, as distinguished by British authors, is a form of diphtheria, and, according to them, 'croup' is synonymous with tracheal and laryngeal diphtheria.

I think it is necessary, in the first place, to determine, if

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* At present I am disposed to discontinue the use of the term *laryngitis stridulosa*, first, because it may possibly be confounded with *laryngismus stridulus*; and, secondly, because in French it implies a mixture of the inflammatory and the nervous elements.

† I have shown in a previous page (note, p. 24) that the number of these writers is now daily diminishing.

possible, what is meant by Croup, as the term is used by British authors.

The first account of croup in the English language occurs in a letter written by Dr. Blair, of Cupar Angus, to Dr. Mead, of London, in 1713; but a distinct description of the disease is contained in 'An Inquiry into the Nature, Cause, and Cure of Croup,' by Dr. Francis Home, published in Edinburgh in 1765. This treatise is a small one, but it contains a great amount of valuable information on the malady in question. The author, while wondering that the disease had not been described before his time, accounts for the fact by the local nature of its outbreaks, the infrequency of its attacks, its prevalence among children who are unable to give an account of their complaints, and the rapidity of its course and the apparent *easiness*, as the author terms it, of the symptoms. Croup, he says, happened, or at least was observed, very seldom in Edinburgh, but he himself, by putting his mind in the way of intelligence, had an opportunity of attending several cases, especially upon the coast of Scotland. He was struck by the danger of the symptoms, under apparent *ease;* by which expression Dr. Home evidently means that the indications presented were not apparently of an alarming nature; and the singularity of the post-mortem conditions excited his curiosity. He laments his inability to point out a certain cure, and he excuses his shortcomings as to the description of the entire features of the malady on the pleas of the rarity of its occurrence, and of his own previous inexperience of its visitations. He thought that the croup was local in its attacks, and that it was seldom found at any great distance from the sea-shore.

Notwithstanding Dr. Home's reputation as a physician, and his evident anxiety to collect together the history of all the cases possible, he gives only twelve instances of the disease, and of these the first three are rather doubtful as being really cases of croup, and the last four were communicated to him by brother practitioners. The circumstances just alluded to seem to confirm the opinion that the disease was comparatively rare. But the five fatal cases attended by Dr. Home himself leave no doubt as to the nature of the disease he was describ-

ing, and the evidence as to the other four fatal cases attended by other practitioners is equally clear. It is distinctly shown that in all the fatal cases there was a false membrane lining the trachea, and, in some of the patients, portions of membrane were voided by the mouth during life.

In his corollaries, as he terms them, deduced from his own observations and those of others, Dr. Home distinctly specifies the insidious nature of the symptoms, so that, as he says, patients will sometimes eat a minute before they expire;* he describes the frequent pulse, strong at first, but afterwards soft and weak; the short and stifled cough, which is sometimes absent. He places the seat of the disease in the windpipe, and he describes the tubular false membrane which is there formed; he also considers it impossible to remove it by any internal or external medicine. No means therefore exist to save the patient's life except the extraction of the false membrane, and as this cannot be done through the glottis, he snggests the operation of what he calls *bronchotomy* for that purpose, but he gives no instance in which this operation had been performed, and indeed he proposes that it should be first tried on a dead subject.

In Dr. Home's fatal cases all the appearances of diphtheria are described, except the peculiar exudation on the fauces, and I am inclined to believe that this appearance was not described only because it was not looked for. It is unquestionable that characteristic features of a disease which are actually pathognomonic may remain undetected until some sagacious observer points them out; and I can adduce no better example in illustration of this remark than the peculiar rose-rash which indicates the presence of typhoid or enteric fever. In many of the older works on Fever, that form of the disease which is distinguished by purging during life, and by the discovery of inflamed and ulcerated intestinal glands after death, is most distinctly described, but not one word is said of the rose-rash, which we now know as pointing out most clearly the existence of the

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* Compare one of my own cases, described at p. 19, where the child was playing about in the streets a short time before death.

lesion of the glands of the ileum. I have now before me Dr. Southwood Smith's 'Treatise on Fever,' published in 1830, and in one part of the volume a series of reports is given of the causes of fatal fever occurring in the Fever Hospital, of which, as is well known, Dr. Smith was for many years one of the physicians. The symptoms and the post-mortem appearances of typhoid or enteric fever (although Dr. Smith does not employ those expressions) are fully given under the head of 'Cases illustrating the morbid changes taking place within the abdomen;' but it is remarkable that no mention is made of the rose-rash, which must have existed during life, but which was then probably thought to be undeserving of special mention.

Dr. Cullen, in his 'First Lines of the Practice of Physic,' calls Croup *cynanche trachealis*, and describes it as an inflammation of the glottis, larynx, or upper part of the trachea. 'It may first arise,' he says, 'in these parts and continue to subsist in them alone, *or it may come to affect these parts from the cynanche tonsillaris or maligna spreading into them.*'* The last sentence seems to me to point to Diphtheria, which, as is now well known, appears first upon the tonsils and fauces. Cullen regards croup as an inflammatory affection, and it must be remembered that Bretonneau held the same opinion in reference to *diphthérite.*

Dr. Cullen goes on to say that 'in either way it has been a rare occurrence, *and few instances of it have been marked and recorded by physicians.*' This remark also applies to Diphtheria, which although occurring at intervals as a dangerous epidemic, cannot be said to be a frequent disease even in the present day.

Dr. Cullen then proceeds to detail the symptoms of the disease, as described by Dr. Home, and among many other circumstances he states that, 'If anything be spit up, it is a matter of a purulent appearance, *and sometimes films resembling portions of a membrane,*' another characteristic feature

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* Op. citato., edition of 1802, p. 219. The last edition before the author's death appeared in 1783.

of tracheal Diphtheria; and he also says, 'When the internal fauces are viewed, they are sometimes without an appearance of inflammation, but frequently a redness and even swelling appear, and sometimes in the fauces *there is an appearance of matter like that rejected by coughing.* With the symptoms now described, and particularly with great difficulty of breathing, and a sense of strangling in the fauces, the patient is sometimes suddenly taken off.' Here there is evidently a reference to the pellicular exudation on the fauces, afterwards more particularly described by Bretonneau, Empis, and other still more recent observers; and the suddenness of the termination is also a marked feature of Diphtheria. But the pathological appearances found after death are still more distinctly described by Dr. Cullen. 'Almost constantly,' he says, 'there has appeared a *preternatural membrane* lining the whole internal surface of the upper part of the trachea, and extending in the same manner downward into some of its ramifications. This preternatural membrane may be easily separated, and sometimes has been found separated in part, from the subjacent proper membrane of the trachea. This last is commonly found entire, that is, without any appearance of erosion or ulceration, etc.'

I ask whether a more distinct description of the appearances found after death in tracheal Diphtheria can be found in any recent volume of the 'Transactions of the Pathological Society,' than this which I have just quoted from the 'First Lines' of Dr. Cullen, published at the end of the last century? The next passage I quote in order to show still further that Cullen really described tracheal Diphtheria in his *cynanche trachealis*, and although I think that his theory of the inflammatory nature of the disease is incorrect, it must be remembered that the non-inflammatory character of Diphtheria has only lately been entertained. 'From the remote causes of this disease,' says Cullen; 'from the catarrhal symptoms commonly attending it; from the pyrexia constantly present with it; from the same kind of *preternatural membrane* being found in the trachea, when the cynanche maligna is communicated to it; and from the vestiges of inflammation on the trachea dis-

covered upon dissection, we must conclude that the disease consists of an inflammatory affection of the mucous membrane of the larynx and trachea, *producing an exudation analogous to that found on the surface of inflamed viscera*, and appearing partly in a membranous crust, and partly in a fluid resembling pus. When the disease terminates in health, it is by a resolution of the inflammation, by a ceasing of the spasm of the glottis, by an expectoration of the matter exuding from the trachea *and of the crusts formed there;* and frequently it ends without any expectoration, or at least, with such only as attends an ordinary catarrh. When the disease ends fatally, it is by suffocation, seemingly, as we have said, depending upon a spasm affecting the glottis; but sometimes probably depending upon a quantity of matter filling the bronchiæ.'*

Now in reference to the views I entertain of the identity of tracheal and laryngeal Diphtheria with croup, I venture to point out that Dr. Cullen, in the above passages (which include nearly his whole article on Croup), has exactly described the features of tracheal and laryngeal Diphtheria in the present day, although his theoretical views on the subject are certainly not in accordance with those now entertained. Excluding, therefore, his opinions as to the inflammatory character of the affection, we find that the *facts* he adduces are: the rare occurrence of the disease; the death caused frequently by suffocation; the expectoration of films resembling portions of a membrane; the frequent redness and swelling of the fauces, and the appearance on them of matter (*i.e.* portions of a membrane) like that rejected by coughing; the presence, discovered after death, of a preternatural membrane lining the trachea and extending to the bronchi; and the resemblance of this membrane to that found on the surface of inflamed viscera, as, for instance, the pleura and the peritoneum. It must be recollected that the essential features of Diphtheria as now known and described are, the first appearance of a membranous exudation on the fauces; the extension of the disease, in fatal cases, to the larynx and trachea; and the presence of a tubular

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* First Lines, edition of 1802, p. 223.

false membrane in the trachea, and sometimes in the bronchi. The patients who recover from laryngo-tracheal Diphtheria either throw out the pellicular exudation by coughing or vomiting, or the false membrane is removed by the operation of tracheotomy; in those who die, a false membrane is found lining the trachea.

Dr. Home and Dr. Cullen wrote upon Croup and cynanche trachealis (which words are exactly synonymous, for Home's Croup is Cullen's cynanche trachealis) toward the end of the last century,* Home's Treatise having appeared in 1765, and Cullen's 'First Lines' being published a few years later. Bretonneau's first observations on *diphthérite* were made in the year 1818, at Tours in France, but were not published until 1826. The great peculiarity, or I should say, the merit, of Bretonneau's observations, was the determination of the presence of a false membrane on the fauces as the necessary and almost constant pathological feature of the disease now described. Home appears to have omitted to look for the pellicular exudation on the fauces, and therefore does not describe it; Cullen states that Croup (cynanche trachealis) may affect the larynx and trachea from an extension into those parts of the *cynanche tonsillaris* or *maligna*, and that in the

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* In 1801, Dr. Cheyne published his well-known 'Essay on Cynanche Trachealis, or Croup,' the names adopted being clearly those used by Home and Cullen. The picture of the disease painted by Cheyne was that of an affection commencing with symptoms of acute inflammatory fever, stridulous breathing and loud cough, rapidly running on to the production of a false membrane in the larynx and trachea, and terminating the life of the patient by suffocation. But on carefully reading Cheyne's Essay and examining his coloured plates (executed by Sir Charles Bell) it is quite evident that the author confounded together two distinct diseases: namely, tracheal Diphtheria, which was generally fatal and afforded the originals of the coloured plates; and ordinary inflammatory Laryngitis, which represented the successful cases, in which there never was any false membrane. Cheyne complacently attributes the result in the latter cases to the vigorous adoption of bleeding, purging, and the use of tartar emetic, by which he conceives that the false membrane was absorbed, or its formation prevented; and nearly all subsequent British writers on the so-called 'Croup' have fallen into the same mistake.

fauces there sometimes appears a matter like that rejected by coughing, namely, films resembling portions of a membrane. But Bretonneau pointed out that the pellicular exudation on the fauces was an *essential character* of the disease, and among all his cases he saw only a single patient who did not present plastic exudations at the back of the throat. He therefore considered the presence of the false membrane to be pathognomonic of the disease which had been described by Home and Cullen in Scotland, and which he himself had observed in Tours, and he proposed the name of *Diphthérite*, which name has, with some modification (Diphtheria), been since employed.

The 'Croup' of Home and Cullen was, as I have shown, a comparatively rare disease, and appears to have occurred in a sporadic form in certain parts of the east coast of Scotland; and the *diphthérite* of Bretonneau occurred in a similarly sporadic form in various parts of France. All attempts to connect the origin or spread of the disease with local peculiarities of soil or situation have hitherto failed, and although Home supposed that the vicinity of the sea, and the prevalence of the east wind, might explain the outbreak of the Scotch epidemic, it is quite evident, from all subsequent observations, that any parts of a country are equally liable to become the scenes of the sporadic attacks. Elevation and dryness of soil, depression and moisture, vicinity of rivers, climate and season, are alike inadequate to explain the outbreaks of this mysterious disease, which fitfully appears in some spot (perhaps apparently an isolated one), commits dreadful havoc among a few families, and then disappears for a longer or shorter period, leaving the most acute observers in doubt as to the explanation of its advent or its decline.*

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* The following eloquent passage, which I give in the original beautiful Italian language, from an essay by Dr. Giacchi, on the recent Florentine epidemic of Diphtheria, and published in 1873, strongly corroborates this view: 'Nella campagna ove io esercito; in questi ameni colli bagnati dalle fresche onde dell' Arno giovinetto e modesto; in questi aprici villaggi ove si respira a pieni polmoni l' aria pura e balsamica degli abeti e dei faggi; ove non opprime la grave e corrotta

Now it appears to me that writers on the Practice of Medicine in recent years, by putting together the throat-affections described by Home, Cullen, and Bretonneau, and by adding to them the descriptions of laryngeal and tracheal inflammation given by a multitude of other observers, have confounded two diseases, which I maintain to be in their essence and nature wholly distinct, although it is true the throat is affected in both.

Thus Dr. Aitken, in his 'Science and Practice of Medicine,' article 'Croup,' seems to recognise this distinction, for he says that 'there are two forms of Croup, which can easily be distinguished from each other, but which are often confounded. One form,' he says, 'is very manageable, the other is very fatal. In the first variety the mucous membrane chiefly secretes mucus, pus, or mucopurulent fluid. In the second and more dangerous form an *albuminous or fibrinous exudation* grows upon the inner surface of the air-passages, constituting the false membrane. The first form seems to be the one common in America, of which not more than *one* case in *fifty* dies. The second is the more common European form, of which the deaths

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atmosfera delle grandi città, nè l' umido e mefitico ambiente di vicine paludi, qua regna, ed ha regnato come altrove, l' angina difterica; qua la robusta montanara ha pianto e piange sulla spoglia del ricciuto e vegeto suo bambino, non altrimenti che la pallida cittadina piange desolata sul feretro del biondo linfatico rampollo delle sue viscere; mentita manifesta a quelli scrittori che ammettono a loro modo e con idee preconcette tanta importanza alla parte etiologica di questa infermità.'

'In the country district where I practise, in these pleasant hills bathed by the cool waves of the young and modest Arno, in these sunny villages where the inhabitants breathe with full lungs the pure and balsamic air of the firs and beeches—where there is no oppression from the heavy and corrupted atmosphere of great cities or the moist and mephitic neighbourhood of adjacent marshes—there Diphtheria prevails and has prevailed as elsewhere; there the robust woman of the mountains has wept and still weeps for the loss of her curly-headed and active child, just as the pale woman of the city weeps forlorn on the bier of the pale and lymphatic offspring of her womb: a manifest contradiction to those writers who attach, after their fashion and with preconceived ideas, so much importance to the etiological part of this disease.'

used to be *four* out of *five*, and still are about *a half*.' Dr. Aitken, therefore, takes the same view of the question as I do; but I proceed somewhat further and propose to abolish the word Croup altogether as a nosological term, and to substitute, for the one name under which the two affections have hitherto been confounded, two others which really convey a pathological significance: namely, *Laryngo-tracheal Diphtheria*, in which there *is* a false membrane, and *Laryngitis stridulosa*, or *Infantile laryngitis*, in which there is none. The first is the very fatal disease alluded to by Dr. Aitken, and the second is the 'very manageable one' of the same paragraph by that author.*

Guersant, in his article on Croup,† which he designates as synonymous with the *tracheal diphthérite* of Bretonneau, clearly points out the distinction between the two diseases above mentioned. 'We find,' he says, 'that the diseases generally designated under the name of Croup present themselves, in relation to their anatomical characters, under two principal, but very different aspects; either the internal surface of the pharynx, and consequently that of the larynx, the trachea, and the bronchi, is covered with membranous or pseudo-membranous exudations, which are easily perceived on all the parts within the reach of sight, and which the expectoration afterwards contains; or all these parts are simply reddened, or very slightly swollen, as in slight cases of pharyngeal and laryngeal angina, and then no plastic exudation is

* The able writer of the two articles 'Croup' and 'Diphtheria' in Reynolds's 'System of Medicine' falls into nearly the same error as Dr. Aitken, and is equally embarrassed in describing the diagnostic distinctions between membranous croup and tracheal Diphtheria: for in the article 'Croup,' he admits that 'Diphtheria implicating the air-passages produces the effects of croup with very similar symptoms;' and he also states in the same article that 'epidemic croup is strictly Diphtheria.'‡ Nevertheless, he strongly maintains that croup and Diphtheria are essentially distinct diseases!

† 'Dictionnaire de Médecine,' 1835.

‡ Op. cit., vol. i. p. 270.

discovered.' Guersant, in accordance with the French views, considers both these affections as inflammatory, and calls the first membranous or pseudo-membranous pharyngo-laryngitis, and the second stridulous laryngitis.

The doctrines taught in the schools of medicine in Great Britain, and carried out in practice in recent years in reference to (1) the inflammatory and (2) the pseudo-membranous affections of the larynx and trachea, were founded upon the supposition that inflammations of the mucous membrane of these organs were necessarily attended by the formation of a false membrane, which choked the patient, and was the cause of death; and hence it was concluded that the most energetic means were to be adopted to prevent the formation of this false membrane, or to cause its absorption if it had been formed. For this purpose bleeding was recommended in order to subdue the inflammation, and calomel was also recommended for the purpose of removing or absorbing the membranous exudation.

I candidly admit that, having been taught these doctrines myself, my practice was guided by them for many years, but I now believe that they are erroneous. My views of croup were based upon the instructions I received at the medical school where I was educated, and upon the article 'Croup' in Dr. Copland's Dictionary; and, if I am not mistaken, that article (a very able one in a literary point of view) formed the text for most of the essays and writings subsequently published on the same subject. But, as I have previously observed, Dr. Copland (even when we exclude his laryngismus stridulus) evidently confounded two other diseases together. He was well acquainted with the literature of the subject, and finding that Home, Cullen, Bretonneau, and others, particularly described a false membrane in the same disease, which they respectively called croup, cynanche trachealis, and *diphthérite*, and knowing also from his own experience and that of his contemporaries that an inflammatory disease of the larynx and wind-pipe was very common in children, he put together the two diseases into one, and hence the confusion which now exists. For I look in vain through Dr. Copland's article for

any cases, *from his own experience,* in which the inflammatory symptoms were attended or followed by the formation of a false membrane, and I doubt whether that distinguished physician had seen or treated many cases of diphtheria.

Those who are familiar with these affections in the present day will, I think, readily admit that laryngo-tracheal diphtheria is not preceded by what are called inflammatory symptoms; and that, on the other hand, the inflammatory affection (or infantile laryngitis) is not followed by the formation of false membrane. But by adding together the features of the inflammatory affection which is indigenous among us (and which indeed is never absent) and those of the sporadic disease, which occurs only at intervals, an imaginary picture—like that of the centaur, made up of a man and a horse, or that of the mermaid, made up of a woman and a fish—has been obtained, and has received and still retains the name of 'Croup.' If practitioners really acted on this erroneous notion, they would probably continue to prescribe calomel for the solution of a false membrane which never existed, or, still worse, perform tracheotomy for the removal of an imaginary obstacle to the respiration; while, on the other hand, they would combat diphtheria with powerful antiphlogistic remedies which would only accelerate a fatal result.

In the previous Memoir I have pointed out the distinctions existing between (1) the laryngitis stridulosa, or infantile laryngitis, which is a very common inflammatory affection in this country, and is popularly called croup, and (2) tracheal diphtheria, which is not a very common disease, and is not inflammatory. The first is not characterised by the formation of a false membrane, and the second invariably is: in fact, *the false membrane is the pathognomonic feature of diphtheria.*

During an experience of several years, rendered somewhat more extensive of late by my special attention being devoted to the subject, I have seen many cases of laryngo-tracheal Diphtheria, and many more of infantile laryngitis, but I have failed to find any cases which, while presenting the strongly marked inflammatory characters of the latter, have also

exhibited the false membranes of the former.* I am induced, therefore, to believe that the infantile laryngitis, although it may be, and probably is, sometimes fatal, does not prove so by the development of a false membrane; and that, on the other hand, tracheal Diphtheria is not an inflammatory disease at all, but that the false membrane is the result of the operation of some peculiar endemic, epidemic, or even perhaps contagious poison, on certain portions of the mucous membrane. Infantile laryngitis, which is not necessarily fatal, may kill the patient, as bronchitis or pneumonia may do, by the general inflammatory action: Diphtheria, which is almost necessarily fatal when it attacks the larynx or trachea, kills by suffocation or by the action of a specific poison on the nervous system. I say that Diphtheria is almost necessarily fatal when it attacks the larynx or trachea, the exceptions being found in the cases where the false membrane is thrown up by expectoration, or is removed by surgical operation. The successful cases of Diphtheria are

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* The opinion above expressed has only been strengthened by subsequent experience. I have almost all my life been constantly attending large masses of poor patients in Hospitals, Infirmaries, and Dispensaries, and I have diligently sought for one of the typical cases of 'Croup' described by Cheyne, and have never found it. At present I am, and long have been, physician to two large dispensaries, where an enormous number of children's complaints are attended, either at the dispensaries or at the patients' own homes; and I have begged the officials to let me know of any case presenting the features of the hybrid disease in question, but I have met with no response. At the Hospital for Diseases of the Throat, with which I have also long been connected, I have made a similar request, and with the same result. Still more, I have requested many of my professional friends who are connected with large hospitals to show me such a case, but I have met with no reply; and I have sought in vain at the Medical Societies or in Medical periodicals for any typical instance of the 'Croup' of Cheyne. In making this statement, I may mention that hardly a day passes without some patient being brought by the mother to one or other of the Charities which I attend, as a case of 'Croup;' but all such cases are instances either of infantile laryngitis, or of laryngismus stridulus. Cases where a false membrane exists in the larynx and trachea are comparatively rare, and in the practice of one of the large institutions of which I have been the physician for twelve years, no such case has ever occurred to my knowledge.

usually those which are confined to the fauces or upper part of the glottis, or other more or less external parts, and in which the interior of the larynx and trachea is not attacked.

The evidence of statistics in determining the question of the pathology or the relative frequency of Diphtheria and Croup, I do not regard as of much value :* I am aware that the returns of the Registrar-General will give so many cases of Croup, and so many cases of Diphtheria, as occurring in given periods at stated times, but in the absence of post-mortem examinations, carefully made and recorded, the pathological or diagnostic bearing of such returns is of no value. Scores of children die of laryngitis, tracheitis, bronchitis, and pneumonia, strumous or otherwise, and if they have had what is called a 'croupy cough,' the deaths are probably registered as Croup; and, on the other hand, besides the actual deaths from Diphtheria, there is no doubt that many cases of aphthæ, muguet, malignant ulceration of the throat, and even scarlatina, are comprehended in the returns under that term, familiar as it has now become in the public mind.†

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* When the above was written I might with truth have affirmed that the evidence of statistics, as bearing on the question, was of no value at all. Medical men were then but very imperfectly acquainted with the pathological features of Diphtheria, and all such cases when attacking the windpipe were set down as 'Croup.' I have in a previous note remarked that when Dr. Thorne Thorne investigated an outbreak of Diphtheria in Essex, in 1875, he found that before his arrival all the fatal cases of throat-disease in the neighbourhood were set down as 'Croup' in the Returns; but after his visit this word disappears from the documents, and 'Diphtheria' is substituted. Dr. T. Thorne's tabular statement is now lying before me, and I find that in 1875 (three years after my second memoir was published), *all* the infantile throat-diseases are entered as 'Croup,' seven out of eleven having died; in the early part of 1876, two of the cases are registered as 'Diphtheria and Croup;' and after that period I find that *all* the cases, one hundred and fifty in number, are entered as Diphtheria! So much for the value of the Registrar-General's statistics, as distinguishing between Diphtheria and Croup.

† At present it is probable that more care is taken in recording the causes of death, but there is still a great amount of misapprehension on the subject.

But on turning to the records of the Pathological Society of London, the evidence there given becomes really valuable, because in that Society nothing is believed on hearsay, and the specimens are seen and examined by competent observers, and the history of each case, during life and after death, is related by the reporter. Now, in examining the volumes of the Pathological Society's Transactions, I cannot find any account of false membranes in the larynx or trachea preceded by those inflammatory symptoms which we are told, in systematic books treating on the disease called Croup, to look for. Some of these cases (*i.e.* of false membrane in the larynx and trachea) presented to the Pathological Society were contributed by myself, and they were certainly not preceded by acute inflammatory symptoms. Before the year 1859, the word Diphtheria is of course not to be found in the Index of the Pathological Society's Transactions, but since that year it appears pretty frequently; and what is remarkable, as bearing upon the views I am now advancing, the word Croup then appears but seldom. In fact, in proportion as Diphtheria appears in the 'Transactions,' Croup disappears, showing that the old Croup is the modern (tracheal) Diphtheria.*

On examining the cases of so-called Croup in the Transactions, they are all really cases of Diphtheria, except one, and in that there was no false membrane. As an instance of the

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* The following is a very striking fact showing the manner in which the old 'Croup' is proved to be nothing more nor less than the modern tracheal Diphtheria. I took a specimen of tracheal Diphtheria obtained by myself to the Pathological department of the Museum of the College of Surgeons of England, and I compared it with the specimens of 'Croup' in that collection. It presented identically the same characters. The museum specimens are from the collections of John Hunter, Sir Astley Cooper, Mr. Langstaff, and Mr. Liston. The specimens are taken from persons of different ages, some being children, but others adults, one being from a female aged seventy-five. The above cases are described in the old catalogue of the museum as 'Croup;' but two more specimens have since been added to the collection, and, although they are exactly of the same character as the others, they are described in the new catalogue as cases of 'Diphtheria.'

more correct views which are now beginning to be entertained as to the pathology of Diphtheria, I may adduce from volume xxi. of the 'Transactions' a case headed, 'Specimen Illustrating a Case of Croup.' I cannot transcribe the whole of this case from want of space, but the chief features were that the patient, a man aged forty-three, was seized with hoarseness, and 'was somewhat feverish, *but not very so.*' '*He threw up a cast,*' exhibited afterwards to the Society. He was naturally pale and dingy in complexion, but, had it not been for his painfully difficult respiration, 'he would not have appeared ill;' when he was visited, 'he was lying in a comfortable semi-supine position.' I have quoted the exact words of the reporter, and I ask, How do such symptoms represent the inflammatory and febrile disturbance which is said in medical books to characterise croup? The rest of the report of the case shows that the false membrane lined the whole of the trachea, and this false membrane, together with that thrown up during life, was exhibited to the Society. The gentleman who reports the case, however, strongly insists upon its being one of Croup, 'if ever,' he says, 'there is such a disease as Croup *per se.*' Notwithstanding this strongly-expressed opinion on his part, I am not astonished to find, in a note by the editor of the Transactions and appended to the report, that 'there was an opinion generally expressed,' at the meeting at which the specimen was shown, to the effect 'that the disease corresponded with what is ordinarily described as Diphtheria.'

The member of the Pathological Society, whose case is now referred to, says that it is one of Croup, 'if there is such a disease as Croup *per se.*' His case is clearly one of *tracheal Diphtheria*, and so it was properly regarded by the members of the Society when it was related, and when the specimen was exhibited; and it may be remarked that there is really no such disease as Croup *per se*, but that the word, as popularly used, comprises two different affections, namely tracheal (or laryngo-tracheal) Diphtheria, where there is a false membrane, and laryngitis stridulosa, or infantilis, where there is none.

The distinction thus drawn is not a merely theoretical one, founded upon speculative views of pathology, but is most

important in relation to practice. Infantile laryngitis is very properly treated by antiphlogistic remedies, by a spare diet, and by depressing expectorants, including tartarised antimony; but diphtheria requires essentially a supporting method of treatment, including wine, and local applications to the uvula and tonsils and soft palate, to alter the condition of the mucous membrane, to support the strength, and to prevent the spread of the pellicular exudation. In diphtheria, the expulsion of the false membrane from the larynx or trachea (if the disease has extended there) is essential to the cure; in infantile laryngitis there is no false membrane to expel.

Tracheotomy in tracheal Diphtheria is employed in order to remove the false membrane, but the operation is useless or mischievous in infantile laryngitis, or when the windpipe is merely clogged by mucus, or the mucous membrane is simply inflamed. In making this statement I by no means assert that tracheotomy is useful *only* in tracheal Diphtheria, for it is absolutely essential and often successful in some cases of occlusion of the glottis, in syphilitic and other growths obstructing the rima glottidis, in œdema of the same part, etc., but the question of tracheotomy in such affections has no relation to my present subject.*

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* Since the above passages were written, much more information has been obtained as to the circumstances which call for the operation of Tracheotomy in stenosis of the larynx and in the deposition of false membrane in the windpipe, but the views expressed I believe still to be correct. I fear that surgeons, even in the present day, are but imperfectly acquainted with the diagnosis of many of the cases in which they operate, however skilfully they perform the operation. Yet I regard it as a matter of primary importance to determine clearly, if possible, in the first instance, whether the case be one of laryngo-tracheal Diphtheria, or of simple infantile laryngitis, because the chances of success are infinitely greater in the latter case than in the former. It must always be borne in mind that in laryngo-tracheal Diphtheria there is in the larynx or trachea, or both, a false membrane which blocks up the air-passages, and which must be removed before the patient has even a chance of recovery. In ordinary laryngitis there is no such membrane, and there is no constitutional poisoning of the system. Nevertheless it is often necessary to perform tracheotomy in laryngitis, where the inflammation has so affected

In conclusion, I briefly adduce a case occurring in my own family, as illustrating the views I have just advanced; and as my observations involve a confession of my own pathological error, formerly entertained, they are at least sincere. One of my daughters, when a child of two years old, was seized, in the middle of the night, with what I then considered as decided symptoms of Croup, and she was immediately and successfully treated by antiphlogistic measures, including leeches, calomel, and tartar emetic. My opinion then was that these remedies had prevented the formation of the false membrane, or had caused its absorption if it were formed. I am now convinced that, although the treatment was quite correct, the reasoning was wrong, and that no false membrane was, or would have been, formed. The case was one of infantile laryngitis, in which no false membrane is ever formed. I have seen many such cases since, and I have treated them in a similar, though perhaps not in quite so active a manner, and generally with success; but laryngo-tracheal Diphtheria is a totally different affection, and the same treatment would accelerate, if it did not cause, a fatal result.

The propositions advanced in this communication, when arranged in a logical form, are the following:

(1.) 'CROUP' is a barbarous Scotch word, with no etymological meaning whatever, but it was used by Francis Home to designate a disease the features of which he distinctly described.

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the rima glottidis as to impede the passage of the air. In such cases the operation is performed below the part affected, and while the air is introduced in sufficient quantity to supply the necessities of respiration, the inflammation of the larynx is subsiding, and the parts are eventually restored to their healthy condition. But in laryngo-tracheal Diphtheria there is a false membrane in the windpipe which acts like a foreign body, and must be removed; and moreover, when it has been removed, there is still the danger of the patient dying from syncope, and from the poisoning of the system. In a recent discussion at one of the principal Medical Societies, I heard a distinguished surgeon state that although his mortality was very great in cases of tracheotomy, in Diphtheria, it was much less in Croup; by which he must have meant that the favourable cases were instances of infantile laryngitis, in which the operation is unattended with any particular danger.

(2.) That disease was undoubtedly the same as the *cynanche trachealis* of Cullen, the *tracheal diphthérite* of Bretonneau, and the *tracheal Diphtheria* of the present day.

(3.) Therefore the Croup of Home, the cynanche trachealis of Cullen, the tracheal diphthérite of Bretonneau, and the tracheal Diphtheria of the present day, are one and the same disease.

(4.) If Croup is tracheal Diphtheria, then Croup is a form of diphtheria.

(5.) If the populace employ the word Croup in a loose way to designate any form of suffocative cough attended with stridulous inspiration, the circumstance is of no pathological importance, any more than the habit of applying the term Asthma to all kinds of difficulty of breathing, whether caused by disease of the heart or lungs, or whether it be organic, inflammatory, or spasmodic.

(6.) The inflammatory disease of the larnyx and windpipe, which is often popularly called Croup, but is not attended by the formation of a false membrane, and is therefore not the Croup of Home and Cullen and Bretonneau, is *not* a form of Diphtheria; its proper name is infantile laryngitis.*

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* The above propositions, although I have nothing in them to retract, are capable of expansion. Thus, for instance, in the first proposition, it might be added that the pseudo-membranous disease of the larynx and trachea, designated by Home by the barbarous Scotch word 'Croup,' was the same disease as that described, though under many different names, by Villa Real, Fontecha, and Herrera in Spain; by Nola, Sgambati, and Carnevale, in Italy; by Marteau de Grandvilliers in Picardy, France; by Wilcke in Sweden; by Starr in Cornwall; by Bard in New York, and many others. The disease has preserved the same characters throughout all the epidemics. A most extraordinary feature of Diphtheria is the capricious nature of its visitations, for there cannot be a doubt that epidemics of the disease have sometimes been absent from certain localities for a great number of years. Another circumstance deserving of notice is that the cases of Diphtheria often occur sporadically or singly, and these are the cases which usually pass under the name of 'Croup.'

APPENDIX.

THE RELATIONS BETWEEN DIPHTHERIA AND (SO-CALLED) CROUP.

THE word 'Croup' ought to be abolished altogether from medical language, as it has no real meaning, and is applied to a number of affections which are widely distinct from one another. It is made, in common discourse, to do duty for infantile laryngitis, tracheal Diphtheria, laryngismus stridulus, and, indeed, for any affection whatever, which, whether acting directly or indirectly, causes obstruction to the entrance of air into the windpipe. It is difficult to understand how the word is still retained as indicative of any special disease, and the only explanation is that many persons are unable to divest themselves of erroneous notions which they have once early imbibed. Hardly a generation has passed since the words *Synocha* and *Synochus* were used to designate the fever now known as Typhoid or Enteric, and any one who doubted the propriety of blood-letting in this affection would have been formerly regarded as incompetent to practise his profession. But Synocha and Synochus were both used to denote one fever, whereas the single word Croup was used to denote at least two different diseases, and bleeding was the panacea for them both; the writers on 'Croup' in this country and in other countries insisting upon the energetic and early employment of blood-letting for the cure of the disease. I have carefully examined the arguments offered in favour of the retention of the word

'Croup' as indicating a specific form of disease, and I have arrived at the conviction that they are wholly inconclusive. Those who insist upon the essential difference between laryngo-tracheal Diphtheria and membranous Croup really mean that the former is entirely different from infantile laryngitis, and they are perfectly right in so believing; but if they mean that there are *two* pseudo-membranous diseases affecting the wind-pipe they are entirely wrong. If they are not wrong, they must prove that the false membrane in the one case is different from the false membrane in the other, and no successful attempt has ever been made to prove any difference at all. I was once gravely informed that the microscopic differences between these two false membranes were perfectly well marked, and I was kindly offered the inspection of the specimens; but when I came to look at them, I found that the difference was between the false membrane in the human subject and the diphtheritic (?) ulceration in the intestines (!) of a fowl (!). Some of the supposed diagnostic characters between Croup and Diphtheria are almost too absurd to notice seriously, and others are utterly inconsistent with daily experience. Thus, some allege that Diphtheria attacks only the fauces, and Croup only the larynx and trachea; the last part of the proposition being true, but the first false, because the membrane is repeatedly seen to extend from above downwards. The assertion that Croup is distinguished by attacking only the young, while Diphtheria attacks all ages, is unfounded, for the Empress Josephine died of so-called 'Croup,' and a specimen of 'Croup' in the College of Surgeons' Museum is from a patient seventy-five years old. Weather and locality afford no diagnostic marks, for Diphtheria may occur in any locality, or at any season, although it is true that infantile laryngitis is caused or excited by cold winds and exposed localities.

GERMAN VIEWS ON DIPHTHERIA AND CROUP.

An opinion seems to prevail in some quarters that German pathologists have discovered the real difference between tracheal Diphtheria and Membranous Croup; and this opinion seems to be founded on a passage in Virchow's 'Pathologie und Therapie,' in which the author states that the distinction between the two diseases lies in the necrosis of the tissues in Diphtheria, and the absence of this condition in Croup. It is very difficult for those who have practically studied the question to seize the meaning of the German pathologist, for most certainly in the disease usually known as Diphtheria in Great Britain and France, there is no necrosis or gangrene of the tissues, unless under some exceptional circumstances of great malignity of the attack. But the difficulty is somewhat lessened when we find that Virchow, and Rindfleisch (who adopts Virchow's views) employ the word Diphtheria in a totally different sense to that in which it is employed by all other writers. In fact, those two pathologists appear almost to exclude throat-diseases from the category of Diphtheria, and to apply the latter term to the diseases of the mucous membrane of the intestines, gall-bladder, and uterus, and to some other anomalous affections. Thus Virchow declares that Diphtheritis has the greatest resemblance to hospital gangrene (!), and that he noticed it to be very common in conjunction with cholera (!) and existing over the whole intestinal tract and the gall-bladder; and he goes on to observe that the dysentery (?) of the puerperal uterus, like the dysentery of the rectum and the colon, is a diphtheritis! I give the original German of this passage in order to prove that I have not misrepresented the author's meaning. 'In der That ist die Dysenterie des puerperalen Uterus, wie die Dysenterie des Mastdarms und Dickdarms eine Diphtheritis.'*

It should be mentioned that these remarkable views of Virchow's are contained in his chapter on 'Derangements of Nutrition,' and are supposed to illustrate the processes of

* Virchow's 'Pathologie und Therapie,' p. 292.

'necrosis and gangrene.' But on turning to the same great pathologist's volume where croup and diphtheritis are specially described (Virchow, vol. vi., No. I., 'Die Krankheiten des Digestions-Apparates von Professor Bamberger'), the writer, (Bamberger) clearly regards them both as the same disease. The passage will be found at page 17 of the work referred to; and Bamberger states that croup and diphtheritis cannot be distinguished either by anatomical or clinical limits, and that in all probability they are only gradations of the same process caused by some unknown internal and external conditions. He goes on to observe that there is no recognisable chemical difference in the products of croup and diphtheritis: that their external appearance, colour, and consistence are the same, or vary within defined limits; and he thinks that the necrosis of the tissue supposed by Virchow to be characteristic of diphtheritis, may be only a difference of degree and not a real distinction ('mehr ein Gradunterschied als eine strenge Scheidung').

The hypothetical views of Virchow are not shared by many even of his own countrymen, for there is a growing disposition at present among German pathologists to regard laryngo-tracheal diphtheria and membranous croup as identical. Thus Wagner maintains that they are the same, differing only in their locality in the throat or in the windpipe. Oertel, of Munich, in his article 'Diphtheria' in Ziemssen's Dictionary, divides this disease into the catarrhal and the croupous form; and he states, moreover, that the croupous inflammation especially occurs in children, and the diphtheritic especially in adults (op. citato, vol. ii. 'Acute Infectionskrankheiten,' p. 587). He therefore evidently regards the age of the patient as the only distinctive mark between croup and diphtheria, a diagnostic character which, with his very recent experience on the subject in an illustrious case, he must now abandon. Hueter, of Rostock, in his treatise on 'Tracheotomy,' maintains that there is no distinction between croup and diphtheria. 'I cannot recognise,' he says in the treatise referred to, 'any division of the croupous and diphtheritic maladies into two sharply-defined diseases; and it appears to me not unimportant,

in reference to the indications afforded for tracheotomy by these affections, to regard them as identical in their origin, as was maintained by Bretonneau and other French writers.' He also declares, that 'in an etiological point of view, croup and diphtheria are the same infectious disease' ('in ätiologischer Beziehung ist Croup und Diphtheritis dieselbe Infectionskrankheit'—'Tracheotomie,' p. 24). Stoerck, the professor of Laryngoscopy at Vienna, entertains no doubt as to the identity of the tracheal form of diphtheria and membranous croup, and he has expressed this opinion most distinctly in his work on 'Laryngoscopy,' and in a private letter in my possession and written for me at my request. One of the most recent German writers on the subject is Steiner of Prague, who, in the article 'Croup' in Ziemssen's Dictionary, thus clearly expresses his opinion:—'Der Versuch, den Croup und die Diphtheritis als zwei ganz verschiedene Krankheiten zu trennen, lässt sich weder vom anatomischen, noch klinischen Standpunkte strenge durchführen; im Gegentheile sprechen viele und gewichtige Gründe dafür, dass diese beiden Krankheiten nur Abarten und Gradunterschiede eines und desselben Processes sind.' (The attempt to separate Croup and Diphtheria as two entirely different diseases cannot be strictly maintained either on anatomical or clinical grounds: on the contrary, many and weighty reasons show that these two diseases are only deviations and differences of degree of one and the same process.)

FUNGOUS OR BACTERIAL THEORY OF DIPHTHERIA.

A NEW view has lately been expressed, especially by some continental medical authors, as to the nature of the diphtheric membrane, and, indeed, as to the essence of the disease of which the membrane is the exponent or the result. Dr. Bristowe, in his early microscopic examination of diphtheric membranes, alludes to the possible development of lowly-organised cryptogamic plants on the free surface of the membranes; and when

the epidemic of diphtheria first manifested itself in this country, about 1858, Dr. Laycock, of Edinburgh, distinctly associated the membrane with the presence of a microscopic fungus of the genus *oidium*. This view, however, was first expressed by Professor Tigri, in a communication presented to the Académie de Médecine in Paris, in 1857. Letzerich, in an article in Virchow's 'Archiv' for 1869, refers the parasite of diphtheria to the tribe of *hypomycetes*, and the genus *cladosporum*; and Nassilloff, of St. Petersburg, has found in the diphtheric membrane fungi, which were reproduced by inoculation. Hueter, of Rostock, in conjunction with Professor Tommasi, of Palermo, has described in the false membranes of the pharynx and larynx certain corpuscles to which they give no name, but which they regard as essentially connected with the production of diphtheria.*

The opinion as to the parasitic origin of diphtheria has lately been strengthened by some researches of Oertel and Hueter, who have simultaneously announced the discovery in the diphtheric membranes, the subjacent tissues, and even in the blood, of great numbers of vegetable organisms, to which Oertel has given the name of micrococci. The latter author believes that he has experimentally proved that diphtheria is first a local affection, and then develops itself into a general one, the disease establishing itself at one spot and thence radiating through the body, until by general blood-poisoning it destroys life.† This opinion as to the agency of vegetable parasites in producing diphtheria has been further expressed and defended by many other modern authors, as Recklinghausen, Waldeyer, Klebs, Eberth, Heiberg and others.

It is admitted by Oertel himself that the vegetable organisms which he believes to constitute the essential feature of diphtheria are of such exceeding minuteness that as yet we possess only the most unsatisfactory knowledge of their nature and

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* 'Studi sulla Difterite,' by Dottore Faralli, p. 9.; and 'Ueber Diphtheritis Vorläufige Mittheilung,' von Professor C. Tommasi, and Professor C. Hueter, in Rostock.

† Oertel, Article 'Diphtheria,' in Ziemssen's Dictionary.

organisation, and in fact he states that 'they stand upon the very borders of the visible.* The vegetations, however, which he has discovered among the] pathological products of diphtheria, are described by him as consisting principally of spherical bacteria (micrococcus) accompanied by a larger or smaller number of bacterium termo; and Oertel states that these organisms are constantly found in parts attacked by a diphtheric infection. From a review of all the facts he has obtained, he thinks there can be no doubt that the vegetable forms in question are not of accidental occurrence, but are inseparable from the diphtheric process, and in fact he agrees with Eberth, that 'without micrococci there can be no diphtheria.' But he still leaves in doubt the exact mode in which the bacteria act in producing diphtheria. The period of incubation, or the time which elapses between the moment when the diphtheric contagion comes in contact with the body and the outbreak of the disease, is not exactly known; and it depends, he says, partly on the quality and quantity of the infecting material itself, and partly on the structure of the tissues as to their penetrability and power of absorbing the diphtheric matter. The signs of disease will begin the earlier, the more favourable the local conditions may be for the clinging and the development of the infectious agent and its penetration into the tissues.

These views, which are entertained by many Italian as well as German observers, have not yet found much favour in this country; and, indeed, when Oertel himself admits that his microscopical objects are on the very limits of the invisible, it cannot be expected that their existence can be always verified by persons possessing only ordinary eyesight, though aided by the best artificial optical instruments. Nevertheless, I confess that I am inclined to believe that there is some truth or at least some probability in the hypothesis, that the essence of diphtheria really consists in the presence of germs or monads which find in certain localities a fitting receptacle for their growth and propagation.

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* Op. citato, p. 587.

FLORENTINE EPIDEMIC OF DIPHTHERIA, 1862—1872.

THE most recent severe epidemic of diphtheria with which I am acquainted, occurred soon after 1860, in Italy, in the neighbourhood of Florence; and the dreadful ravages which it caused recall the visitations of the same malady in the same country, described in the seventeenth century by Ghisi, Nola, and Carnevale. The extent and fatality of this visitation, which continued from the year 1862 to 1872, may be at once estimated by a glance at some of the tabular returns made by the local authorities, wherein it appears, that in a single district there occurred in about twelve months one hundred and eighty cases, of which forty-seven died; that in all the districts of Florence, in the first six months of the year 1872, eight hundred and twenty cases occurred, of which four hundred and thirty-five died; and that in the whole year 1872, in all the districts, ten hundred and fifty-eight cases occurred, of which five hundred and sixty-three died.* Most of the Italian physicians who have written upon the disease, adopt the views as to its nature entertained by Bretonneau and Trousseau.

A detailed account of this severe epidemic, derived from original Italian Reports and Memoirs, and which, I believe, is the only record in English on the subject, was communicated by me to the *Medical Times and Gazette* for 1873.

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* 'Lo Sperimentale,' Giornale di Firenze, 1872; a Treatise on 'Angina Difterica,' by Dr. Oscar Giacchi; Report by Dr. Faralli, 'Studi sulla Difterite;' and many other papers and monographs in the Italian language.

TREATMENT OF DIPHTHERIA.

The treatment of Diphtheria is a subject surrounded with difficulties; for while many of the cases are so mild as to require but little medication, some of them are so severe as to baffle all treatment whatever. There can be little doubt that in former times the slighter cases escaped notice altogether or were regarded as forms of common sore-throat, while the fatal ones were referred to the category of acute inflammations, and were vainly combated by what are called antiphlogistic measures.

It may be stated at once that there is no specific for Diphtheria, and every case must be treated according to the symptoms it presents. It must also be borne in mind that Diphtheria is a constitutional as well as a local disease; and, indeed, that the local phenomena are only the visible manifestations of the morbid condition. All local applications, therefore, useful as they undoubtedly are, must always be supplemented by constitutional treatment, medicinal, dietetic, and regiminal; and when the malady has reached the larynx and trachea, surgical interference almost always becomes absolutely essential for the preservation of life. Even after the disease has apparently abated, convalescence is often long and tedious, and the sequelæ troublesome though not generally fatal.

The subject of treatment may perhaps be most conveniently studied under the following heads, viz.:

1. THE LOCAL TREATMENT.
2. THE CONSTITUTIONAL TREATMENT.
3. THE SURGICAL TREATMENT.
4. THE AFTER TREATMENT.

1. Local Treatment.—On the supposition that Diphtheria of the throat was a local disease, it was formerly thought that strong caustics might destroy the false membrane, and thus

prevent the affection from extending into the general system. These remedies were applied on the same principle which directs the application of strong nitric acid to arrest the spread of phagedæna. The caustic most generally employed at first, when the disease prevailed extensively in this country, was *hydrochloric acid*, which was applied in combination with honey, by means of a camel's hair pencil, to the affected parts; and *nitrate of silver* was also a favourite local application. Although I employed and recommended these agents myself, I have become convinced of their inutility, if not of their injurious effects. But still, local remedies are of very great service in the treatment of faucial Diphtheria, and one of the best, I believe, to be the strong solution of the *perchloride of iron* (120 grains of the solid perchloride to 1 oz. of water), applied by a brush very freely to the affected parts every three or four hours. This remedy never does any harm; and I think it is efficacious in altering for the better the condition of the throat, and perhaps in preventing the extension of the false membrane. Various other applications have also been used, some of which appear to act by dissolving the false membrane; and among the best of these is *lactic acid*, first proposed by Weber.

For the same object other solvents have been recommended and employed, such as *lime-water*, *chlorate of potash*, *acetic acid*, *common vinegar*, and even *gastric juice*, and these agents may all be useful in separating the false membrane from the subjacent parts. On the supposition that the false membranes may be parasitic in their nature, or even that they may form the nidus for the development of cryptogamic forms, various antiseptic and parasiticide remedies have been recommended and employed, such as *carbolic acid*, and *sulphur*, the last of which has been extensively used in Italy, where the parasitic theory of Diphtheria finds many advocates.

I should also mention that *ice*, in small pieces, is always very grateful to the patient, and that in addition to the ordinary method of applying the above remedies, insufflation of powdered alum and chlorate of potash, especially in nasal Diphtheria, has been found beneficial, and also irrigation of the affected parts by means of a syringe.

2. CONSTITUTIONAL TREATMENT.—Far more important than the local application of remedies in Diphtheria is the adoption of general therapeutical measures. The disease undoubtedly affects the whole system; and it may be broadly stated that, although accompanied by feverish symptoms, it is adynamic in its character. Hence, from the very first, tonic and alterative remedies should be administered, and depletion in every form should be avoided. The principal medicine to be employed is *iron*, the tincture of the sesquichloride being perhaps the best, used either alone or in combination with *quinine*. It is remarkable how large a quantity of these tonics may be employed in this disease, not only without any ill consequences, but with positive benefit. In a case lately attended by me, the patient (a girl of 16) took tincture of iron, to which quinine was afterwards added, continuously for more than three months.

When the disease has reached the larynx and trachea, the danger is aggravated a hundredfold; and drug-medication, and any other ordinary form of treatment, is of questionable utility. I do not believe that calomel, or bleeding, or purging has any effect either in causing the absorption of the false membrane or in preventing its formation, although that opinion was formerly entertained by British physicians. The mistake probably originated from the observation of the beneficial effect of these measures in cases of ordinary laryngitis, for which, even now, Diphtheria is too often mistaken. When the false membrane has once been formed in the larynx, it must be removed, and this removal is sometimes accomplished by the efforts of nature, and sometimes by the use of emetics, especially ipecacuanha and sulphate of zinc, which two drugs ought to be employed in all such cases; but the last resource is tracheotomy, to which reference will presently be made.

While tonic medicines should be diligently administered, it is also necessary to support the patient's strength by a liberal allowance of food and stimulants, and to a watchful administration of these agents the saving of many lives is no doubt to be attributed. Beef-tea, as strong as it can be made, should be given at frequent intervals, and brandy or wine should be repeatedly administered, even although the patients show a repug-

nance to its reception. Dr. Squire, in the article 'Diphtheria,' in 'Reynolds's System of Medicine,' states that he has known the determined deglutition of four pints of beef-tea and nearly two pints of port wine in little more than twelve hours by a temperate young man, put a stop to further illness.* In a successful case attended by myself, brandy was frequently administered every day to a young girl, not only without bad effects, but with great benefit; and I never hesitate, however young the patient, to recommend and insist upon the free and even forcible employment of alcoholic stimulants. Rest is also absolutely essential in the treatment of the disease, which is so liable to terminate in fatal syncope that no exertion on the part of the patient should be allowed. Cases are on record where death was clearly attributable to a neglect of this precaution.

3. Surgical Treatment.—When the disease has reached the windpipe or the larynx, the false membrane, if it be not expelled by natural efforts, or voided by the use of emetics, must be removed, or at least the obstruction must be obviated, by means of tracheotomy. This proceeding, however, is so dangerous in tracheal Diphtheria, that many distinguished authorities have declined to sanction it, and it has often failed in the most skilful hands. The arguments against its adoption are not drawn so much from the danger of the operation itself, as from the complications always present in tracheal Diphtheria, in which, besides the risk of the surgical proceeding, there is a false membrane occluding or lining the larynx and trachea; and there is, moreover, a constitutional depression of the system. Hence, even when the operation has been successful, the patient may sink suddenly, as in a painful case related by Sir John Cormack in the 'Edinburgh Monthly Journal' for March, 1876, where the operation was performed by M. Jules Simon with perfect success, but the patient died unexpectedly from syncope.

However, according to the old saying, 'Anceps remedium melius ac nullum,' tracheotomy is imperatively called for when

* Op. citato, p. 407.

there is a tubular or funnel-shaped membrane in the larynx or trachea, or both. Life cannot continue while this obstruction remains, and an attempt must be made for its removal. Much difference of opinion has existed as to the exact time when tracheotomy should be resorted to, but the general rule probably is, that when the false membrane is proved to exist, the sooner the operation is performed the better. Much inaccuracy has been shown in the Reports on Tracheotomy in reference to the distinction of the cases where there really was a false membrane, or where there was not; but success actually depends in a great measure upon the correct determination of this question in the first instance. Many cases of laryngeal obstruction require the operation besides tracheal diphtheria, and are successfully relieved by the hand of the surgeon; but the mode of relief and the amount of success are very different. In ordinary inflammations of the larynx, for instance, leading to œdema glottidis, or in the case of tumours, or morbid growths, obstructing the glottis, the operation is very likely to afford immediate and permanent relief, because the aperture in the windpipe and the introduction of the tube are the only conditions necessary. But the dangers of a fatal termination are far greater in tracheal diphtheria for the reasons I have already given. The diagnosis of tracheal diphtheria is not very difficult in a great majority of cases, because the presence of false membrane on the tonsils, or soft palate, is quite pathognomonic; and, without making any dogmatic assertion, I think it may be stated that when there is no false membrane on these structures the disease, in all probability, is not tracheal diphtheria, although the symptoms of tracheal or laryngeal stenosis may be present. Bretonneau clearly proved that in nearly every case of tracheal diphtheria, the affection was preceded or accompanied by the appearance of false membrane on the back of the throat, and the Committee of Italian Physicians appointed to report on the epidemic of diphtheria in and around Florence, from 1860 to 1870, have confirmed Bretonneau's statement;* so that the existence of tracheal

* Studi sulla Difterite, by Dottore Faralli, pp. 10 and 11.

diphtheria without any affection of the tonsils, or soft palate, must be at least very rare. There is, however, a certain number of such cases, which belong to the *croup d'emblée* of the French writers.

When, therefore, it is proved, or at least rendered very probable, that the larynx or trachea is lined with a false membrane, the operation of tracheotomy, doubtful and uncertain as the result necessarily is, must be performed as the only chance of saving the patient's life. Notwithstanding the many occasions on which it has failed, the instances of success are sufficiently numerous and striking to justify its adoption. Not to mention the successful results recorded by Bretonneau * and Trousseau,† and a striking case mentioned by Sir William Jenner, in his work on 'Diphtheria,' in which a medical gentleman, apparently on the point of death, was immediately relieved by tracheotomy, I would refer, as one of the most recent instances of success, to a case published by Sir John Cormack, of Paris, in the April number of the 'Edinburgh Monthly Journal' for 1876, in which M. Jules Simon operated on an English child, 6½ years old, with perfect success.‡ The case is very remarkable as being a typical one of diphtheria, the false membrane being seen by Sir John Cormack on the tonsils and pharynx in the first instance, and subsequently being formed in the wind-pipe, and of course causing urgent symptoms of suffocation. The diagnosis being thus made, and surgical interference being therefore urgently required, the operation effected the very results which were anticipated and hoped for. Large portions of the false membrane were expelled from the incision by the expired air, and other large shreds were drawn out of the trachea by the forceps. Further portions of false membrane were subsequently removed, and the patient ultimately recovered.

I regret very much that the records of tracheotomy in Diphtheria in Great Britain are very imperfect, and, indeed,

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* 'Memoirs on Diphtheria.' New Sydenham Society.

† 'Clinique Médicale.' Paris. 1861.

‡ This case is not the same as that alluded to as an unsuccessful one in a previous page.

I know of no English book where any accurate description, comprising both the previous symptoms and the details of the operation, is to be found. Surgeons who have written upon the subject almost invariably confound together laryngo-tracheal diphtheria and infantile laryngitis, which they call croup, ignoring the fact that in infantile laryngitis there is no false membrane. After the reading of a very able paper on the operation of tracheotomy in what was called by the author 'Membranous Croup,' in which the success was very great and indeed unusual, I asked the writer whether he really *saw* the membrane in all the cases, and he admitted that he did not; and another surgeon on the same occasion stated that his operations in tracheal diphtheria were generally unsuccessful, but that in croup his success was very great.* His meaning of course was that in *his* croup (*i.e.* infantile laryngitis) where there was no false membrane, and no constitutional poisoning, his operations were attended with great success. The same mistake underlies most of the descriptions of tracheotomy in so-called croup and diphtheria.

I confess that I do not attach very much importance to what is called the *early* performance of tracheotomy, and I believe that in many of the successful cases, the operation need not have been performed at all, the disease in all probability being only infantile laryngitis. But even in this disease there are no doubt many cases which, from the violence and rapidity of the symptoms and the stenosis of the larynx, imperatively demand the operation, which is then very likely to be successful. In tracheal diphtheria, however, whether tracheotomy be performed early or late, the issue is always doubtful; though, for reasons already explained, the operation is perfectly justifiable, and is sometimes successful.

4. After Treatment.—When the acute symptoms of diphtheria have passed away, or after the operation of tracheotomy has been successfully performed, it by no means follows that the patient is immediately restored to health or that medical treatment is no longer necessary. It has already been shown

* I have previously alluded to this circumstance in a note at p. 55.

that diphtheria is a constitutional disease, and that general debility, paralysis, and albuminuria are its chief attendants or consequences. The mildness or severity of the attack bears no necessary proportion to the nature of the sequelæ, and in cases where the disease has affected only the fauces, the convalescence may be long and tedious from the supervention of the morbid conditions just noticed. The general affection of the nervous system is often denoted by paralysis of various nature, as immobility of the soft palate, and want of power of the limbs, difficulty of deglutition, dimness of sight, impairment of speech, weakness and rapidity of pulse, deficiency of appetite; and these conditions may persist for a long time. But the prognosis is favourable under such circumstances, and the paralytic symptoms and the albuminuria eventually disappear. The medical measures to be adopted are the careful and continued administration of nervine tonics, as iron, quinine, and nux vomica; the supply of nutritious food, and the allowance of a moderate amount of stimulants, fresh air and sea bathing. In cases where tracheotomy has been performed, the most assiduous care is necessary in the immediate after-treatment, for there are numerous circumstances, partly of a surgical nature, partly in connexion with the constitutional condition of the patient, which require the utmost caution on the part of the medical attendant.

THE END.

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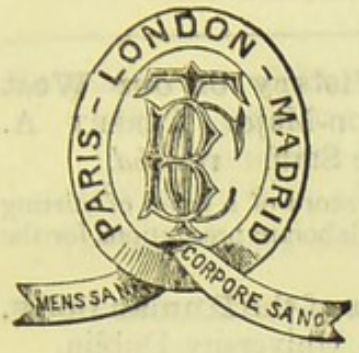

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