Memoirs on diphtheria : from the writings of Bretonneau, Guersant, Trousseau, Bouchut, Empis, and Daviot / ed. by R.H. Semple ; with a bibliographical appendix by John Chatto.

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Publication/Creation

London : New Sydenham Society, 1859.

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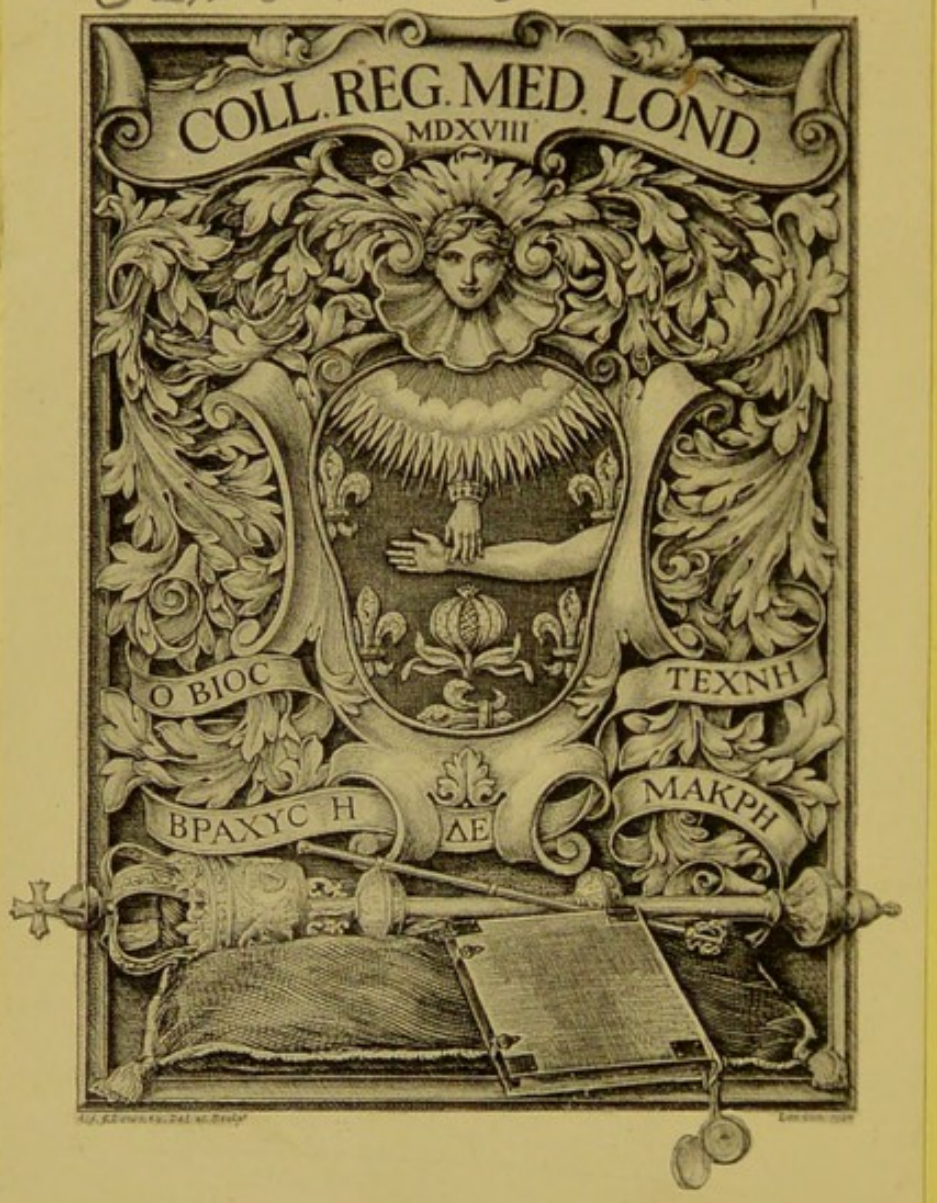

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THE NEW SYDENHAM SOCIETY.

INSTITUTED MDCCCLVIII.

VOLUME III.

MEMOIRS

ON

DIPHTHERIA.

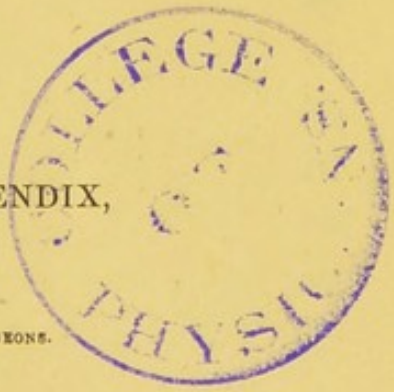
FROM THE WRITINGS OF

BRETONNEAU,
GUERSANT, TROUSSEAU, BOUCHUT, EMPIS
AND DAVIOT.

SELECTED AND TRANSLATED

BY

ROBERT HUNTER SEMPLE, M.D.



WITH

A BIBLIOGRAPHICAL APPENDIX,

BY

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CONTENTS.

	Page
Bretonneau on Diphtherite	
Introduction	1
First Memoir	5
Second Memoir	23
Third Memoir	126
Fourth Memoir	139
Fifth Memoir	173
Guersant on Croup *(Tracheal Diphthérite)*	207
Trousseau on Diphtherite	235
Bouchut on Croup *(Tracheal Diphthérite)*	271
Empis on Diphtherite	301
Daviot on Diphtherite	345
Appendix *(Bibliography)*	383
Index	405

INTRODUCTION.

The distinguished author of the philosophical Nosography, in taking the modifications which inflammation undergoes in the different organic tissues as the basis of his classification of phlegmasiæ, has certainly thrown a new light upon a great number of diseases, and has impressed a new impulse upon the spirit of observation. Still we are compelled to admit that the diversity of the inflammatory alterations and that of the phenomena by which they are accompanied, may not depend upon these modifications alone. The specific nature of the inflammation, still more than its intensity or than the nature of the tissue in which it is seated, influences the disturbance introduced into the functions by every inflammatory lesion. To the specific nature of the inflammation must be referred the duration, the severity, and the danger of the greater number of the pyrexiæ. No tissue perhaps exhibits a single inflammatory lesion; but the different inflammations with which the external tegumentary layer is affected, offer, undoubtedly, the most multiplied and the most remarkable varieties. By paying a little attention we shall be equally convinced that the mucous tissue, which is the internal tegumentary organ, is also the seat of very different kinds of phlegmasia.

The anatomical characters by which several of these phlegmasiæ are distinguished, the progress of their development, their stages and their symptoms, form the subject of this work, which has especial reference to the description, the history, and the treatment of pellicular inflammation. I have had occasion to study this affection under all its forms, during the course of several epidemics, and I have been able to determine that it is separated by special properties from some other inflammations, accompanied with membranous exudations,—affections which are very distinct, and the characters of which I have also pointed out.

In another work, which will immediately follow the present, I shall describe the different aspects under which several phlegmasiæ of the gastro-intestinal mucous coat are successively exhibited; I shall set forth the peculiarities proper to each of them; and I shall assume, as the term of comparison, the affection which I have most frequently observed, namely, the exanthematic pustular eruption which is met with in the digestive canal of subjects who sink under putrid epidemic fever. This pyrexia is one of the diseases which is most commonly observed in practice. Being independent of atmospheric conditions, we find it prevailing, almost without interruption, in populous cities, while it does not reappear, in other localities, until after a longer or shorter interval.

The first two Memoirs, on "Croup and Malignant Angina," were read at the Académie Royale de Médecine, in 1821, and perhaps, it might have been more convenient to combine them as a monograph on pellicular inflammation; but, being engaged in other occupations, I have preferred to leave them unchanged, and to devote a third section to observations which could not have found a place in the two which precede it.

In thus going over the ground again, I have been able to determine some facts which remained doubtful, to add others which I have since collected, and to supply some omissions. In fact, the result has been, that the same subject has been treated in different places. Thus, after having treated of tracheotomy, in the second and third sections, I have devoted to it an additional and separate article; so that the advantages and disadvantages of this operation are discussed in three different paragraphs. This course I know to be rather irregular; but I think that the reader, while waiting for results which are doubtful and unknown, will also be interested in those which he sees progressively developed, under conditions the whole importance of which is not at first foreseen.

An additional motive determined me to this course. I at first entertained the intention of proving the identity of Croup and Malignant Angina, and in order to attain any object more rapidly, I suppressed, in a reading at the Académie, many details which might have led me astray. But the opinion which I ventured to oppose, has prevailed so generally, that this question is still one of the most important of those which remained for me to treat.

Since 1821, I have continued to follow the progress of the epidemic affection which was the occasion of my researches, and I have

seen it reproduced in other places. My friend, Dr. Guersant, has been enabled to verify my observations at the Hôpital des Enfans. At whatever period I have met with Malignant Angina, I have constantly found in it the identical characters which have been remarked by the Spanish and Italian physicians of the seventeenth century, and which have been so judiciously noticed by a French physician, Marteau de Grandvilliers, in his Treatise on *Gangrenous Affections of the Throat*, published in 1757. I do not doubt that this able physician, if he had met with less difficulty in opening bodies, would have ascertained that the danger of the affection which he was observing, did not all arise from a gangrenous lesion. In fact, after having described with care the Pellicular Angina, and the Scarlatinal Angina, he confounds these two diseases; but it is evident, that he required only the aid of pathological anatomy to avoid an error into which he had been led by the authority of Huxham and Fothergill.

It is the opinion of Professor Laennec, that diseases cannot be more certainly distinguished than by their anatomical characters. Deeply imbued with this opinion, I have never neglected any occasion of multiplying my necroscopic researches during the course of the epidemic which I have been called upon to observe. It is, in fact, only by following the changing aspect of every morbid lesion, and by comparing the results of a great number of observations, made at different times and places, that it is possible to determine the alterations which belong to one and the same kind of disease.

It will be readily imagined that I have had some obstacles to overcome; but I should render myself guilty of exaggeration and ingratitude in hesitating to acknowledge that they have often been removed by the civil and religious authorities, and if I did not add that there has been a progressive diminution of the resistance which prejudice at first opposed to my researches. With a little perseverance the most rooted objections are found to yield to motives which are recommended by their disinterestedness, and which derive their strength from the benevolence of their objects.

I have employed considerable time in returning to the point to which the ancients, and particularly the authors of the seventeenth century had arrived; they, in fact, perfectly described the symptoms of Malignant Angina, and their attention had already been specially directed to the signs which prove that the disease extended from the pharynx to the air-passages.

In the year 1740, the nature of the pseudo-membranous exudation which lines the air-passages, was pointed out by Ghisi. In all countries, physicians began to perceive that it was necessary to open dead bodies in order to ascertain the seat of diseases : it is even probable that after the new impulse given by Morgagni, they would not have failed to discover that Malignant Angina consists only in a gangrene of the mucous tissue, if Francis Home, by publishing his "Treatise on Croup," had not suspended the progress of observation. It is difficult to conceive how a work which contains only a small number of isolated and scattered facts, was capable of obliterating the traces of the ancient traditions, and, for half a century, of preserving a great amount of influence over the opinions of practitioners! Such is, however, the fact. Struck with the most ordinary mode of termination of Malignant Angina, Francis Home persuaded himself that he had just met with an affection which had hitherto escaped the attention of his predecessors ; he thought that he ought to give it the popular name under which he found it designated in a Scotch province : the novelty of his discovery was widely diffused, and the new denomination so fascinated all persons, that it prevented them from recognizing a disease observed from the most remote antiquity, and which, in our own days, is accompanied by all the symptoms which it has uniformly exhibited.

TREATISE ON DIPHTHERITE.

FIRST MEMOIR

ON THE DIPHTHERITIC PHLEGMASIA, OR PELLICULAR INFLAMMATION OF THE MOUTH, PHARYNX, AND AIR-PASSAGES.

The Memoir which I have the honour to submit to the judgment of the Academy, is extracted from a collection of observations on the special phlegmasiæ of the mucous membranes. The result of my labours tends to prove, that many inflammatory lesions of the mucous tissue have been confounded together, while the gradations of the same affection have often been mistaken for so many different diseases.

The inflammations of the mucous membranes exhibit, perhaps, some characters no less varied than those of the cutaneous phlegmasiæ, the classification of which has exercised so fully the talent of nosographers. The exudation which accompanies them, presents, in itself, remarkable varieties; sometimes it is a diffluent serosity, sometimes it is mucus variously altered; sometimes it is a coating, which has the whiteness and consistence of cheesy matter; at other times it is an intimately adherent membranous substance, or simply an adherent membraniform pellicle. The degree of thickness, or of induration, the force of cohesion, the colour, the amount of elevation of the affected tissue, and the more or less limited nature of the inflammation, furnish a multitude of other varieties, which I shall not undertake even to indicate. I shall only add, that some very frequent combinations of these different alterations co-exist too constantly with the symptoms of certain diseases, to prevent us from seeing in them the relations of cause and effect.

So far from entering into these distinctions, and insisting upon the difference of the inflammatory conditions of the mucous tissue, I undertake at present to prove, by the testimony of facts, that the

Scorbutic Gangrene of the gums, Croup, and Malignant Angina, are only one and the same form of phlegmasia. These facts, which are supported by numerous researches in pathological anatomy, have been noticed and collected together, during the course of an epidemic which prevailed at Tours, from 1818 till 1820; and they have been obtained either in the town, the population of which amounts (1826) to upwards of twenty thousand souls, or in the Hospital, where the number of patients varies from one hundred and twenty to four hundred. They are similar in their nature to those facts which have been seen in our own time, or have been observed from the most remote antiquity, and by bringing together the notions of modern times, and those which have been transmitted to us by the ancients, their anomaly and discordance are explained.

To prove that Croup is only the last degree of Malignant Angina, that Malignant or Gangrenous Angina is not gangrenous, that there is no relation between sphacelus or a supposed superficial mortification and the alterations which this disease leaves behind it, would be a difficult undertaking, even for a physician whose opinion would have all the weight due to eminence attained by useful labours. Although in a very different position, it remains for me to accomplish a more delicate task; for I have not only to demonstrate the nature and identity of these affections, but I must also show that the ancients had recognized this identity, and that, moreover, they had traced the objects presented to them with great fidelity; and that, in a word, they had represented them as they might be seen without the help of pathological anatomy; so that the illusion of distance, which must necessarily have been found in their representations, has become for the moderns a source of material errors, and errors the more dangerous, because they have been solemnly ratified by the assent of many justly celebrated men.

But the truth has only to exhibit itself, in order to surmount these obstacles. From the moment when chance presented it to me, I thought that before publishing my conclusions, it was my duty to direct my attention again to the observation of facts, to review them, to examine them a second time, and to consider them under all their aspects.

Sixty bodies were opened during the course of the epidemic. Although the examination of certain viscera, which had not presented any sign of morbid alteration during life, was sometimes neglected, the state of the digestive canal and of the air-passages was always studied with the most minute exactness.

I endeavoured to prosecute my researches on the bodies of those, who had more particularly presented, either the characteristic symptoms of Croup, or those of Malignant Angina, whether the progress of the disease had been left to take its course without any treatment, or had been fruitlessly opposed by the most energetic and most opposite remedies.

In a great number of subjects, I was able to follow the decreasing modifications of the disease up to its perfect cure, which was obtained under the influence of special, general, or local treatment.

A hundred and thirty soldiers, and twenty individuals of all ages, presented the different gradations, acute or chronic, of scorbutic gangrene, confined to the mouth, or extending to the pharynx, and not differing, in the latter case, from Gangrenous Angina.

In order not to exceed the bounds which I have thought it convenient to prescribe to myself, I shall, in the first part, limit my observations to the examination of each of these affections, and to the explanation of their general and common character.

In a second Memoir, the historical records will be succinctly analyzed, and I shall show, that the results of their comparison do not at all differ from those which have been furnished to me by direct observation. I shall add what I have been able to glance at in relation to the contagion of pellicular inflammation, a question, the solution of which is no less serious than difficult. Some therapeutical observations will terminate the second division of this Memoir, the principal facts of which will be collected together in a general view of the epidemic which prevailed at Tours.

1. Of Scorbutic Gangrene.

The appearance of this affection varies very much according to its extent, or to its greater or less duration. It generally presents itself under the form of a greyish ulceration, occupying the undulating border of the gums; the tartar is deposited in greater quantity than in the healthy state on the surface of the teeth, or rather the latter are coated with a grey-brown dirty matter, of the colour of rust. Their line of insertion is more particularly the seat of the disease, so that the adhesion of the gum to the neck of the tooth being gradually destroyed, an incurable looseness is the result; and this is one of the ordinary and troublesome consequences of Scorbutic Gangrene.

The diseased parts allow the blood to transude with such facility, that it is sufficient to open the lips gently, in order to let it ooze out in little drops from all the ulcerated surfaces.

When the affection is communicated from the gums to the mucous membrane lining the lips and cheeks, a white spot arises at the point of contact; it soon increases, and becomes grey, livid, and blackish: sometimes it sinks deeply, and then the edges of this foul ulcer are swollen, and of a livid-red colour; thick patches are detached from its surface, and are replaced by new layers. A sanious serosity flows from the mouth in abundance, and this flux, which continues during sleep, soaks in and stains the linen of the patients. The surrounding cellular tissue and the circumjacent lymphatic glands become tumefied. The breath is rendered intolerably offensive, and the disease then assumes the most specious resemblance to the true gangrene of the mouth, which is a more dangerous affection, and one of an entirely different nature. I purposely omit peculiarities, the detail of which at present would be out of place, and which can only be observed in following the progress, and the successive stages of scorbutic gangrene. I shall only add, that when arrived at this stage, the disease may be cured without leaving any cicatrix, and without the least trace of it being perceptible.

The disease which has just been described, has shown itself among the soldiers of the legion of La Vendée, while they were still in garrison at Bourbon. When they arrived at Tours, at the beginning of 1818, a great number were attacked by it. The disgusting affection broke out especially in the western barrack, which had just before been occupied by another regiment, exhibiting no case of the disease. The malady was thought to be of a scorbutic nature, and was attributed to endemic causes; the well-water was especially suspected; it was found soft and brackish; but in fact, the water of this establishment, like the filter-water of all the district, had neither the taste which was attributed to it, nor any other bad quality.

It was evident, that this affection had nothing in common with scurvy, however little precision was attached to this word, and however little it was taken in the acceptation laid down by Lind in his *Treatise on Scurvy*, a work based upon a great mass of observations, and a masterpiece of learning and criticism.

Thus the juice of sorrel, alone or combined with the juice of the cress, and anti-scorbutics in all forms, were administered in large

doses, and during a considerable time without any diminution of the disease or any arrest of its progress; yet this of itself became pretty frequently stationary when it was limited to the gums of the incisor teeth.

There was no circumstance in the management of the soldiers, and there was no error in hygiene which had predisposed them to the scorbutic cachexia. But a more direct proof that the affection of the mouth was not induced by such a diathesis, is to be found in the circumstance that their constitution in other respects offered no trace of it. They were strong men, of good constitution, who, in every other respect, enjoyed full and perfect health.

The necessity of combating a purely local affection by topical means, having been thoroughly recognised, hydrochloric acid, so often employed with advantage in modifying aphthous ulcerations of the mouth, was tried with a success which surpassed all expectation.

This disease was certainly the *stomacace* of the ancients, and he *fégarite* of the Spaniards, denominations which, with an etymology of different origin, have only a single meaning, since they both signify *a foul ulcer of the mouth.* It was, moreover, the affection designated by the learned commentator of Boerhaave, under the name of *scorbutic gangrene of the gums,* and of *watery cankers* (*chancres aquatiques*); a disease which he subdued by means of hydrochloric acid; in fact, he believed it to be of a scorbutic nature, but still he did not fail to observe that it was exasperated by an anti-scorbutic treatment.

The diagnosis of the disease, and its relations with well-known affections being so positively established, there was nothing less surprising than to see the spots in the mouth extending to the pharynx, and at other times the tonsils presenting the first traces of the disease, which did not then differ in any respect from Malignant or Gangrenous Angina.

Van Swieten, who certainly saw the disease in several of its forms, recognises the identity of these two affections, and he quotes, in support of his opinion, a part of the description traced by Aretæus, a description of remarkable fidelity, in which the general features as well as the details of the different morbid alterations which form the subject of this Memoir, are represented with such forcible and true touches, that it is difficult to understand how the impression and the remembrance of them have ever been effaced.

2. Of Malignant Angina.

The enumeration of the names which have been given to this formidable malady would be tedious. It is, however, remarkable, that many of them express the idea of choking and strangulation. When the disease appeared at Tours, it was new to the greater part of the practitioners, and upon its diagnosis and treatment, opinions were divided, while the views laid down in books were very little calculated to reconcile them. During the prevalence of the disease, it became our duty to observe it, and closely to study its nature, which must have been very destructive if we may judge by the descriptions which have been drawn of it, by its repulsive aspect, and by the rapidity of its progress. Some cases collected at the beginning of the epidemic, will serve better than any description, to give an idea of its true characters.

Case 1.—A child, five years old, healthy, and of good constitution. Coryza, rather severe pain of the ear, which was relieved after the appearance of a serous discharge through the auditory canal. For two days only had there been slight pain in the throat; deglutition was so little affected that the child supped in the evening with its parents, and with its accustomed appetite. The third day the throat appeared to be obstructed, and on examination of the back of the mouth, at eleven o'clock A.M., large grey spots were seen covering the tonsils, the bases of which were red and swollen. Eight leeches were applied to the sides of the neck, and produced an abundant flow of blood; and kermes mineral was given in emetic and repeated doses. There was a hoarse cough, with alteration of the sound of the voice; in the evening there was aphonia, extreme fetor of the breath, a blackish-grey tint of the eschars which extended over the whole surface of the pharynx; frequent and small pulse; dyspnœa, lividity, and sinking, which terminated in a peaceful death during the early part of the night. It appeared to me very evident that death was caused by gangrene of the back of the mouth; but I asked and obtained permission to make inquiries into the extent and true seat of a disease, which had had so rapid and fatal a termination.

Necropsy.—External appearance. Body stout; lividity; tumefaction of the sides of the neck. *Internal appearances, observed eight hours after death.* The velum palati was of a blackish-grey

tint, as far as the height of the palatine arch; the putrid decomposition of the surface of the tonsils appeared still more advanced; the eschars extended from the guttural opening of the nassl fossæ as far as the commencement of the œsophagus; they penetrated into the glottis, where they assumed a dull-white tint. Their margin was marked by a bright-red line. The mucous membrane of the trachea exhibited no trace of inflammation; a small quantity of mucus was accumulated near the bifurcation of the bronchi. This gangrenous alteration, which had extended with so much rapidity, had gained so little in depth, that the velum palati divided from before backwards, presented a vermilion section between two grey lines, which were quite superficial. The fetid odour exhaled by the patient had ceased to be perceptible after death.

It was impossible to make a more imperfect investigation. To what a degree may prejudice blind the judgment! The prepossession in favour of the existence of a gangrenous affection prevailed over evidence. Although no excuse can justify the want of attention in so severe a case, where everything demanded the most accurate investigation, some circumstances may at least explain the hurried nature of this autopsy, which was made in the middle of the night, in a confined place, and under the eyes of parents, whose sorrow inspired me with the fear that I had already carried my zeal for science too far.

Doubt was the first result of this case. Indeed, how could gangrene be limited to such slender surfaces, and deviate, in this respect, from its habitual character? A disposition which was so peculiar to this epidemic affection, required a new and especially a more severe investigation. There was reason to fear that the occasion would not be long wanting, for it was observed that the number of those who were dying of Gangrenous Angina, was daily increasing. Children were particularly attacked by it, and at this age, the disease appeared to be transmitted by contagion.

Case 2.—A child, eight years old, was brought to the Infirmary of the Orphan Hospital. Tottering gait, complexion pale and leaden, eyes sunk; aphonia, pulse feeble and frequent; breath foul, the fetor being perceptible at a great distance. It is stated that this child had complained of a pain in the throat only for a few days, without much apparent difficulty in deglutition. All the soft parts of the back of the mouth were of a grey tint and appeared deeply sphacelated. One of the tonsils, hanging and detached, seemed to be retained only

by loose remains of cellular tissue. Although there appeared to be no hope of recovery, a sponge soaked in concentrated hydrochloric acid was applied to the isthmus of the throat.

The next day all the symptoms began to mend, and membraniform shreds were detached: the topical applications were continued, and a cure was obtained on the eighth day of the treatment. Astonishment was excited on a view of the existing state of the pharynx; for the velum palati, the uvula, the tonsils, especially the left, which was seen in a state of putrid dissolution, separated and almost entirely detached; in fact, all the parts, the presumed removal of which had induced the denudation of the bones, were in a healthy state, and had preserved the most perfect integrity.

A fortnight had elapsed and this child appeared to be completely recovered, when he complained of a feeling of suffocation, which made him put his hand to his neck. In the evening he had some convulsive movements and vomited. In the night he uttered some piercing cries and died, saying that a beast was devouring his inside. In this expression there was more truth than might at first be supposed, for the small intestine was distended with two balls of worms; one especially, exceeding in volume the child's fist, was arrested in the duodenum, and was formed by the interlacement of twenty worms (*ascaris lumbricoides*), the movements of which had irritated and wounded the intestine, so that in a great part of its circumference the mucous membrane was destroyed by this attrition. The pharynx, the larynx, and the trachea were quite healthy. A slight wrinkling of the edges of the glottis was the only alteration which could be discovered at the back of the mouth after the most attentive examination.

The facility with which I succeeded, by means of the application of hydrochloric acid, in producing the removal of the eschars which in some subjects extended from the mouth to the pharynx, and the success of this measure when it was employed at the commencement of Malignant Angina, tended to conceal the danger of a disease which was about to desolate so many families.

Case 3.—A child, seven years old. Sore-throat with slight fever; on the right tonsil, which was a little tumefied, there was a white spot which disappeared after two applications of hydrochloric acid, weakened by mixing it with two parts of honey. Four days elapsed without any apparent alteration of the health: the child made no mention of the

return of sore-throat from the fear of another application of the acid; but the difficulty of deglutition became so distressing, that it could no longer be concealed. A fresh examination of the throat was therefore made; all the back of the mouth was of a grey-marbled tint; there was frequent cough, with abundant expectoration. The local applications were renewed. The next day the tone of the voice was altered, and on the following day, aphonia was complete, there was hoarse cough, dyspnœa, and sibilous inspiration, fetid breath, and lividity of the face. In the night, the dyspnœa increased every moment, and on the morning of the third day, counting from the relapse, the child expired in rising to make water.

Although a part of the symptoms observed towards the end of the disease exhibited a great analogy with those of Croup, yet it was probable that the gradual embarrassment of the respiration originated in a propagation of the gangrene, which had undoubtedly extended from the pharynx to the air-passages; and the epidemic mortality, already mentioned, had certainly no other cause than the extension of the gangrenous eschars which were seen in the back of the mouth.

Necropsy.—As in the child who forms the subject of the first case the walls of the pharynx were in appearance covered with eschars; but an unexpected difference was observed in the interior of the trachea; a tube of a membraniform substance which was white, supple, elastic, consistent, adhering feebly to the mucous membrane, or even merely applied to its surface, extended from the orifice of the larynx to the last divisions of the bronchi.

It became impossible to mistake the false membrane which characterizes Croup, or to doubt that the air-passages were the seat of this disease. A multitude of conjectures sprang up on a more minute examination. The inorganic tube, invaginated in the trachea, was continuous with the eschars of the isthmus of the throat, and these supposed eschars represented the expanded portion of a funnel of which the tracheal tube formed the stem. That surface of the false membrane, which, in the pharynx, was in contact with the mucous tissue, was neither grey nor blackish, like the opposite surface; it had the whiteness, the consistence, and the inorganic aspect of the exudation, drawn from the trachea and the bronchi. I pass in silence the identity in action of the different chemical re-agents on these different portions of the false membrane. What is most worthy of remark is, that when the exudation was removed (and in order

to remove and detach it, it was sufficient to raise it with the dissecting forceps) the walls of the pharynx presented not the least trace of gangrenous alteration; red patches, dotted with spots of a deeper red, without erosion and without thickening of the tissue, were the only marks of inflammation which could be observed, and the inflammatory redness was still less marked in the trachea.

From what affection did this child die? Was it from Croup, Angina Maligna, or a complication of these two diseases? Up to this time, the symptoms of Malignant Angina had alone been observed, and in several patients, the coincidence of the affection of the throat with scorbutic gangrene of the gums, a coincidence already often observed in the Hospital, characterized still better the disease so often described, both under this name and under that of gangrenous sore-throat. During the life of the child, the affection of the throat had shown so much similarity to Malignant Angina, that the nature of the disease had not left the least doubt. After death, pathological anatomy discovered more certain and positive relations with Croup, both in respect to the inflammatory lesion of the mucous tissue and to the membranous exudation which was produced by it.

What then was the nature of this dangerous disease? Could the intensity of Croup proceed so far as to affect the pharynx and simulate Malignant Angina, or was the gangrenous sore-throat invested with fallacious appearances, which went so far as to mislead us as to its most striking character, namely, that which has given to it its denomination? This last opinion was improbable, and yet the doubt was strengthened by a remark that must have often been made; all the phenomena of inflammation are inverted in Malignant Angina, and the gangrene which is usually its last stage, here takes the initiative: the slough is formed and renewed with an unusual rapidity. Whence then arose so great an anomaly?

Were, then, Malignant Angina, and Scorbutic Gangrene, which sometimes become chronic, and Croup, a disease eminently acute, only varied forms of one and the same species of phlegmasia? The least probable of these suppositions has been found the most true; but let me not anticipate the explanation of the facts which will leave no doubt in this respect.

Pathological anatomy might suffice to resolve these questions and many others, which curiosity would have already induced me to clear up, if more serious motives had not made it incumbent on me to

pursue my researches. Some adults, and a greater number of young subjects, died in an almost sudden manner, and as many as five children were carried off from a single family in the neighbourhood of the town.

The following were the circumstances which gave a new impulse to my inquiries. A pupil of pharmacy, attached to the Hospital, was still suffering from the effects of Malignant Angina, and, perhaps, from those of the rather energetic local treatment which the severity of the disease had demanded, when he went to pass a few days in the country. During this time one of the children of the vine-dresser in the house died of Croup; the disease had been recognised in good time, and the treatment most generally in use had been adopted. The resident pupil of the Hospital (M. Velpeau) succeeded in ascertaining after death, that the walls of the pharynx were covered with exudations. The disease was seen to extend from the tonsils to the velum palati in another child of five years old (the brother of the former child), who was treated in the same manner and died likewise. The mother, aged forty-four, began, three days afterwards, to suffer from a slight sore-throat. Alarmed by the apprehension of what she imagined was *a burning of her throat,* she would not consent to any local application until she had waited too long; and she died. During the last two days her attendants had been struck with the alteration in the tone of her voice. Her eldest daughter, aged twenty, and a young woman of the neighbourhood, who had nursed the patient, were brought to the Hospital. They were both already suffering from severe symptoms of Malignant Angina. I succeeded in obtaining permission to examine the trachea of the woman who had just died. When the parts were removed, we found in the trachea a slightly adherent membraniform tube, half-a-line thick at its lower extremity, which, consequently, must have extended itself downwards into the bronchi. It was evident that the exudation of the pharynx was of the same nature as the tube invaginated in the trachea.

Two young peasant girls were treated and cured by applications of concentrated hydrochloric acid.

Twenty-two *post-mortem* examinations were successively made, with the sole intention of ascertaining if the exudations, which, in the pharynx, assumed the appearance of eschars, so as to produce an illusion which it was always difficult to dissipate, were really composed of an inorganic substance of the same nature as the Croupal exudations, and above all, in order to be assured if the organized tissues which

they covered, preserved their integrity. Subsequently, it appeared still more important to ascertain if, in other cases, more suddenly fatal, in which the breath had not presented any fetor, and in which the Croupal cough, the alteration in the tone of the voice, and the fits of suffocation had not been preceded by any apparent difficulty of deglutition,—if, I say, in these circumstances, when the beginning, the developed stage, and the termination of the disease, had presented the most perfect appearance of Membranous Angina, the formation of the exudations had always commenced upon the tonsils, at a point, in fact, where, by the help of local treatment, we might, prevent their extension.

Different therapeutical questions presented themselves and required new investigations; but the greater part of these observations would here be out of place. I shall confine myself to the indication of their general results, and to a notice of those points which have a particular relation to any leading subject of discussion.

In comparing together the morbid lesions, observed in fifty-five subjects of all ages, who, in the course of two years,* had fallen victims to epidemic Angina, I find that it once happened that the false membrane existed in the trachea without any exudations being found either upon the tonsils or upon any other part of the pharynx. In no case, even when the Malignant Angina had assumed the most repulsive aspect, was I able to discover anything which resembled a gangrenous lesion. Ecchymoses of very limited extent, as well as a slight erosion of the surfaces on which the disease had developed itself, were the most serious alterations of tissue which I was able to ascertain. Six or seven times, that is to say, in the proportion of one to nine, the membraniform exudation reached to the extreme ramifications of the bronchi. In a third of the whole number, it passed beyond their great divisions; in all the rest it terminated at different distances from the trachea, so that the mechanical obstacle offered to respiration by the development of the false membrane always appeared to have been the immediate cause of death.

* M. Velpeau, my pupil and friend, at present Professeur Agrégé in the Faculty of Medicine at Paris, and who was then first house-pupil at the General Hospital of Tours, assisted me throughout in these *post-mortem* researches; his zeal for the progress of his art foretold the well-merited success which he has since obtained.

A single exception was observed: a child who appeared to die of exhaustion on the fifteenth day, from Malignant Angina, without any other symptoms than a continual vomiting, had the pharynx lined with thick pellicles, which did not pass beyond either the commencement of the œsophagus or the entrance of the glottis.

The concrete exudation, observed on the surface of the pituitary membrane, did not in all cases occupy the same extent of surface; in general, the guttural opening of the nostrils was incrusted with it; but it was seldom found to reach as far as the orifice of the nose. In the latter case all the anfractuosities of the nasal fossæ were covered by it. In two young children, a thick, consistent membraniform tube, invaginated in the œsophagus, was traced as far as the cardaic end of the stomach.

Notwithstanding the length of these details, I must add that I saw in a woman of thirty, who was attacked with Malignant Angina to such a degree as to resemble gangrene, a membraniform pellicle which projected from the external auditory meatus, and extended to a part of the concha. There was the most perfect similarity between the affection of the pharynx and that of the skin, and they both yielded to a few local applications of hydrochloric acid.

At the very time when this woman was most seriously affected, her daughter, aged five, had behind her ears a slight excoriation covered with a membranous coating; the symptoms of Croup supervened suddenly: the intractability of the little patient scarcely allowed of the possibility of my assuring myself that the tonsils were covered with pellicles of a yellowish-white colour; she died forty-eight hours after this examination. The next day, her younger brother appeared on the point of perishing in a fit of croupal suffocation; but a few fumigations brought about the expulsion of a membraniform tube. The following days, other fragments of false membrane were drawn away from the child's mouth after efforts of coughing, produced by the same means. The tone of the voice remained altered for some time; but the child recovered. Subsequently the same membranous excoriation was observed behind the ears of another child a few months old, and this unusual affection was removed by two or three applications of hydrochloric acid. At first, the health of the little patient appeared to improve; but some little time afterwards it died. It would be difficult, by the mere narration of the symptoms of the fatal disease, to draw any conclusion as to its nature. The *post-mortem* examination proved that the child died of Croup, and that a

membraniform pellicle of considerable consistence, extended from the pharynx as far as the trachea.

I should scarcely have pointed out circumstances which appear to have but little relation to my subject, had not a membranous affection of the skin, quite similar to what I have just described, and sometimes even attacking blistered surfaces, exhibited itself as a serious symptom, frequently accompanying the attacks of Angina Maligna in two epidemics, which were observed, one by Starr, in the county of Cornwall, and the other by Samuel Bard, in New York.

The details of three cases, presented at distant periods by subjects of different ages, who died of Croup and Malignant Angina, will prove, better than a mere asertion, the identity of the morbid affection of which they died.

Case 4.—A very weak and small child of fifteen, who died of Croup.—White, thick, coriaceous pellicles lined the walls of the pharynx and of the trachea, and extended over the whole of the pituitary membrane. The false membrane had seldom been found so tenacious and elastic. It passed deep into the œsophagus, but in place of forming there a complete tube, it was spread out by distinct bands which were terminated in points at different distances; the longest reached the cardiac end of the stomach. A rather vivid redness descended below the false membrane and circumscribed it; so that between each red dotted streak there remained a perfectly healthy interval.

Case 5.—A woman aged thirty-three, moderately stout, healthy, and of good constitution, who had bestowed great care upon the child who forms the subject of the preceding case, experienced a rather severe pain in the throat; deglutition was especially painful. The tonsils were tumefied and of a deep red colour; white spots were observed upon their surface. The following day there was dyspnœa with hoarse cough; a copious blood-letting was ordered from the arm and twenty leeches were applied to the upper part of the chest; and syrup of ipecacuanha was given in repeated doses. All the symptoms continued to increase; and soon one of them predominated, namely, palpitations of the heart attended with extreme pain. Death terminated this state of suffering on the sixth day of the disease, and the fourth of the treatment.

After death, the body presented a puffy swelling of the face, and œdema of the neck and the upper region of the chest.

Autopsy, twenty-seven hours after death.—The brachio-cephalic artery was opened by the first stroke of the scalpel; a prolonged hissing sound was heard, manifestly caused by the air escaping from the divided vessel; another portion of air escaped as soon as the incision penetrated into the right thoracic cavity, but nothing similar was observed on the left side. Both lungs exhibited superficial emphysematous dilatations; the right alone was depressed. The vessels of the small curvature of the stomach were filled with air, as well as those which ran along its surface. In the back of the mouth and in the larynx we found pellicular exudations and all the usual alterations already mentioned. One peculiarity alone was remarked: the tube, formed by the false membrane, hung freely in the trachea: this tube, was thick and very firm, and was becoming very adherent to the larynx. Is it not probable that during life it may have performed the office of a valve allowing the air to penetrate into the lung, and opposing its escape? May not this circumstance have brought about the rupture of the pulmonary cells, and determined the passage of air into the blood-vessels, an accident which appears in this case, to have been the immediate cause of the palpitations and of death?

Case 6.—Examination of the body of a woman aged fifty-five, who died after having thrown up, for several days, by the efforts of coughing, large and tubular shreds of membraniform pellicles. The false membrane, which extended beyond the third division of the bronchi, presented to me only this notable peculiarity, namely, that from the trachea to the glottis it was composed of several laminæ superposed on one another, while in the remainder of its extent it was formed only of a single lamina.

Inflammatory Lesions and Alterations of Tissue; General Considerations.

It is sometimes rather difficult to discover the organic alteration of which the concrete exudation is merely the product. Generally it is confined to a pointed redness, arranged in irregular spots, without the least swelling; for we must not attribute to the mucous covering (which does not participate in it at all) the tumefaction of the surrounding cellular tissue. This tumefaction is nowhere more considerable than under the skin, in the vicinity of the lymphatic glands

which correspond to the region of the mucous membrane affected. It is from these glands themselves, that the intumescence seems to extend and diffuse itself. Their congestion is constantly observed, and even from the beginning it is considerable, and out of proportion to the slight extent and intensity of the inflammatory lesion. I have twice seen it terminate by a suppuration analogous to that of buboes. (See the letter of Ghisi.) This redness of the mucous membrane without thickening of tissue, which is quite superficial, and which, however, is accompanied with an abundant and remarkable concrete exudation, appears to me, I admit, a very peculiar inflammatory condition.

I should not express my entire opinion, if I did not add that I see in this membranous inflammation a specific phlegmasia, as different from a catarrhal phlogosis as the malignant pustule is from Zona, a disease more distinct from Scarlatinal Angina, than scarlatina itself is from small-pox; in fact a morbid affection *sui generis,* which is no more the last degree of a catarrh than a squamous eruption is the last degree of erysipelas.

As it is impossible to apply to a special inflammation which is so well-marked, any one of the improper names which have been given to each of its varieties, let it be permitted me to designate this phlegmasia by the name of Diphthérite, derived from *διφθέρα, pellis, exuvium, vestis coriacea,* whence comes *διφθερόω, corio obtego.*

The more attention I have given to the study of the phenomena peculiar to this inflammatory condition, the more it has appeared to me to differ from every other by characters which are proper to it.

If we examine with the microscope the most vivid diphtheritic spots, and those which appear to the naked eye to be pointed with red and white, we see that they are due to very minute vascular injection, and that the points of a brighter redness are so many little ecchymoses, while the white spots are only the prominent orifices of the mucous follicles.

Diphtheritic inflammation is propagated in an altogether peculiar manner on the surface of the mucous membranes which it attacks; it spreads on them almost like a liquid which is effused or flows over them.

We often see a long, narrow streak, of a dark red colour, which extends into the pharynx, or descends into the trachea, either alone or accompanied with other distinct striæ. A band of pseudo-membranous matter is formed in the middle of each stria. At this period

some rounded pores, or rather some semi-transparent bullæ, are still observed in the substance of the pellicle; the sides of this growing pellicle, irregularly crenate and attenuated, are confounded with the mucus which surrounds them, and which, without being altered in its appearance, is already altered in its properties, for it has no longer any viscosity, and is coagulated, ready to be concreted. Soon the bands are enlarged, they become more dense and homogeneous, and form, by their union, complete tubes, of a single lamina, united to the mucous membrane by little prolongations which penetrate into the orifices of the muciparous follicles. If the pellicle is detached, the redness increases in the denuded points, the false membrane is reproduced, and in proportion as the superposed laminæ add to its thickness, it becomes more and more adherent to the organic surface. If it happens that such morbid processes take place in the respiratory canals, any chance of recovery is probably small.

I would willingly have abridged this description, if the knowledge of the various appearances which are successively assumed by the membranous exudation were not often useful in practice. The long, narrow, and porous bands which are seen floating in the sputa, when an abundant expectoration is established under the influence of a mercurial treatment, indicate that there no longer exists any membranous tube in the trachea, and that it is only very recently that the morbid affection has penetrated there. There is more hope that it will be modified in the trachea before the pellicles are united into complete tubes, and have acquired so much adhesion as to render the prognosis very unfavourable.

The characters which I have just described distinguish also the diphtheritic phlegmasia from some other membranous inflammations with which it is necessary not to confound it.

The whole of the phenomena of this specific inflammation are found upon every point of the mucous membrane on which we may observe them, and the white narrow border, which circumscribes the so-termed scorbutic gangrene of the gums, is only the membranous exudation reduced to small dimensions. It rarely happens, unless the patients are very young, that in making its first appearance under this form, the Diphtheritic Phlegmasia is transmitted to the air-passages. It is especially when it shows itself in the first instance upon the tonsils, that this sudden and dangerous extension is to be feared. One or several whitish spots, similar in appearane to lichen,* which

* The word lichen is here used in its botanical sense. (Ed.)

are seen on their surface, and the tumefaction of the lymphatic glands, situated at the angles of the jaw, are the characteristic symptoms of a disease, which it is necessary to arrest at its onset by substituting an inflammation of another character. Long intervals in the return of symptoms peculiar to the affection of the air-passages, often conceal a serious amount of danger. These often quoted intervals of intermittent Croup, belong to a numerous class of pathological phenomena. What practitioner has not observed them? Is it not in an intermittent manner that scirrhous tumours, calculus, and many other permanent causes of pain, make their fatal influence perceptible?

Putting aside for the moment the conclusions which nay be drawn from contagion (a question which belongs exclusively to the second part of this Memoir), and considering only the epidemic character in the Scorbutic Gangrene of the gums, Malignant Angina, and Croup, I think that the identity of these three affections, founded upon an identity of organic alterations, which have been demonstrated by pathological anatomy, cannot be invalidated by a few unimportant symptoms.

If, at the commencement of the epidemic, the death of many children was generally attributed to Croup, because it was sudden and preceded by all the symptoms of that disease, whereas in adults, the fetid smell of the breath, and the lividity of the complexion, caused the ideas of gangrene and putridity to prevail, the difference in the development of the air-passages, at the different periods of life, sufficiently explains this apparent anomaly.

It is scarcely necessary to point out that the fetor of the breath and the gangrenous appearance of the pharynx depend upon the putrid solution of the pellicular exudations. The exudation of the blood, a common phenomenon of diphtheritic inflammation, completes the delusion. The false membrane, coloured by this fluid, assumes successively different tints, indicative of its decomposition. The contact of the air, the influence of damp heat, indeed, all the conditions favourable to induce putrefaction, and even those which may impress upon it the character of a gangrenous alteration, are combined. It was difficult then for the senses not to be deceived; but why should this delusion still exist? The causes which produced it are easily to be understood. It has never prevailed entirely, and it will be seen that a multitude of well-conducted observations have often been on the point of dissipating it.

SECOND MEMOIR

ON DIPHTHERITE, OR PELLICULAR INFLAMMATION OF THE MUCOUS TISSUE.

In the preceding Memoir, read at the Academy, and submitted to the opinion of that learned Society on the 26th of June, I undertook to show, that Scorbutic Gangrene of the gums, Malignant Angina, and Croup, are only one and the same species of disease, the phenomena of which present a great diversity of symptoms, according to the functions of the organ affected, without the necessary existence of any essential difference between the pellicular inflammation which becomes so formidable by its propogation into the air-passages, and that which, being limited to the gums, causes only a slight indisposition. I have also said, that according to the uniform result of a great number of clinical observations and of *post-mortem* examinations, it was constantly found that Malignant Angina was not accompanied by any mortification, that only fallacious appearances had given rise to the suspicion of a gangrenous alteration, and that in fact the lividity and torpor which precede the death of adults arise only from a slow asphyxia, the consequence of the mechanical obstacle which is gradually opposed to respiration by the false membrane, in the same way as the fetor of the breath depends upon the putrefaction of this same albuminous production, which assumes the appearance of eschars upon all the surfaces affected with pellicular inflammation.

I have been led to propose the denomination of Diphtherite to designate the phlegmasia which forms the particular object of this Memoir, in order to distinguish it from several other pellicular inflammations, from membranous mercurial inflammation, and from a buccal phlegmasia which is accompanied by a caseiform exudation (a very distinct sporadic affection); but above all, this name will distinguish it from Scarlatinal Angina, a membranous inflammation accompanied by a cutaneous exanthem, and which has often been confounded with Diphtheritic Phlegmasia, although it differs from it essentially by its mode of attack, its duration, and its different terminations. Before passing to the second part of this Memoir, which will have for its object the examination of some historical details, the discussion of facts relative to contagion, and the explanation

of the different therapeutic plans which have been opposed to the true Diphtheritic Phlegmasia, it will be convenient to represent its characteristic features in a tabular form drawn up from nature, and to describe them more minutely than I have done in the first part.

Specific Characters of Diphtherite.

At the beginning of the disease, a circumscribed redness is perceived, covered with a coagulated semitransparent mucus. This first layer, which is slight, supple and porous, may be still further raised up by some portions of unaltered mucus in such a manner as to form vesicles. Often, in a few hours, the red spots extend perceptibly from one to another, by continuity or by contact, like a liquid which is effused on a flat surface, or which flows by streaks in a tube. The concretion becomes opaque, white and thick, and it assumes a membranous consistence. At this period it is easily detached, and does not adhere to the mucous membrane, except by some very slender prolongations of concrete matter, which penetrate into the mucuparous follicles. The surface which it covers is generally of a slight red tint, with points of a deeper red; this tint is more vivid at the periphery of the spots.*

If the false membrane in detaching itself, leaves the surface of the mucous membrane uncovered, the redness which was obscured by the exudation returns, and the points of a deeper red allow blood to transude. The concrete coating is renewed and becomes more and more adherent upon the points which have been first attacked; it often acquires a thickness of several lines, and passes from a yellowish-white colour to brown, grey, or black. At the same time the transudation of blood becomes still more free, and

* The mode of circumscription of the diphtheritic spots presents varieties which it is necessary to notice in practice. Sometimes an intense redness, accompanied by tumefaction, circumscribes these spots. *Crustam vero circumveniunt rubor et inflammatio,* says Aretæus. Sometimes a thinner, half-transparent membrane spreads rapidly, and does not appear circumscribed. Instead of forming upon the surface of the tonsils membranous layers, which present the appearance of a deep ulceration, it covers and envelopes them. In this last case, the danger of its extension and propagation into the air-passages is still more to be feared. I have sometimes availed myself of the epithet "enveloping" *(enveloppantes)* to denote this disposition of the pellicular exudations.

is the source of those *stillicidia* which have been so generally remarked by authors.

At this time the alteration of the organic surfaces is more apparent than at the beginning; portions of concrete matter are often effused into the substance itself of the mucous tissue: a slight erosion, and a few ecchymoses are observed in the spots, which, by their situation, are exposed to some friction, or from which the avulsion of the false eschars has been attempted. It is above all towards this period that the pellicles which are being decomposed exhale a foul odour. If they are circumscribed, the œdematous swelling of the surrounding cellular tissue makes them appear depressed, and by this appearance alone, we might be tempted to believe that we have under our eyes a foul ulcer with a considerable loss of substance. If, on the contrary, they are extended over large surfaces, they are partly detached, they hang in more or less putrefied shreds, and they put on the appearance of the last stage of sphacelus. But when we open the bodies of those who, after some days of disease, die of tracheal Diphtherite, there will be found in the air-tubes all the gradations of this inflammation from its first stage on the parts recently attacked, up to that which is the most likely to deceive us by the aspect of a gangrenous alteration, involving those which were first affected.

As we have sometimes seen gangrene supervene in inflammatory affections, of which it is not generally the termination, as, for example, in syphilitic chancre, I do not understand why, in some circumstances, it should not succeed to diphtheritic inflammation; but this case must be very rare, since it was not once present in more than fifty *post-mortem* examinations.

Whatever may be the structure of the membrane on which diphtheritic inflammation is developed, the disease preserves all its characters. The dissimilarity which so remarkably exists between the surface of the tongue and that of the buccal cavity, and the more striking disparity of the internal coats of the pharynx and of the œsophagus, do not produce any notable change in the aggregate of its phenomena.

It was seen, during the whole course of the epidemic which prevailed at Tours, to affect a kind of predilection for the tonsils and for the gums, a fact which is consistent with the most ancient observations. With regard to this last mode of attack, so frequently observed among the soldiers of the Legion of La Vendée, it appeared

to be favoured by the contact of the vessels which the soldiers used in common. The mucous covering of the tongue, and that of the œsophagus are, on the contrary, the surfaces which chiefly oppose the extension of this inflammation. I have not been able to discover its primitive development upon the skin. The manner in which the epidermis is altered must offer some remarkable peculiarities. Dr. Guersant, Physician to the Hospital for Children, who has frequently observed the pellicular affection of the vermilion part of the lips, may furnish some useful information upon this point.

In an epidemic at New York, and more especially in another epidemic of Diphtheritic Angina observed by Starr in the county of Cornwall, it was behind the ears, upon the sores of blisters, and generally upon all the points where the skin had assumed some resemblance to the mucous tissue, that the pellicular inflammation, which afterwards spread very extensively, was seen to commence.

The rapid progress of Diphtherite was usually retarded some days after its invasion. This phenomenon is not peculiar to Diphtherite; it occurs in several other diseases, and the local symptoms of syphilis, for example, after having rather rapidly reached their highest degree of intensity and extent, very soon lose their activity. In the present instance, this tendency to a stationary condition is of particular importance in the prognosis, since it is by its propagation into the air-passages, that pellicular inflammation becomes fatal. In fact, there is not the slightest relation between the danger of a pellicular affection of the mouth, serious as it is believed to be (provided the disease in spreading itself has already lost a part of its energy), and the peril to which the patient is exposed by a small diphtheritic spot, which shows itself in the first instance upon the surface of the tonsils, from which it may propagate itself in a few days, sometimes even in a few hours, into the trachea, and soon into the last ramifications of the bronchi.

The human organism seems to acquire by custom the property of resisting diseases, as it acquires the power of resisting the gradual action of poisons and of venoms. This power is obtained, for a more or less durable period, by paying a first tribute to such agencies as small-pox, vaccination, and climate, without speaking of the inaptitude of contracting blennorrhagia, an inaptitude which may also be acquired and maintained, if we are to believe the assertion of John Hunter. Perhaps this influence of custom may contribute to the extinction of some

epidemic contagious affections, by wearing out the disposition to contract them. Perhaps also, for the same reason, there may be no individuals less exposed to take Croup, during the course of the epidemic, than those who have already been attacked with scorbutic gangrene of the gums. However this may be, it is at least certain, that after the departure of the Legion of la Vendée, it was not scorbutic gangrene which showed itself among the soldiers sent to replace it, but Diphtheritic Angina, which placed three patients in great risk of their lives.

It is not to explain, still less to prove, a fact so often observed, that I have contrasted with some analogous facts this tendency of Diphtherite to become stationary; I have only endeavoured to give a reason for some apparent contradictions which are observed in practice.

Authors have agreed in saying, with much truth, that there is the greatest danger of the air-passages becoming attacked, if the circumscription of the white spots in the pharynx is no longer to be perceived; but this assertion ceases to be true from the time when the disease has lasted several days, for then it is often seen to make no further progress. It also happens, that a pellicular inflammation of the gums, in a few days from its commencement, surpasses by its duration and its intensity another affection of the same nature, which has lasted for some months, and the course of which, though at first rapid, has afterwards become retarded.

Analysis of Historical Evidence.

In deferring so long the explanation of the bibliographical history of the affection which forms the subject of this Memoir, several advantages have been sacrificed. I do not conceal from myself that facts which may seem to be more in accordance with those already related, might have inspired more confidence; but, in order that a great number of historical notices should be properly interpreted, it was necessary that, by the help of pathological anatomy, the seat, the extent, and above all the nature of the lesions which exist after death, should be exactly determined.

We never fail to discover a familiar object in the most incorrect drawing; thus, we easily perceive the principal features of the diphtheritic affection, when we have studied them according to

nature, in the descriptions which have reached us, at whatever epoch and under whatever denomination its ravages have been noticed. Truth makes its way through the prejudices of the age and of the schools, and often the testimony rendered to it has the more value, as it escapes without the consciousness and contrary to the intentions of him who offers it.

If some passages in the works of Hippocrates relate to Diphtherite, their brevity permits us to doubt the fact. When he says, in the book on Dentition (if indeed this book is to be attributed to him) "Quibus cito in tonsillis ulcera serpentia considunt, febribris ac tussi permanentibus, periculum est rursus esse generanda ulcera," it is probable that he had in view rather an aphthous ulceration of the back of the mouth, than a disease, all the symptoms of which would have struck so able an observer more forcibly.

In the works of Aretæus, we find the first description of the Diphtheritic Phlegmasia, a disease which he has depicted under all its aspects, and which in his time, was undoubtedly not new, since he speaks of it as of an affection which was known in Egypt and Syria, and was so common that it had received the name of Egyptian or Syriac ulcer: "Ulcera, in tonsillis fiunt, aliqua mitia, aliqua pestifera, necantia; pestifera autem sunt lata, cava, pinguia, quodam concreto humore albo, livido, autnigro sordentia. Quòd si concreta illa sordes altiùs descenderit, affectus ille eschara est, atque ità Græcé vocatur, Latinè crusta; crustam verò circumveniunt rubor excellens et inflammatio, et exiguæ raræque pustulæ orientes, hisque aliæ supervenientes in unum coalescunt, atque indè latum ulcus efficitur. Id si interim in os depascendo serpit, ad columellam usque pervenit, linguam etiam occupat et gingivas; dentesque indè labefactautur et denigrescunt. . . . . In collum etiam phlegmone erumpit. . . Atque isti haud ità multis diebus intereunt. . . *At si in pectus per arteriam id malum invadat, illo eodem die strangulat.* Pueri usque ad pubertatem maximè hoc morbo tentantur."

Although he mixes with this faithful description the opinions and some of the frivolous explanations peculiar to his age, with what truth, on the other hand, does he not describe the sufferings of the croupal suffocation which terminates the disease: "Tussis spirandique difficultas enascitur, et modus verò mortis quàm miserrimus accidit. Pallida his seu livida facies, tristantur cùm tonsillæ comprimuntur. Cùmque decumbunt, surgunt ut sedeant, decubitum non ferentes; quod si

sedent, quiete carentes iterùm decumbere coguntur; plerùmque recti stantes obambulant, nam quiescere nequeunt. Inspiratio magna est, expiratio verò parva; raucitas adest vocisque defectio. Hæc signa in pejus ruunt cùm subito in terram collapsis anima deficit."

Who would not recognize in this striking and animated picture, some details of which I have omitted with regret, the scorbutic Gangrene of the Mouth, Malignant Angina, and Croup,—the same affections, indeed, which I have endeavoured to describe with a rigid and severe exactness?

Aetius adds to the description of Aretæus, a commentary and some particulars which leave no doubt that he had seen the same disease two or three centuries later.

It is perhaps less from want of occasions for observation than from want of observers, that we must pass from the fifth to the end of the sixteenth century to find the disease again well described.

It may be inferred from some passages in the historians, that physicians have not noticed all the epidemics of this kind, even when they presented themselves with the most serious symptoms, and caused the most severe calamities. Macrobius, in the year 380, speaks, according to Julius Modestus, of sacrifices which were instituted in honour of a heathen goddess, "ut populus Romanus morbo qui Angina dicitur, promisso voto, sit liberatus."

The diversity in the appearance of the disease and its insidious progress, may have often prevented its being observed. Sometimes the epidemic terminates as soon as a small number of individuals have been attacked. Even when its duration is prolonged in any country, a few intervals between its attacks seem to offer a security against its ravages, which act only in detail, and on a few subjects at a time.

We cannot mistake tracheal Diphtherite for the orthopnœic affection of which Baillou speaks, in the second book of his Epidemics, when giving an account of the constitution of the winter of 1576. M. Royer-Collard (*Dict. des Sciences Médic. Art. Croup*), observes with truth, that the quotation from Baillou, given in Lieutaud, copied in a multitude of modern works and even adopted by the authors of the collections of observations and facts relative to Croup, is very inexact. This quotation appears to him to be adapted to the idea which has been formed of this disease in more modern times, and he thinks "that if Baillou has certainly had several kinds of Croup under his notice, it is not, therefore, proved that he knew which was Croup." It

is sufficient to read attentively the passage from Baillou and the annotations upon it, in order to adopt the views of M. Royer-Collard: but, at the same time, we arrive at the conviction that at the period when Baillou wrote, Malignant Angina prevailed at Paris, and that it was there misunderstood. It carried off children and adults; Baillou's father-in-law fell a victim to it. In vain does this able practitioner persist in regarding the difficulty of respiration as a symptomatic affection, and in vain does he support his opinion by clinical observations, for his testimony receives additional weight from his prejudices, and it does not permit us to doubt that the orthopnœic affection of which he speaks was not really Malignant Angina.

Ever since the end of the sixteenth century, Diphtherite has almost constantly shown itself in every region of the old or new continent. At first, it continued for a long time in Spain, and during nearly forty years it was noticed in different parts of the peninsula. Rather later, all Italy was successively afflicted by it. It has prevailed at Naples only for two years, and already the number of those who have died of it has amounted to more than five thousand.

It is especially towards the middle of the last century that similar epidemics, less general and less prolonged, but also more multiplied, have attracted attention in England, in France, in Sweden, and in America, particularly at New York and Philadelphia. It appears that this disease terminated the life of the celebrated Washington. Towards the same period, writers began to designate it under two different denominations, or rather to view two distinct diseases in the same affection, namely, Croup, and Malignant Angina, according to the prominence of some or other of its symptoms.

At present, it is becoming so frequent that at very closely connected periods, but at great distances in locality, I have seen it attack three individnals of the same family; namely, the child whose death caused the competition for the Prize Essay on Croup, next the mother, who remained for a long time affected with scorbutic gangrene of the gums, and then the grandmother, the ex-Empress Josephine, whose last moments were preceded by suffocation, aphonia, and all the other symptoms of Malignant Angina.*

It ought not to be necessary to demonstrate among the greater part of these epidemics an identity which has never been contested;

* Professor Béclard has permitted me to quote his testimony in this place, and he states, that in preparing the body for embalming, he saw in the pharynx the false membranes which characterize pellicular inflammation.

the question is to prove that at the different epochs when the Malignant Angina has shewn itself, the occlusion of the air-tubes has constituted the principal danger of the disease. On this point, the most positive and unanimous testimony presented itself in abundance.

The epidemic affection receives in Spain the name of *garotillo*, because those who were attacked by it perished as if they had been strangled by a cord. The Neapolitans, struck by the most formidable of its symptoms, call it *malè in cannâ*, disease of the air-tube or trachea. A great number of denominations proposed by the physicians of that age, such as that of *passio anginosa, affectus suffocatorius, laqueus gutturis præfocans pueros, abscessus, morbus, strangulatorius*, have no other meaning than popular names. But it is superfluous to discuss this matter, when the most express declarations leave no doubt upon the point. "it often happens," says Mercatus, "that those who are attacked with the garotillo perish in less than four days, *instar laqueo suffocatorum.*"

The disease had appeared for some years, when the learned physician of Philip II. and of Philip III. published his observations, which serve as commentaries to two particular histories, which he calls *Consultations*. It is in his eyes the most serious disease which he has met with; he is astonished at the rapidity with which persons who appeared to enjoy the most perfect health, were fatally attacked, and at the disproportion which he remarks between the real danger and the appearance, often very slight, of the disease. He insists on comparing it with some greater diseases, the cure of which it is more easy to obtain; and he designates as very malignant a fever which often hardly shows itself at all. Non multùm fidere oportet si febris mox non appareat aut succrescat, nam sæpe citiùs suffocat affectio quam si febris succendatur." He adduces the difficulty of respiration, which is accompanied rather frequently with difficulty of deglutition. "Cum pectoris et dorsi dolore,* ac veluti compressione suffocante; . . . . cum vocis et loquelæ vitio . . . . Quibus etiam accedit sublimis respiratio, et alta spirituum revulsio, cum maximâ pinnarum nasi distentione . . . . Variis ulcerum coloribus, fetore, etc." He recurs several times to the swelling of the lymphatic glands (pestiferi morbi naturam redolens) and of the cellular tissue of the sides of the neck.

* It is especially in adults, who resist the malignant Angina longer than children, that I have remarked this symptom of the propagation of the diphtheritic inflammation into the last division of the bronchi.

Without doubt, Fonseca, and some other Spanish physicians, whose original works I have not been able to procure, agree with Mercatus in the description of the symptoms, since Heredia, the physician of Philip IV, who wrote twenty years later on this subject, makes no mention of the diversity of opinion among his predecessors, except in relation to the treatment. At the time when he published his Treatise, *de Anginâ Malignâ*, inserted in the third volume of his works, the disease had not changed its aspect. He regarded the fever which accompanies the Garotillo as entirely symptomatic.

Sgambati and Carnevale are distinguished among the Italian physcians, who have described the epidemic of the commencement of the seventeenth century. Carnevale especially, in his Treatise, *de Epidemico strangulatorio affectu,* in discussing the greater part of the questions relating to the disease, relates many facts. I should have too much to quote, even if I confined myself to those which characterize the nature of the disease. It is in every point the same epidemic as that which has been observed at Tours, from 1818 to 1822 : and to avoid the errors into which the author has fallen, it would have been sufficient if he had examined after death the alterations which he describes with exactness, since he describes such as are usually seen during life.

It was in the month of June, 1618, in a market-town of Naples, named Chiaia, near the sea-shore, that the epidemic affection began to be remarked; many children died, " morbo quodam medicis incognito jugulatos, sed oris internas partes tentante et apprehendente." The disease soon extended to the rest of the town, and the children were no longer the only victims. The greater part of those who were attacked, perished of the disease. The author thought that he ought to give the name *strangulatory* to this disease, because it appeared to strangle and suffocate the patients, the passage of air being intercepted, either by an ulcer or by inflammation. According to him, the name of Angina could not be fairly given to an ulcerous inflammation proper to the tonsils. He prefers, therefore, to designate it under the name of strangulatory affection, succeeding to the ulceration of the tonsils, because, if the strangulation is not the necessary consequence of the disease, it is the mode of termination which it generally presents. He does not acknowledge that it is an Anginoid affection, although it suffocates like an Angina : "If I learn," says he, " that it strangles the greater part of the patients, it is because the putrilage (?) and the corruption of the parts oppose themselves

to the passage of the air (viam ingredientis egredientisque aeris impediunt, arctant, claudunt)."

If we persist in giving the name of Angina to the epidemic affection because it strangles like a bowstring or a cord, he consents to admit this denomination only in order to express one of its symptoms; names being of little importance, he adds, when we speak of any striking objects which we have under our own eyes.

It is with such diffuseness, or, rather with such prolixity, that Carnevale sustains his opinion. This author treats of the different aspects which the disease presents in the pharynx; of its extension to the trachea, the œsophagus, or the pituitary membrane; of its differential signs; and of the prognosis. Carnevale, like Aretæus, places confidence especially in local treatment.

The Treatise of Nola, which appeared in 1620, does not invalidate any of the facts announced by Carnevale; the author, who was still young, admitted that he wrote in order to exercise his mind. According to him, the disease is propagated rather by infection than contagion; it was caused by the exhalations which escaped from the soil after the earthquake of 1616. During the first year, these exhalations occasioned an epizootic disease, affecting first the lower animals, because they kept their muzzles nearest to the earth; in the following years, children were attacked, and lastly, adults.

Athough he supported this opinion with arguments, which are as puerile as they are paradozical, Nola might have enriched science with valuable facts, if he had observed more carefully the epizootic disease of which he writes; but he describes it more like a poet than a physician, and it is impossible to discover in his description more than a very doubtful analogy with the epidemic affection. However, it is not without interest to hear a man who appears rather disposed to put himself in opposition to received opinions, discoursing upon the same facts, observed in the same places, and at the same period. The symptoms of the epidemic disease must have possessed some very striking characters, since the description of Nola is entirely in conformity with that of Carnevale, and since, besides, these authors seem to have treated the same subject independently of each other. Nola remarks that the white layer which appears to spread so rapidly into the pharynx and trachea, is extremely superficial:—"Crustulis quibus detersis, sinus cutis profunditate non altior remanebat."

In 1622, twelve years later, Alaymus published his "Treatise on Syriac Ulcers." Here we find exactly the same facts reproduced in

different language. From several remarkable passages, which prove that the characteristic features of the epidemic affection which prevailed at Palermo, belong no less to Croup than to Angina Maligna, I shall quote only the following:—"Et ut unico prognostico multa concludamus si difficultas spirandi .... si ægri decubitum non ferant, sed sedere cogantur, et si sedentes non quiescant: si vox rauca et interclusa eis fiat, magnam quidem viarum spiritûs interclusionem et subitam animæ exsolutionem, hæc omnia significant." The symptoms which foretel the fatal termination of Membranous Angina could not be more clearly described than in this enumeration, in which the author affects to paraphrase Aretæus, in order, no doubt, to enforce more fully the truth of his description.

About the same time, Cortesius thought that he perceived some difference between the garotillo of the Spanish physicians and the epidemic affection which he witnessed at Messina; but what he says on this subject is, on the contrary, calculated to demonstrate the constant uniformity of symptoms under which Diphtherite was manifested. It carried off his son-in-law, and a little later, his grandson. The difficulty of breathing increased in the former immediately after some attempts had been made to remove the eschars from the pharynx. Morgagni is astonished that such an able anatomist should have been opposed to the *post-mortem* examinations demanded by the senate of Messina, and that he should declare them to be absolutely useless, inasmuch as it was sufficient to make the patients open their mouths to ascertain that they were dying of gangrene, with which all the parts of the back of the mouth, and especially the tonsils, were affected.

Marcus Aurelius Severinus appears to him still more reprehensible; for this author had seen many thousand children carried off by this formidable disease, and yet he inserted in his Treatise only a single *post-mortem* examination, and this was so vaguely described, that scarcely two lines relate to the subject! These two lines, however, are remarkable, "Larynge investigatâ, contecta erat pituitâ quâdam crustaceâ, citra ulceris speciem."

No physician of this age mentions that a cutaneous exanthem accompanied the other symptoms of the Malignant Angina which they have so well described.

Since the middle of the seventeenth century until 1740, few descriptions appeared of Malignant Angina. If, since this period, we compare together the general descriptions, and especially the particular histories of epidemic Croup and of gangrenous sore-

throat, we shall arrive at the conviction, that the same disease is described under these two names, and that it has always presented an assemblage of the same symptoms; but we shall be able to observe that those of Malignant Angina predominate in young subjects who perish by tracheal strangulation, and that those of Gangrenous Angina, on the contrary, are more striking in adults, who are more slowly suffocated.

Ghisi, after having given an exact description of the epidemic Angina which began to show itself at Cremona in the month of May, 1747, merely says that in some subjects, "other mortal and treacherous cases of Angina which were accompanied with scarcely any difficulty of deglutition, killed unexpectedly and exactly in the same manner as the cases of the first kind, the progress of which had been neglected;" that is to say, that all those patients, whether they had or had not experienced a pain in throat which had attracted attention, perished from suffocation. Ghisi has taken particular pains to depict with great force and truth the dreadful sufferings attending their death. But the absence of difficulty in deglutition, which has been so much insisted upon, has been constantly observed in all the epidemics of Malignant Angina; and particularly in that of Tours, it has too often inspired the most dangerous security. Details which were found in works, the recollection of which was quite recent, were not the object of this letter of Ghisi, so often quoted in the annals of Croup. It was evident that he wrote it only to make mention of the case of a little girl who expectorated a tubular false membrane, some moments before dying. It is true that on opening the body of another child, he found in the trachea a membraniform pellicle, which was altogether of a similar character, and he states explicitly, that everything in the throat was healthy, "nelle fauci tutto ci vede sano." Whether the pellicle was really developed in the first instance in the trachea, and whether the pharynx was examined with sufficient attention, it is impossible to determine; but it is at any rate certain, that these two children died of the epidemic affection which then prevailed at Cremona, and to which Ghisi himself asigns all the symptoms of Malignant Angina, being the same symptoms as those which had characterized the epidemics of the preceding century, and which at an epoch nearer to our own days, were seen to be reproduced in the epidemics of Croup described by Starr, Bergius, Van Bergen, Rosen, Zobel and Keetel.

But on this point, instead of expressing my own opinion, I may

adduce a testimony which cannot be suspected; namely, that of Michaëlis or Göttingen, the author of a monograph on Membranous Angina. The case of his younger sister, carried off by this disease, is, according to him, the type to which he refers all the examples of the malady which he was able to collect.* He discovers that in the epidemic which Cullen and Crawford refer to Croup, a great mumber of the cases belong to Malignant Angina. He supposes that these two diseases prevailed at the same time, and that they may have been confounded together. His rule for distinguishing them, is to refer to Malignant Angina all the cases in which the fetor of the breath has been particularly observed, especially if, at the same time, spots have been seen in the pharynx. "But in the cases," he says, "in which fragments of false membrane have been expelled by the efforts of coughing, there is no doubt that this was not really our disease."

Rosen, who recommends us not to confound Croup with Malignant Angina, falls into this error himself. The affection described by him, is said to be transmitted from one child to another; pellicles are seen in the pharynx from the beginning of the disease, and a long time before it is terminated by croupal suffocation. It is true that the membraniform tube, which at this period particularly attracted attention, is seen in the trachea after death; but Michaëlis fears that Rosen, who does not adduce facts observed by himself, has been ill-informed. He is more embarrassed by the cases collected by Starr, who has described, under the name of strangulatory disease, the destructive epidemic of the county of Cornwall. He frankly confesses that after having divived the cases into two parts, there remains a third variety which appears to belong as much to one affection as to the other. A particular case which he translates literally, especially offers him some insurmountable difficulties. The length to which this analysis has already extended does not permit me to copy more than the following few details.

Membranous shreds are seen in the pharynx of the child who forms the subject of the case; and at the moment when it is on the point of suffocation, its father helps it to disengage a membraniform

* The difficulty of deglutition observed during life, the enlargement of the tonsils which was perceived and noted after death, and the character of the affection which prevailed at this period in the surrounding countries, all lead us to believe that the disease of which Michaëlis's sister died, presented a much greater resemblance to Diphtheric Angina than is indicated at first by the too succinct case which he has related in his "Treatise on Membranous Angina."

tube several inches long. The respiration becomes free ; the supposed eschars of the pharynx, touched with hydrochloric acid, are detached without leaving, on the points which they occupied, any trace of ulceration or even of erosion. Other membraniform fragments and portions of tube are also expectorated, but twenty-four hours after the expulsion of the last fragment, the child dies suddenly, preserving, like all those affected with the same disease, its presence of mind to the last moment.

If this case should still leave any doubt upon the identity of Croup and Malignant Angina, I know not what the most obstinate prejudice could object to the assertions of Samuel Bard, whose name figures in the list of authors who have written on Croup. He saw upon several children in the same family, thick coriaceous pellicles formed upon the tonsils, and propagated from the pharynx to the trachea ; and at the period of this extension he observed all the symptoms of Croup developed. He remarked in several adults the same succession of phenomena ; three *post-mortem* examinations exhibited to him, as an uniform result, white, thick, coriaceous, elastic layers of concrete matter, which lined the walls of the pharynx. A membraniform tube of the same nature, advanced into the trachea, and became progressively thinner in proportion as it descended into the bronchi. The tracheal mucous membrane was slightly inflamed ; that of the pharynx, after the pellicles were removed, was found rather pale. Neither the appearance of the surfaces, nor the smell of the bodies, allowed the least suspicion of putrid or gangrenous alteration.

I shall conclude this historical sketch by a succinct analysis of the works which complete the history of Diphtherite up to our own time.

The dissertation of Dr. Fothergill has no relation to this disease, except by the learned researches which he has instituted on the subject; but the complaint which he observed and described is certainly a Scarlatinal Angina, and very different from Diphtheritic Angina. The gangrenous sore-throats, observed by Huxham, are also related, for the most part, to Scarlatinal Angina.

In 1747 and 1748, Arnault of Orleans, makes mention of terrible quinsies, which carried off the patients in twenty-four hours. He says that he opened two children who died of this disease, and that the tracheal mucous membrane was found detached like a roller of the length of three or four fingers. It was as thick as parchment and its colour was white.

The history of the gangrenous sore-throat, edited by Chomel, presents several special observations on Diphtheritic Angina, of which all the symptoms were noted daily with great care.

In 1768, Marteau de Grandvilliers, a physician at Aumale, published a description of gangrenous sore-throats which he had observed for several years in Picardy. This is one of the most interesting Treatises which has appeared on this subject. Being an attentive as well as a modest observer, he has collected a great number of facts, and arranged several special narratives with great exactness. If, at a period when the inorganic nature of the false membrane had already been discovered by Ghisi in Italy, the physician of Aumale preserved, as an example of exfoliation of the trachea and bronchi, some long membraniform tubes expectorated by a young man who died of a gangrenous sore-throat; and if, after having opened a body, he persuaded himself that it was the mucous membrane of the trachea which was detached beneath his fingers like the epidermis in a burn, I should have less right than another to be surprised at it, since I was not able to avoid a very similar mistake, in circumstances which rendered it less excusable. The practical facts collected by Marteau would have contributed more certainly to clear up several therapeutical questions, if he had not, like Fothergill and Huxham, confounded Scarlatinal Angina with Diphtheritic Angina.

The dissertation of Samuel Bard appeared in 1771. Since that time, many observations on Croup, which, under this denomination, have really reference to more then one disease, have been published in the periodicals or in a multitude of special Treatises. Several of these observations present the union of Malignant Angina with Croup, as a complication. The frequency of this complication, and the singular affinity of these two diseases, is a fresh presumption in favour of their identity which I abstain from insisting upon.

Is Diphtherite contagious? All the authors of the seventeenth century reply to this question in the affirmative. Alaymus, in speaking of the danger of contagion, expresses himself with much force: "Caveant angue pejus parentes suos filios secum gerere, ubi puerulus hoc modo infirmatur; et si in domo ejus continget, statim alios pueros valetudine fruentes separent."

Carnevale quotes, on this point, in a Latin verse, the opinion of his contemporaries:

"Cede citò, longinquum abi, serusque reverte."

Cortesius, indeed, says that this disease is not contagious except

in a limited sense; but on this point he quotes the case of a young student who died of the disease after having approached a monk affected with the same malady, this patient having begged the student to ascertain if his breath was as fetid as he himself believed it to be. Cortesius concludes by remarking that the disease is not free from contagion.

Nola, who is a partizan of infection, does not deny that, by very close intimacy, the disease may be communicated; but then, according to him, it is a simple transmission.

Marcus Aurelius Severinus says on this point:—"Quod ad contagium attinet, hoc communi omnium consensu atque experimento evincitur."

During the epidemic of Tours, twelve children, from six to nine years old, who went as day-scholars to a school consisting of thirty pupils, were attacked in the same week with Diphtheritic Angina. There were not at this period any other examples of the disease in the town. Five died three or four days after the symptoms of Croup had declared themselves; and in the families of some of the scholars other children were attacked.

An attendant at the Hospital, two Sisters of Charity, and two pupils attached to the medical department, suffered from the epidemic affection.

Still it must be admitted that it was often impossible to arrive at the origin of the contagion, and in some circumstances it was altogether improbable that it occasioned the disease. It cannot be denied that the same difficulties might be raised relatively to the transmission of the small-pox, if the contagion of that disease were not established on the most solid foundation. Every time that it has been brought from without into the General Hospital, and that it has propagated itself, it has been easy to ascertain at the beginning, the exact period when it was communicated. But as soon as a certain number of individuals were attacked by it, it became impossible to follow the traces of the contagion through a multitude of indirect and doubtful modes of communication.

If it was still more positively demonstrated, that Diphtherite is contagious, it would not be less certain that it is so in a degree very inferior to that of other diseases. But on this point, and on the mode and the conditions of contagion, much remains to be learned. I have made ineffectual attempts to communicate Diphtherite to the lower animals.

Treatment of Diphtherite.

Diphtheritic inflammation of the mucous membrane of the mouth, when arrived at the degree which has received the name of "watery canker," (*chancre aquatique*) is to be regarded as a serious affection, against which various modes of treatment have been employed with more or less success. It is chiefly to the means of contending against pellicular inflammation of the air-passages that the attention of practitioners has been directed, but the frightful rapidity of the disease has suggested modes of treatment which are rash and ill-advised, more violent than energetic, and better adapted to preconceived ideas of its pathology than appropriate to its nature.

It is not its violence which renders it formidable, and it is not by an energetic violent determination of blood, nor by its destructive activity, that it takes away life; but the inert product of a superficial inflammation is accumulated in the respiratory tubes, and all the phenomena of Croup in its last stage, are the necessary consequences of the increasing embarrassment of a function so important to life as respiration.

I do not conceal from myself that I am approaching a difficult question; and one which from the seventeenth century has been the subject of discussions, "in which," says Fothergill, "bitterness and acrimony were not spared."

Even the multitude of the measures to which we have had recourse, only proves too fully the insufficiency of the greater number of them. The difficulty of choice among so many modes of treatment which are equally lauded, and equally disapproved, is increased by the application which has been made of them to very distinct diseases. A simple tracheitis or even a very mild sporadic affection, which is, perhaps, the same as that designated by Millar as his acute asthma in the first stage, has made the reputation of the most accredited methods. This sporadic affection which simulates Croup is not at all rare. It commences as it terminates; that is to say, from the beginning, the alteration of the tone of the voice, the peculiar sound of the cough (resembling the barking of a young dog heard at a distance), and the spasmodic difficulty of respiration, would cause the most fearful apprehensions, if our fears were not counteracted by the rhythm of the circulation, which is not so much disturbed as it is accustomed to be at this stage of true Croup; and

if we had not an additional reason for security in the natural state of the pharynx, and in the absence of swelling of the lymphatic glands, which in epidemic Croup, are constantly tumefied in the regions corresponding to the affected membranes.

It is after crying, and a prolonged exposure to cold air, that we often see, especially in young patients, an indisposition which has appeared to me to depend upon a simple catarrhal annoyance, or a kind of obstruction of the glottis.

With regard to epidemic Croup, I am compelled to declare, contrary to the generally received principle, that abstraction of blood has appeared to me to be hurtful, and to accelerate the propagation of Diphtheritic inflammation. Emetics and blisters have been used without relief, and I can assert that these means had not been omitted in the greater number of patients who died.

At one period when I had already recognized the inefficiency of blood-letting in extinguishing an inflammation which yielded only to local applications, I still believed that it would be useful in moderating its rapidity. I persisted especially in looking upon it in this light, after having ascertained that the idea of a putrid and gangrenous alteration was supported only upon a misapprehension, and I persisted the more willingly, because this course appeared to me to reconcile the opposing views of the ancients and moderns. In fact, in the seventeenth century, the local application of caustic prevailed, and bleeding had fallen into great disrepute, especially if the disease had already made some progress. It was then condemned, I said to myself, upon the preconceived opinion of the septic character of the disease, while at the same time, it was simply without efficacy against the mechanical lesion, which causes the principal danger of Malignant Angina. But modern physicians have hastened to resort to it only in order to prevent the formation of the false membrane. This view has, I admit, something of so specious a character, that I have not abandoned it without much hesitation; I have been compelled nevertheless, to yield to evidence, seeing too frequently the occurrence of the opposite to that which I had hoped. I am certain that the symptoms of Croup, so far from having been retarded, have several times manifested themselves immediately after the application of leeches, applied with the intention of preventing this fatal disease, the fear of which had been excited by a very slight sore-throat. I am now astonished that I did not sooner understand that sinapisms, pediluvia, purgatives, and irritant injections were

measures which were not appropriate to the nature of the disease, and were without proportion to its severity.

From the commencement of the epidemic observed at Tours, the tendency which Diphtheritic inflammation of the mouth had to perpetuate itself by the removal and the renewal of the pellicles (so long as we had no recourse to local applications) made known to us the value and the advantage of topical remedies; and I can declare with Van Swieten, who says, in speaking of spirit of salt (hydrochloric acid), "Neque fefellit unquam me, huic consilio unicè confidentem nisi, etc.," that I have always found local applications efficacious when I have been able to carry them over the whole extent of the diseased surface. The favourable results from hydrochloric acid very soon assigned to it an extensive preference. I regretted afterwards that I did not make a comparative trial of the efficacy of many other substances which have been much praised as specifics in Croup.

Sulphuret of potassium, continued for some time as a local application, was found to have no effect against pellicular inflammation of the gums, and it was the same with powdered cayenne (*capsicum annuum*), the decotion of which is employed, it is said, as a specific in the gangrenous sore-throats of the Caribbee Islanders.

The effects of sulphuric acid and ammonia, have been doubtful. Powdered alum has had some success;* and a complete cure has been obtained by the use of calomel, although the method of application was defective, since this insoluble body, mixed with honey, was only applied, like hydrochloric acid, once in twenty-four hours. These attempts were not continued for a sufficient length of time nor were they sufficiently multiplied to allow much confidence to be placed in the results. The substances which possess a certain degree of causticity induce a membranous inflammation, often difficult to be distinguished from the morbid affection. Hydrochloric acid, in the degree of concentration in which it is sufficient to employ it (one part to three of honey),† was free from this inconvenience, especially if the

* Aretæus recommends the use of alum. In latter times, the same substance has been extolled under the name of anticroupal powder, and the insufflation of this powder into the back part of the mouth, has been recommended as a very good specific in this disease. But the evidence which Dr. P—— gives of the efficacy of this local treatment, no doubt preferable to many accredited plans, has been quoted in several Medical Journals only in order to make it a subject of bitter derision.

† Since this memoir was read at the Academy, I have ascertained that it is preferable to employ hydrochloric acid pure and concentrated.

applications of it were made at distant intervals; and it always appeared more advantageous to employ the strong acid at long intervals (twenty-four or thirty hours) than to return more frequently to less energetic applications. It appears sufficient to substitute another inflammation in order to arrest the progress of that which is specific. I have obtained an analogous effect upon the pustules of small-pox,* from the second to the fifth day of the eruption, by pricking the heads with the point of a gold or silver needle, wetted with a solution of nitrate of silver. The variolous inflammation is extinguished almost instantaneously. Such a very slight touch is sufficient upon pustules of the second day, that all traces of it disappear before the period of suppuration. The same deduction may be drawn from many other practical observations, but it is by the very fact of the constant efficacy of the local treatment, that its advantages ought to be appreciated. In general, it is less by reason of its serious character, than by its prolonged duration, that Diphtheritic inflammation has made itself important. Unfortunately, local treatment is no longer applicable when the membraniform pellicles have reached the larynx.

Nevertheless, five individuals have been preserved from the danger of imminent suffocation by fumigations of hydrochloric acid, but these fumigations are dangerous and difficult to manage. Even in a case where local treatment is no longer applicable, an energetic mercurial course still offers some valuable resources. It was only near the end of the epidemic, that an unhoped for example of cure, obtained by an English surgeon, Mr. Conoly, became the occasion of new efforts, rewarded by a success which surpassed all expectation. I have collected the detailed history of seven patients very rapidly cured of Croup; and in the stage to which the affection of the air-passages had already reached, I cannot doubt that they were rescued from approaching death by the agency of mercury. The inutility of the most accredited plans, and the abuse which English physicians seem to have made of calomel, had at first prepossessed me against a remedy, the whole worth of which I had failed to recognize.

A very sensible effect was perceived a few hours after the administration of the first doses; the point of the tongue began to clean, and, what is a still more favourable sign, the cough began to be

* A memoir on this subject was read at the Royal Academy of Medicine, in 1821, but before that time I had already performed these experiments (Arch. Gén. de Méd. Cahier de Juillet, 1825).

moist. Is it by substituting another irritation, namely, a mercurial irritation for a morbid one, that calomel produces an exfoliation of the pellicles, and opposes itself to a reproduction of the false membrane? Tracheotomy has been advised as a last resource in imminent cases of suffocation. The tendency which the inflamed surfaces have to be covered with new pellicles was the strongest objection against this operation. But was there no reason to hope that it might have been performed under more favourable auspices, if we had had recourse to it after the acid fumigations had modified the phlegmasia, and reduced the disease to the inconvenience occasioned by the presence of the false membrane? and would it not be sufficient to obtain the expulsion of the foreign body by the aid of this operation in order to finish the cure? I have been twice induced by these motives to practise it, and I am convinced, that it would have succeeded in the case which I subjoin, if calomel had been employed, instead of fumigations.

Case 7.—N. D., aged six years; stout, of rosy complexion;* slight coryza, rather painful tonsillitis, without much fever. (Leeches and an emetic.) The third day, a swelling which showed itself behind the angle of the jaw, was the cause of my apprehending Croup. A white membranous spot was seen on the right tonsil; but the child was better, and it was only six days after the appearance of the first symptoms, that he was taken to the ordinary family physician. At that time it was impossible to overcome his resistance, and to determine the state of the back part of the mouth. (An emetic.) On the seventh day in the morning, the pharynx was found lined with thick pellicles descending beyond the reach of the sight, the sound of the voice was altered, and the hoarse cough which the little patient *could cause to be heard at will*, indicated undoubtedly, that some false membranes were already formed in the larynx. The respiration was only slightly impeded and the fever was scarcely marked. (Topical treatment and fumigations.) The following day the symptoms were aggravated. Some shreds of membrane were expelled by the efforts of the cough; there was somnolence. In the evening, there was comatose insensibility, with lividity of the lips, and coldness of the extremities. The rapid beatings of the pulse could not be counted; the head was thrown backwards; the dyspnœa became extreme; the expiration was rattling (*râleuse*), and

* This child was an out-door pupil in a school, where several of his schoolfellows had already been attacked with epidemic Croup.

each inspiration was accompanied with an acute hissing sound. At one o'clock in the morning, the imminence of the suffocation, and the wishes of the parents induced me to perform tracheotomy. Asphyxia was making rapid progress; the preparations for the operation were hastily made; but as the opening of the trachea was retarded by the effusion of the blood, which poured out so copiously from a thyroid vein that it was indispensable to tie it, the child remained for some time in a state of apparent death. In the place of a canula, which we were not able to procure immediately, a large quill facilitated the access of the air. Then there was deep and noisy respiration, which stopped all at once for some seconds, and death appeared certain. There was a sudden convulsive cough; ejection of bloody mucus by the wound and by the quill. At this moment a gum-elastic catheter, reduced to a proper length was substituted for the quill. The respiration ceased to be noisy, and it became quiet and regular; the face again acquired a rosy colour. The catheter was fixed to the neck by a bandage; but the child pulled it away at the moment when the dressing had just been finished, and notwithstanding the promptitude with which we hastened to replace it (the inspiration taking place only through the wound), the little patient, who was already standing up, ready to return to bed, fell back in less than three seconds, completely asphyxiated. Precautions were then taken to prevent another similar accident; the catheter was firmly retained by means of a twisted thread, fixed to a bandage with a hole in it, bound round the neck, and calmness was restored. At two o'clock in the morning, the respiration was slow and regular, and the child drank without difficulty; he expressed his wants by the motion of his lips in such a manner as to make himself easily understsod. He promised by signs not to make any effort to draw away the tube. During the remainder of the night the respiration was alternately noisy and tranquil; it become very difficult about two o'clock in the morning. A portion of the false membrane was entangled in the tube, which was immediately taken out. The edges of the wound were kept apart by means of a pair of forceps with their branches curved outwards. A long membranous cast was entangled in the opening of the trachea, and was felt by the fingers, but it slipped away several times before it could be seized.

From the moment of the extraction of the foreign body, respiration, was performed without difficulty by means of the tube which was then replaced. Occasionally, however, by means of a small sponge

attached to the end of a piece of whalebone, we used the precaution of wiping away the mucus, which, in accumulating at the orifice of the instrument, sometimes rendered the passage of the air noisy and difficult. Some broth was allowed the little patient, according to his own wish, and he played on his bed during a part of the day; the night was passed in tranquillity.

The second day after the operation the pellicles on the tonsils, and the velum palati were detached; the local treatment had been continued. During the day, the respiration became more painful without being noisy. At this period the oppression appeared to depend upon a more deeply-seated obstacle, namely, the extension of the disease into the bronchial tubes; and the slow and gradual progress of the dyspnœa confirmed this opinion. The occlusion of these tubes, compared with that of the trachea, seemed still more and more distinguishable; but a rather considerable portion of false membrane, which had been entangled in the opening of the catheter, having been drawn out with it, the respiration became quite free, and hunger began to be felt. The inflammation of the lips of the wound kept them gaping. The catheter was replaced by a small silver spring, which kept the rings of the trachea separate. A slight depression of the alæ nasi, at the time of inspiration, showed that a small quantity of air was beginning to penetrate through the larynx.

I was now venturing to entertain hopes in which I feared to allow the parents to participate; but I was about to be sadly disappointed. The pulse was accelerated during the night: to the fever were joined prostration and oppression, and the dyspnœa was augmented every moment. A sudden dilatation of the pupil, comparable to the flying open of a spring, marked the moment of the cessation of life.

This unfortunate child preserved up to his death a kind of exaltation of his intellectual faculties. With a movement of the eye, he asked, thanked, or refused expressively and with inconceivable rapidity. All his movements were sudden and vehement. In drinking greedily, he bit the edges of the vessel, and clasped everything presented to him as if he wished to fix himself to it.

It had been thought necessary to oppose the extension of the Diphtheritic Phlegmasia by means of fumigations of chlorine and hydrochloric acid. This plan had been adopted at the period when suffocation appeared imminent, in the hope of putting an end to the cough and provoking the expulsion of the false membranes.

After tracheotomy, it was again adopted, and, although it was managed with extreme caution, it may possibly have done mischief.

Autopsy, twelve hours after death.—All the abdominal viscera were free from morbid alteration; two rather circumscribed and partial spots of hepatization, which were observed towards the centre of the right lung, made us suspect that the inhalation of the hydrochloric vapour might have caused inflammation of the pulmonary parenchyma. This lesion, however, differed much from those which I have observed in animals exposed to the prolonged inspiration of this vapour.*

The air-tubes, which we had alternately believed to be free or affected below the aperture made in the trachea, were examined with much attention. The mucous membrane, in the vicinity of the wound, was found a little reddened and tumefied; that of the bronchi was not at all different from its healthy state. No false membrane was discovered along the whole extent of the air-passages, as high as the ventricles of the larynx; but a fibrinous mass of seven lines in length, of a cylindrical form, without any hollow, and which adhered to the glottis only by one of its sides, closed incompletely the entrance of this cavity. A slender pellicle still covered the base of each ventricle, and adhered to it very slightly. No trace of Diphtheritic inflammation existed anywhere else, and everything proved that the object for which the operation had been performed was on the point of accomplishment, if the patient had not sunk, I will not say from the peripneumonic lesions (for they were not serious enough to enable us to attribute death with certainty to their existence), but without doubt from the general and prolonged disturbance of the most important vital functions.

This disproportion between the morbid alterations and their fatal result presents nothing surprising. It cannot be concealed that here is the weak side of pathological anatomy. Although at the time when appreciable lesions exist, it discovers pretty accurately their special character, it does not so constantly show us a due relation between the symptoms which are manifested and the alterations which exist after death, and it is especially rare that it offers a sufficient explanation for the cessation of life.

It is clear that I intend to speak here only of acute diseases, for

* M. Bretonneau here describes in a note some results of his experiments and *post-mortem* examinations on dogs, which were made to inhale the fumes of hydrochloric acid. (Ed.)

precisely the contrary happens in chronic affections, as I have elsewhere explained. Lesions which supervene slowly often attain a degree which seems to have long been incompatible with the exercise of a function essential to life.

In order not to augment the length of this Memoir, I shall add only a single example of success by the mercurial treatment, and a detailed history, chosen from a great number of those which have demonstrated to me the inefficacy of blood-letting and emetics employed at the commencement of the disease.

Case 8.—F. P., aged seven, of slender stature. For five days there was sore-throat, with tumefaction of the lymphatic glands of the neck and sub-maxillary region, with fever. On the sixth day, there was diminution of the sore-throat and of the general symptoms. On the seventh day, there was frequent cough. In the evening there was cough and croupal voice, with abundant, glairy, frothy expectoration. Fragments of false membrane, evidently proceeding from the larynx, were seen floating in the midst of the expectorated matter. There was orthopnœa with sibilant inspiration, and an alteration of the tone of the voice, the change of which became less sensible when the child spoke very low. On exploring the throat, it was found lined, in all its extent, with membranous pellicles of a yellowish-white colour; the tongue was covered with a thick, slimy, greyish coating. (Four grains of calomel were ordered every hour). After the fourth dose, the expectoration was easier and more abundant; a membranous tube, three inches long, was thrown up; the respiration was more easy; there were two stools. On the eighth day, the respiration again became more painful and more frequent; there was somnolence, a livid tint of the face, and commencement of asphyxia. (Frictions on the arm and on the lateral parts of the body with mercurial ointment; these frictions were renewed every three hours.) There was agitation and convulsive cough, followed by the expectoration of a thick membraniform pellicle, thirty lines long and thirteen broad, with its edges irregularly torn. The tongue was remarkably modified; on its anterior half it was clean and moist and of a rosy tint. On the ninth day, the mouth did not present any sign of mercurial affection; the cough was less hoarse and the respiration more easy. (Calomel, two grains every hour.) On the tenth day, after ten frictions, and after the administration of two drachms (gros) of calomel in sugared water, in jujube-paste or apricot jam, at the fiftieth

hour of the treatment the gums were scarcely swollen; the respiration became more and more free, and the tint of the skin was natural; the cough was catarrhal and loose; the voice was hoarse. Some fragments of false membrane, reduced to small dimensions, could no longer be distinguished from the abundant, thick, rounded, muco-puriform expectoration, which, with a small quantity of glairy matter, proceeded from the pharynx. However, by means of repeated washing, and by shaking the matter of the expectoration with water, the mucus was attenuated, and it allowed the deposition of insoluble portions of membranous matter at the bottom of the liquid. Two or three stools of a deep green colour were passed every day. At this date, vomiting succeeded to nausea, and became more and more frequent. The doses of calomel were given less frequently and the frictions were discontinued. There was dyspepsia and sudden emaciation, which latter made rapid progress. On the eleventh day there was loathing and nausea, with muco-puriform expectoration, variegated with streaks of blood. (Soothing drinks.) On the twelfth day, in the morning, there was a little appetite; in the evening there was voracity. There was less abundant expectoration of lighter sputa, which were still bloody. (Chicken broth, with or without the addition of potato starch.) On the thirteenth day the voice was gradually resuming its natural tone. The hunger was appeased only temporarily by the administration of light food; the expectoration became less frequent, and ceased to be tinged with blood. After the tenth day, the pulse exhibited no febrile frequency; and, from the thirteenth day, the patient began to be convalescent. Great precautions were taken to protect him from the effects of cold, and his health, up to the time when I write, has undergone no alteration.

The following case shows how little efficacy the most copious blood-lettings possess in arresting the progress of Malignant Angina.

Case 9.—A. S., a little girl, five years of age, of rather a delicate constitution. For two years this child has been frequently attacked with coryza and bronchial catarrhs.

On the first day there was sore-throat, with painful deglutition. On the second day there was febrile excitement; very well-marked swelling of the cervical lymphatic glands, situated at the angle of the jaw. After having attentively explored the state of the pharynx,

I found both tonsils red and tumefied; white, semi-transparent, separated, *enveloping* pellicular membranes, were seen very distinctly upon the left tonsil, and were still more apparent upon that of the right side. The largest and most opaque was nearly three lines in its greatest diameter.

The treatment was directed by a physician who had recognized the existence of Croup, although the cough was not yet manifested. Twenty-two leeches were applied at two intervals, and blood flowed abundantly for twelve hours. Two pounds of syrup of ipecacuanha with tartar emetic, were administered in the space of three days. There was repeated vomiting.

The examination of the throat had left no doubt on my mind as to the nature of the disease, and all the facts which I had been able to collect up to that time had so constantly shown me the inefficacy of general remedies in the treatment of Diphtheritic Angina, that I could scarcely hope for success by the means employed.

It was not by the use either of derivatives, however powerful they may have been, or of blood-lettings, general or local, that the extension of diphtheritic pellicles and their propagation into the air-passages had previously been prevented.

For three days, I could obtain only vague reports upon the state of the little patient, which, however, were generally satisfactory. These reports, and the results of my own observations, were entirely opposed to each other, but I had now a favourable opportunity to reconsider my opinion that the progress of Malignant Angina could be suspended only by special treatment. It remained for me to discover the modifications which the exudations on the tonsils, and the diphtheritic phlogosis of the pharynx, had undergone under the influence of blood-letting and emetics.

At the time when I most wished to obtain some information in this respect, and when I was determined to ask for it, I was again called in consultation, on account of the urgent danger of the child.

On the sixth day, there was considerable tumefaction of the sides of the neck, extinction of the voice, and croupal cough, which was infrequent, short and hoarse; breath fetid. The interior of the pharynx was grey, and mottled with brown and black; fragments of false membrane, hanging and detached, resembled shreds of organic tissue, which seemed likely to separate after having reached the last stage of sphacelus.

The imminent danger was unanimously recognized, and mercurial treatment alone appeared to offer any hope of recovery. (English calomel, two grains every half-hour.) Cough less frequent; somnolence. The embarrassment of the breathing was caused by two different obstacles; and the hissing sound denoting the difficulty with which the air traversed the larynx, could not be mistaken for the guttural rattle, caused by obstruction of the pharynx. In the evening, the lividity of the complexion became more and more marked, and asphyxia made rapid progress.

The calomel, together with some sugar, remained deposited on the lips. During the course of the night, mercurial preparations were rubbed in under the arms, and on the back of the neck. (Two liquid stools of a dark-green colour.) On the seventh day, at half-past four o'clock in the morning, the respiration became less difficult, the cough was more frequent, more prolonged, rather soft, and more catarrhal. The point of the tongue was red and moist. The child spoke very low, but very distinctly, and promised to be tractable. The hopes which such an unexpected change had raised in our minds, were dissipated towards the middle of the day; the symptoms were again aggravated, and after twenty hours of slow asphyxia, life was quietly extinguished. The last portions of calomel were not swallowed, and the skin had not sufficient warmth to dissolve the mercurial ointment. During this lengthened struggle, we tried to make the child inhale oxygen gas, with the intention of prolonging life, and of allowing the calomel time to act. I even hoped, that if the torpor of asphyxia were temporarily arrested, the efforts of the cough might throw out the pellicles which were perhaps already partly detached. In fact, where a special treatment has not modified the Diphtheritic Phlegmasia, suffocation, suspended by the ejection of the false membranes, generally returns, but in the present case, their expulsion was followed by a respite which might have allowed us to reckon more and more upon the effects of the calomel.

A jet of oxygen gas was simply directed towards the mouth, by the aid of a bladder supplied with a close-fitting pipe; and, although under the circumstances it was impossible to procure immediately a sufficient quantity of gas, and although the want of proper means to favour its inspiration did not allow us to follow out this plan for any length of time, it had very well-marked effects. The livid tint of the lips and of the face, for an instant changed to red, the stupor was sensibly diminished, and perhaps under more favourable circum-

stances, the treatment might not have been unavailing. Might not blisters, (applied only for a few hours) have diminished the tumefaction of the sides of the neck, and subsequently, the difficulty of respiration? I am only too sensible of the improbability of the success of a mode of treatment which is out of proportion to the disease. When this has arrived at its last stage, life cannot be prolonged except with acceleration of the circulation, and I do not conceal from myself that everything that quickens this, must hasten the fatal termination of the case.

At the time when the child died, numerous researches had established the anatomical characters of Diphtherite, and from this point of view these researches presented no interest, but we might in other respects derive some useful information from this case. It was not impossible that the calomel might have produced effects capable of being ascertained, thus allowing us to judge whether, even when the mercurial treatment can no longer cause the disease to retrograde, it does not limit its progress, and thus allow some favourable chances for the success of tracheotomy.

Autopsy, eighteen hours after death. External aspect. Body rather stout. Anæmic paleness over the whole surface of the body. The swelling of the sides of the neck was still considerable.

Thorax.—Lungs crepitant, of a rosy white, the tint of which became more deep towards their posterior and dependent parts. The mucous membrane which covered the bronchial tubes was pale, and the first traces of the disease were observed only in the trachea. Towards its middle part we began to discover some violet-coloured pointed spots, not very distinct, but which were found more confluent and of a more decidedly red colour on tracing this tube upwards. The membraniform pellicle which lined the upper third of the trachea terminated an inch above the diphtheritic redness by a free, slender, irregular, and, as it were, worn-out edge. In the larynx it became more adherent; it increased in thickness and almost entirely obliterated the glottis. In this region it was no longer possible to separate it completely from the mucous membrane which was of a deeper red. The walls of the pharynx presented the appearance of sphacelus which had reached its last stage; detached filaments, and hanging membranous laminæ, superposed upon one another, of a blackish-grey, and dirty-white colour, resembled thick eschars ready to fall off. The laceration of the

tonsils especially appeared to be the consequence of the putrid solution of these organs. It is, however, undoubted, that these deceptive appearances are only the results of the changes of colour, and of the detachment and more or less advanced decomposition of the pseudo-membranous layers which add successively to the thickness of the pellicle. Although considerable strips were detached during life from the surface of the tonsils, these glandular bodies still preserved an investment which doubled their volume; and the most prominent points of their surface were found reddened or ecchymosed.

The calomel had exerted the most marked influence upon the diphtheritic phlegmasia, at the base of the tongue, on the lateral parts of the pharynx, and on all the points where its contact had been more immediate and more prolonged. The inflammation in those regions was so completely subdued, that doubts might have been entertained of its existence, had there not remained fragments of false membrane which still lined the mucous fossæ, together with a slight alteration of tint, analogous to that of an ecchymosis which is on the point of terminating by resolution. This false membrane lined all the inside of the nostrils, and had lost nothing of its primitive colour; it was of a yellowish-white, adhered but slightly to the pituitary surface, and had so much tenacity, that strong traction might be employed without breaking it; still it was not possible to extract it by the guttural aperture of the nasal cavities, except by pushing it back at the same time from their anterior orifice; on several points it had attained more than a line in thickness. It was moulded exactly to the meatuses and the apertures of the nasal fossæ.

That surface which corresponded to the mucous membrane was studded with papillæ as apparent as those on the point of the tongue. There were prolongations of fibrinous matter, which penetrated into the apertures of the muciparous follicles. The pseudo-membranous pellicle reached the anterior orifice of the nostrils, and even projected beyond it; but, although the snuffling might have been attributed to the propagation of the diphtheritic affection into the cavities of the nose, none of the physicians who examined the child several times every day, had remarked the projection which the exudation made externally; so true it is, that the most apparent signs easily escape our senses, unless they are kept ever on the watch, and unless they are directed towards a definite object of investigation!

The great extent to which the disease had reached at the time when the mercurial treatment was commenced, and that which it still occupied at the time when tracheotomy might have been proposed, scarcely permit us to believe that this operation would have had any other result than to retard the moment of death.

General Sketch of the Epidemic which prevailed at Tours, from 1818 to 1821.

Before the arrival of the Legion of La Vendée, the majority of the physicians of Tours, had not met with a single example of Malignant Angina in the whole course of their practice, and I own that until that time, I myself did not recollect having seen Croup more than twice. In other cases, the very facility of the cure had made me doubt the reality of some of those recoveries, which the tenderness of mothers is so much disposed to exaggerate. It was in the neighbourhood of the principal Barracks, that Malignant Angina first began to show itself. Among the soldiers, pellicular inflammation of the gums was most frequently observed; nevertheless, Malignant Angina was also seen to show itself in several of them, whether the affection was propagated from the mouth to the pharynx, or developed itself in the first instance upon the tonsils. There was one man, of the age of twenty-three, who died in four days; and his illness presented exactly the combination of the symptoms of Croup, which frequently shewed itself in this quarter of the town, and especially affected children. There could not be the slightest doubt of the nature of a disease characterized by the most complete combination of its symptoms.

In fact, the change in the quality of the voice, the peculiar sound of the cough, and the paroxysms of suffocation, which were more and more frequent near the end of the illness (the whole duration of which was from three to four days), left the less uncertainty, since nothing extraordinary had been observed in the pharynx (which was not explored), and since a slight difficulty of swallowing had scarcely attracted attention.

It even happened that young patients did not complain in any way of difficulty of deglutition, and that the most attentive persons sometimes mistook the period, when the diphtheritic phlegmasia began to attack the tonsils. Dr. R. observed, in his eldest son, aged ten

years, the commencement of Malignant Angina. The disease yielded so readily to two or three local applications, that he thought he had exaggerated the danger of the disease. Some days later, another of his children, aged eight years, seemed less cheerful, and less good-humoured than usual. Alarmed by a swelling which he perceived on the left side of the angle of the jaw, Dr. R. hastened to examine the pharynx; he found the tonsil of that side tumefied, and enveloped by pellicles, which were directed behind the posterior column of the velum palati, and descended beyond the reach of sight.

The child complained of no pain in the throat; the same evening the diseased tonsil was painted, though to a very small extent, with a very weak mixture of acid and of honey. The next day the sound of the voice was altered, and cough supervened; there were paroxysms of suffocation, fever was not perceptible, the appetite was maintained; the night was bad. The following day, the child was better; nevertheless, the cough assumed a more and more alarming character, and became less frequent, short and hoarse. He continually felt hungry. He played during the day, seated upon his bed. The relations of Dr. R. could not understand why they ought to fear for the life of a child who was not ill. At three o'clock in the afternoon, there was rather a severe paroxysm of suffocation, accompanied with rattle, which quickly proved fatal.

A long time after anatomical researches had taught us that the disease almost always began in the pharynx, it often happened (whether sufficient attention was not exercised, or the intractability of the children prevented the exploration of the back part of the mouth) that we were unable to discover anything there during life, though after death the thickness and the deep colour of the pellicles, which from the tonsils, extended to the nasal fossæ and into the air-tubes, left no doubt as to the origin of the affection, and the course which it had traversed. But although, at the beginning, the death of several children was not attributed to its true cause, we fell afterwards into an opposite error. The fear which exaggerated the danger, magnified the slightest attack of sore-throat into the epidemic affection. This circumstance contributed not a little to obscure several important questions relative to therapeutics.

In the Legion of La Vendée, the occurrence of Malignant Angina, compared with Scorbutic Gangrene of the Gums, was in the proportion of one in nine cases.

Among the inhabitants of the town, this last affection was always very rare. I have already said that the difference was attributed to the use of the vessels which the soldiers employed in common. The ascertained number of those who died during the course of the epidemic, cannot be estimated above one hundred and fifty.

Although at the beginning, some cases may have been overlooked, the omissions cannot be considerable; upon the whole, it would be difficult to reckon twenty adults. There was a much greater number of adults attacked than this proportion seems to indicate; but they were treated with more success than the children; and I may assert that more than a hundred and fifty cures were obtained by different physicians by means of local treatment.

Notwithstanding all the care I have bestowed, I have not been able to obtain one single example of a spontaneous termination of Diphtherite. Nevertheless, some cases are to be found which are quoted by authors. There would be less doubt upon the subject if the Diphtheritic Phlegmasia had not been so often confounded with other affections. (See *Description des maux de Gorge Gangréneux, by Chomel*). This subject presents many difficulties. Among the numerous cases of Croup published in periodical works, there are several in which the disease terminated by a fortunate expulsion of a false membrane. The intensity of the fever, the pain referred to the larynx, and the whole progress of the disease, seem to indicate an inflammation of an entirely different character. I have met with a remarkable example of this sporadic affection in an adult woman. An acute pain, accompanied with fever and referred to the larynx, was felt before, and especially after, the ejection of a false membrane, which was found floating in the midst of abundant viscous sputa; it was more than half a line in thickness, and, by its semi-transparency, it resembled less the croupal pellicles, than pleuritic false membrane. Its shape indicated that it had lined the thyroid cartilage, as far as the first rings of the trachea. A bloody mucous expectoration preceded, accompanied and followed the expulsion of the pellicle. The voice remained hoarse for several weeks, although convalescence appeared to have been established for some time.

If we pay attention to the fact that these mucous surfaces are rarely excoriated without being covered with a membranous exudation, we shall easily understand that the existence of a pellicle in the larynx is not a certain indication of one and the same in-

flammatory process; and that what is true with regard to the Diphtheritic Phlegmasia, may be quite false with regard to any other kind of inflammation.

It is from my desire to throw some light upon these questions, which become very interesting in practice, that I have minutely noted down all the phenomena of Diphtherite.

I believe that I have proved in the first part of this Memoir that the pellicular inflammation, known from the remotest antiquity, is a special inflammatory process, which preserves all the essential characters which are peculiar to it, on whatever point of the mucous tissue it may be developed.

In the second Memoir, after having freely explained my views with regard to the slight efficacy of the general means opposed to the disease which I have had to treat, I endeavoured to demonstrate, that in the first stage of the disease, local treatment, which inspired so much confidence in the ancients, is still in the present day the safest method; and that in its last stage, the most powerful resources which have been discovered in our own days are the medicines which exert a specific action upon the affected organ.

Finally, comparing the facts which I have now, perhaps at too great length, detailed to the Academy, with those already known, I have seen them gain in certainty what they have lost in novelty, and I confess my belief that even from this circumstance, the labour to which I have devoted myself, will not be altogether useless.

If I am not deceived, the researches in morbid anatomy, which I have multiplied, and which I have followed out with the most scrupulous exactness, serve to connect the modern with the ancient opinions; they show that Croup is not a new disease, but the most ordinary termination of Malignant Angina. May these researches be the means of establishing the views of practitioners upon the incontestable points in the history of this disease, of calling their attention to those which remain doubtful, and of preventing the experience of past ages being entirely lost to us.

ADDITIONS TO THE SECOND MEMOIR (JUNE 1825).

Epidemic Diphtherite.

The first two parts of these researches were already printed when I had occasion to make the following additions to them, and to annex to them successively the Third and Fourth Memoirs.

Diphtheritic Angina has recently been observed at La Ferrière, a little town seven leagues to the north of Tours, and nine persons have died. The disease appeared to be transmitted from one subject to another. Does contagion give rise to these epidemics which are so partial and confined to such small localities? or rather does it not often happen that Diphtheritic Angina is developed spontaneously, and afterwards transmitted? These questions like most of those relating to the contagion of many other epidemic diseases, will, perhaps, remain for a long time incapable of solution.

It was undoubtedly Diphtheritic Angina which presented itself to the observation of M. Jurine, and of which mention is made in the following passage of the Report of the Commission. "It is easy to distinguish Croup from Angina Tonsillaris, Angina Pharyngea, and even from Gangrenous Angina of adults. But there is another sort of Angina, generally epidemic, and perhaps contagious, which is called Gangrenous, and sometimes Aphthous, which specially attacks children, and *which is so often complicated with Croup, that it is almost impossible to distinguish them.* The author is induced to believe that in the greater number of cases, this affection is not a Gangrenous Angina, but a true Croup complicated with Aphthæ, assuming sometimes the forms of adynamia or ataxia, when the prevailing epidemic itself possesses this character. He has himself twice seen Croup combined with Aphthæ: and in neither of these two cases did the disease present itself to him as a true Gangrenous Angina. Malouin, Bard, Lepecq de la Cloture, Ramsey, and some other authors relate examples of it which all appear more or less calculated to give the same idea of it."

In this complication of Croup and of an Angina reputed gangrenous although really not so, but which is generally epidemic, and perhaps contagious, we discover all the characteristic features of Diphtherite; we may also affirm that this disease was really the prototype of the Croup of modern writers, and that afterwards the

most simple tracheal lesions of the respiration have been ranged under the same name, although some of their symptoms have not the least analogy with those of such a formidable affection.

SPORADIC TRACHEAL DIPHTHERITE.

Tracheotomy (communicated July, 1825).

Four years had elapsed since I read at the Académie Royale de Médecine, the two Memoirs on Diphtherite; and with the exception of one case, this disease had not again shown itself at Tours. In the spring of 1825, two children died of an affection which had presented all the characters of Malignant Angina. I saw one of them in his last moments, and no doubt remained in my mind that the disease was the same affection as the epidemic Croup observed during the course of the years 1819 and 1820; there had existed no relationship or communication between these two subjects. A little later, a third was attacked, and he was still more isolated. I was called upon to attend him; the disease made rapid progress; and for the third time I thought that I must perform tracheotomy.

The subject of the following case was one of the youngest daughters of M. le Comte de Puységur, who had already lost three other children, carried off by the same disease. A year after the death of the first, two had died in the same week, a short time before the period when I began to devote myself to the researches which form the subject of this work. M. Puységur had had the opportunity of witnessing the success of local treatment, and that which had been obtained by means of mercurial medication; but, at the same time, he was not ignorant of the numerous occasions when this kind of medication had disappointed my hopes, and he could not conceal from himself the danger of the fatal disease which had already caused him so much anguish: and thus it was but too easy for him to recognize the symptoms of Malignant Angina, when, for the fourth time he saw them developed in one of his children.

Case 10.—E. de Puységur, aged four years, of a rather delicate constitution, had enjoyed good health, since she was cured, in the month of November, 1824, of a tertian autumnal fever, the paroxysms of which were preceded by convulsions, when

in the month of June, 1825, at the close of a slight indisposition, accompanied by colic and diarrhœa, she appeared to have caught a common cold. On the first day the cough was dry in the morning, becoming more dry and frequent towards noon; there was swelling of the tonsils. On the night of the second day there was fever and shrill cough. On the third day there was noisy respiration during sleep; during the day the cough was less frequent. On the fourth day the little patient was brought from the country into town, and perhaps, in a journey of ten leagues, she had suffered a little from the coolness of the night. I saw her on her arrival; she preserved the habits of health; the appetite was maintained; there was absence of fever; little cough during the night; but it was again becoming frequent. On the third day a white spot was very apparent on the left tonsil. (An emetic draught was given.) In the evening, the tonsils were tumefied and moderately reddened; the left tonsil was somewhat the larger. An oblong, excavated, yellowish spot, bordered with red, occupied the centre of its surface; the cervical lymphatic glands situated at the angle of the jaw, were swollen. One of them, on the right side, exceeded the size of an olive, although no spots were discovered on the corresponding tonsil. The cough was short and hoarse.

Although the growths which were seen on the surface of the left tonsil were lichenoid (resembling aphthæ), the swelling of the lymphatic glands and the tone of the cough ought not to have permitted me to mistake Diphtheritic Angina, aud during the course of an epidemic there could not remain any reasonable cause of doubt in this respect. *It then appeared to me more probable that this sporadic affection ought to be referred to common Membranous Angina; but I was soon undeceived.* Before the administration of the emetic, a sponge lightly dipped in concentrated hydrochloric acid was applied upon the tonsils; the surfaces touched assumed a whitish tint, due to the action of the acid. The emetic effect of the draught was rapid and easy. On the sixth day, at three o'clock in the morning, the cough had become hoarse and frequent; however, it was still moist and accompanied by an abundant mucous expectoration. The lymphatic gland of the right side had remained very large. Occasionally the cough again became shrill. (Two grains of calomel every two hours.) At noon, there were slight colicky pains without evacuations. Four drachms of castor oil, in the form of emulsion, were given in two doses; the oil excited vomiting and two abundant alvine evacuations. In the evening, the

cough was more loose, and less frequent, deglutition easy; apyrexia; the night was calm. Up to this time, the appetite had remained good and the child had taken light nourishment. The white spot on the left tonsil was circumscribed by a border of bright red. The lymphatic gland of the same side was rather less swollen, and that of the right remained hard, voluminous, and sensitive to the touch. In the evening, the cough again became dry, short and hoarse; still the base of the pharynx was of a pale rosy tint, and the membranous pellicles of both tonsils, the tumefaction of which was beginning to diminish, had not extended. The tone of the voice was little altered. (Three grains of calomel, divided into three doses, were given in the night.) The cough which again suddenly became croupal was a symptom of the worst description, but I was assured that it had a still more alarming character on the evening before the day when the child was brought from the country. I persisted in mistaking the disease for Tracheal Diphtheritic Angina: and the dose of calomel prescribed for the night was not in proportion to the danger caused by the rapid propagation of pellicular inflammation.

On the seventh day, at four o'clock in the morning, after two hours' sleep, there was dry cough and sibilous inspiration; the lips and the face became of a violet colour; there were cries and alternating efforts of convulsive cough, followed by the ejection of a bifurcated, rather slender, semi-transparent, tenacious and elastic membraniform pellicle, eighteen lines long. The pharnyx presented the same appearance as yesterday; the lymphatic gland of the right side appeared more swollen. There was croupal cough, more and more short and hoarse. (Two grains of calomel every hour.) The cough became more and more croupal, and the respiration was accelerated, each inspiration being sibilous and accompanied by convulsive efforts. The sterno-cleido-mastoid muscles and all the muscles of the neck which are fixed to the thorax, contracted forcibly; and the pressure of the air depressed at the same time the intervals which separate them. The calomel was given every half hour; and twenty-two grains was thus administered. The cough appeared to become rather loose; and a second portion of thick elastic membraniform matter was ejected, fourteen lines long and five broad, terminating in a point and irregularly fringed on its edges. The form of this pellicle left no doubt that it was of recent and primitive formation; its dimensions and form indicated also, that it came from the trachea, and that the morbid affec-

tion had not yet passed beyond this tube. The difficulty of breathing was not diminished. The doses of calomel were repeated more frequently, and mercurial ointment was rubbed into the sides of the neck. The inspirations became still more stridulous, and the efforts of the inspiratory muscles were more and more marked. There was tenesmus without evacuations. (Two grains of senega.) A flying blister, which, notwithstanding the rapidity of its effects, did not at all retard the progress of the disease, was applied to the region of the larynx. The difficulty of fixing an epispastic plaister, induced me to employ a piece of paper soaked in oil of cantharides, fixed on with sticking plaister. As I already feared that I should be compelled to have recourse to tracheotomy, I had taken these precautions to prevent the vesication from extending below the thyroid region. Some spoonfuls of emulsion of castor oil were given after each dose of calomel. The cough became less frequent, shorter, and drier, but it was nevertheless accompanied by great expulsive efforts. The imminence of the danger induced me to make preparations for tracheotomy. For several hours somnolence had been continuous, and it was scarcely interrupted by the efforts of the cough. The head was thrown backwards, the neck was swollen, and the lividity of the face, which announced the progress of asphyxia, no longer permitted the operation to be delayed.

Judging from the results of two cases which I have elsewhere related, what could be anticipated? In one case, life had scarcely been prolonged for twelve hours, and in the other, hopes which had been better founded, had been painfully disappointed. Ought I then to add to a misfortune which seemed inevitable, the torment of a long and useless suspense? I did not conceal from myself that no example of success justified this attempt; but I ventured to anticipate the most favourable results from the conditions which had preceded, and from those which would follow it. Experiments which I had many times repeated and which I have described in another place, had proved to me that to provide for the necessities of respiration, it was not sufficient for the air to have access to the lungs, but that it ought also, in a given time, to be renewed in those organs, as well as to penetrate into them, and pass freely out of them.

Instructed by the example of the animals on which tracheotomy had been performed with much success, I proposed to myself to modify my operation. I suspected that the gum elastic sound, employed in one of my attempts, was far from having a suitable

width; I recollected that it had lost some of its capacity by its flexure and by the accumulation of dried mucous matters with which it was coated on the inside, so that in proportion as the necessities of respiration had increased by the entrance of the chyle into the blood, and by the febrile acceleration of the pulse, the quantity of air which could penetrate into the air-passages had gradually diminished. In vain I had withdrawn the canula; I had gained only a momentary suspension of the progress of the asphyxia; the swelling of the lips of the wound had soon contracted its aperture, and it was especially to this circumstance that I attributed the unfortunate result of my first operation. I had then intended to make the dimensions of the canula proportionate to those of the trachea; and, in order that it might be introduced and kept in its place more easily, I had given it the form of a slightly depressed cylinder, curved along its course and bevelled off at its two extremities. I hoped, besides, by means of the artificial opening, to apply calomel upon the affected surfaces, and I admit that I felt great confidence in the effects of an agent which so powerfully modifies the greater part of the ulcerous phlegmasiæ of the skin. Besides, I had had occasion to convince myself that, even in the cases in which the mercurial treatment had disappointed my hopes, the diphtheritic inflammation had been dissipated on all the points which had been most immediately in contact with the calomel. Lastly, if I did not have recourse to tracheotomy, this disease, hitherto so slight that it was scarcely accompanied by a slight amount of febrile excitement, might soon become fatal: it was about to carry off a fourth child from the same family, and the medicines which up to that time had shown themselves most efficacious, had now been administered without effect in checking the progress of the disease.

Nothing more remained but this chance; and, although it offered only a slight probability of success, yet, under such circumstances, and when an unlimited confidence on the part of the father added to my responsibility, I might, in neglecting this last resource, have failed in a sacred duty.

Operation.—The head, held by an assistant, being thrown back so as to cause the front part of the neck to project, a fold of the integuments, properly raised, was divided from its free border to its base, so that the incision, directed by a line traced beforehand, extended from the inferior part of the thyroid gland to the suprasternal depression. The division of the adipose tissue, and of

the parts which cover the trachea, was rendered laborious by the convulsive movements of the respiration and the turgescence of the capillary vessels, which allowed the escape of a great quantity of blood. The thyroid veins showed themselves on the median line; the dimensions of each exceeded those of a crow's quill; they could not be avoided, and poured forth at each expiration a hemorrhage much more considerable than might have been anticipated. It was impossible to run the risk of opening the air-tube until the principal jet of blood was arrested. Two ligatures were applied without effect; and it was only after having passed a third and a fourth, by means of a curved needle, between the trachea and the divided vessels, that the blood, although it still continued to flow, ceased to spout forth. Five rings were divided and a curved silver canula was introduced into the opening made in the air-tube. The breathing became calm, and more slow, and the oozing hemorrhage still furnished by the wound, dried up almost immediately. The canula was kept in its place by means of a twisted thread, tied round the neck, and passed through rings placed near the orifice of the instrument. The quantity of blood which flowed during the operation was estimated approximatively at six ounces: there was paleness and depression.

Immediately after the dressing of the wound, the child asked for drink, and she herself carried the glass to her lips. Some mucus, mixed with blood, was thrown out by the canula at each repeated effort of the cough. A pellicular band had just been expelled, and I ascertained with satisfaction that it was long and narrow and fringed on its edges. During the night the respiration was calm, not very sonorous, and moderately frequent. There was three mucous, greenish, rather abundant evacuations, preceded by colic.

Until the evening, the calmness of the respiration was occasionally interrupted by cough, followed by the ejection of opaque mucous matters, of a slightly rose-colour, which were expelled through the canula. Some fragments of false membrane now and then accompanied the expectorated matter. Sleep was prolonged for several hours. The bowels were opened by castor oil and emollient injections. Eight grains of calomel were insufflated through the canula. (I perceived afterwards that this pulverulent matter adhered to the walls of the tube and accelerated its obliteration.)

On the eighth day of the disease, and the day after the operation, the respiration became noisy and hurried, and required powerful efforts on the part of the inspiratory muscles; the pulse was also much

accelerated. Was it not in part to the traumatic fever, or to that which accompanies the extension of diphtheritic inflammation, that we must attribute the unfavourable change which was remarked in the state of the patient, or was the diminution in the size of the canula sufficient to occasion such a disorder? It was perceived that mucous matters had contracted its orifice and made it lose more than half of its dimensions; it was therefore withdrawn, cleaned, and replaced pretty easily; from that time tranquillity recommenced, and we observed at the same time that the frequency of the pulse and of the respiration subsided; the edges of the wound were this day slightly tumefied.

On the ninth day, and the third after the operation, the sleep was tranquil until two o'clock in the morning, when the cough became more frequent, and fragments of membranous exudation were expelled through the canula. In the morning, the artificial tube was found obstructed; it was cleaned, and replaced with some difficulty. It was only after several attempts that its extremity, which was bevelled off, could be introduced into the trachea; frequent colic was experienced, attributed in part to the effect of the calomel, and in part to a former disturbance of the digestive canal; an injection of infusion of bark was ordered.

On the tenth day, and the fourth after the operation, the cough had become more frequent; fragments of false membrane were expelled; the extremity of the canula had quitted the opening of the trachea; the air did not enter and go out without producing a loud noise, and the respiration was very much accelerated. The metallic tube, taken out and cleaned, was replaced with difficulty; it could be introduced only by using some force. During this proceeding, several portions of membrane were driven out to a great distance. One of these fragments exhibited the shape of the orifice of the glottis; it was thick, consistent, coriaceous, and of a tawny colour. The respiration became tranquil, the circulation slower, the expression of the face was animated, and the child played with its doll.

On the eleventh day, and the fifth after the operation; during the preceding night the little patient turned herself about so freely, that in one of her movements the canula was displaced. This time, a pair of forceps with curved blades was used to separate the lips of the wound, and assisted in replacing the artificial tube more easily. This precaution prevented the cartilaginous rings of the trachea (folded in and turned back), from partly intercepting the passage of the air; it caused, moreover, two great inconveniences to be

avoided. The canula, being more securely held, did not run the risk of being easily expelled, and its opening could not be obliterated, a condition of especial importance; for we have often seen the respiration accelerated and the pulse become subsequently more frequent, every time that any obstacle, even though it is incapable of intercepting the passage of the air, comes to impede its entrance.

At this time we were able to ascertain, by closing the orifice of the wound, that at the periods when the canula was taken out, the air was beginning to force for itself a passage through the larynx. Indeed the cough still preserved the tone which indicated constriction of the glottis; but bubbles of air were mixed with the saliva, the spitting of which had up to this time accompanied the cough, although during each fit, the column of air passed entirely by the artificial tube. We could not forbear from entertaining hopes of recovery.

At two o'clock the cough became frequent, and was constantly accompanied with an abundant excretion of saliva; the mucous matters which escaped by the opening of the canula were more diffluent; the frequency of the cough, which became convulsive, induced us to remove the canula, and at the same moment fragments of membrane were driven out in great numbers. It was only by using some force and always by the help of the curved forceps that the canula could be replaced; the cough remained the same. During the night tranquillity returned, but still the paroxysms of cough were followed by more exhaustion; the air had not yet passed so freely through the larynx; but the abundance and the liquefaction of the expectorated matter, and above all the character of the cough caused some uneasiness lest the diphtheritic inflammation, exasperated by the irritation which the canula might have occasioned, should become more extensive.

On the twelfth day, and the sixth from the operation; the sleep had been sufficiently tranquil during the night: the closure of the canula rather than the difficulty of the respiration induced us to remove it. The air passed with such facility through the larynx, that the little patient could produce a rustling noise with her lips, and inflate some bubbles of saliva. Some calomel mixed with a few drops of water was poured, at two different times, into the opening of the wound. At the second instillation, after a deep movement of respiration, it was returned almost entirely by the mouth. The canula was only replaced after an interval of half an hour. During the whole of this time, the respiration was easy, but some bloody

mucus which proceeded from the wound, stained the expectorated matter for a few seconds.

Two ligatures had come away. In the evening, after a long calm, the shocks of the cough disturbed the canula, which had become incrusted by mucous matters; the sputa and the discharge from the wound, were again coloured with blood. Some drops of water mixed with calomel, were poured into the trachea by means of the canula. On the thirteenth day, and the seventh from the operation, the night had been pretty tranquil; from hour to hour the sleep had scarcely been disturbed by the cough, the efforts of which, at seven o'clock in the morning, had deranged the canula, without the respiration having been impeded in consequence; eight grains of calomel, mixed with a little water, were instilled into the trachea, by means of the canula. The mucous matters of the bronchi, and the exudations from the fistulous passage, which was covered with an adhesive plaister, returned easily by the larynx. The voice was heard much more clearly, and suddenly some words were pronounced quite loudly, and were articulated distinctly. Ten grains of jalap, and two grains of calomel, were given in a tea-spoonful of orgeat (One rather abundant evacuation). The cheerfulness appeared to be diminished by the uncomfortable feeling which succeeded the effect of the purgative. At five o'clock, the cough, which had become rather more frequent, was in the first instance increased by a fresh instillation of calomel, but half an hour later, the relief which had always been obtained by this measure, was followed by a tranquil sleep, prolonged during the whole night. On the fourteenth day, and the eighth from the operation, in the morning at eight o'clock, the canula was taken out; the respiration was calmly performed, partly through the wound, and partly through the natural passages. A tent to which we had given the shape of the canula by filling with wadding a little cambric bag, was substituted for the metallic tube; but, although it was fastened down by a piece of adhesive plaister, and held by a bandage, the air escaped through the wound during the fits of coughing.

During the greater part of the day, the little patient remained sitting in bed, and the vivacity which she displayed in her childish games, gave us reason to hope that the assistance of the artificial tube would soon become unnecessary. The appetite was good; a slice of bread and butter, the wing of a chicken and the breast of a partridge were allowed for three meals. In the evening, after two

hours' sleep, the bandage exactly closed the aperture of the wound, and the air was no longer heard penetrating into it; the respiration was accelerated, was becoming sibilous, and the cough remained hoarse, still resembling that of Croup.

The canula was replaced without difficulty, with the assistance of the curved forceps, and at the same moment, the respiration became tranquil and less frequent. Some thin, rectangular fragments of false membrane, worn away at their edges, were ejected when the canula was replaced. Other thick and consistent portions were at the same time expectorated and passed out mixed with the sputa. Was the larynx still obstructed by false membranes? Would the diphtheritic inflammation tend to become chronic in this organ, as most frequently happens when it attacks the gums?

The difficulty of reaching the larynx and applying to it a sponge dipped in hydrochloric acid through the artificial tube which was directed towards the bronchi, led me to persevere in the instillation of calomel. Seven or eight grains, mixed with a little water and poured into the wound, were drawn in by inspiration during the efforts of coughing; the instilled liquid was mixed with the mucus of the trachea, and it was afterwards partly expelled through the gaping aperture of the wound, and partly expectorated.

On the fifteenth day, and the ninth of the operation, the night had been good; still the general depression and the frequency of the pulse (100 in a minute) and that of the respiration (28 to 30) left some fear that the pellicular inflammation had not yet yielded either to the general treatment (which had been suspended from the fear of carrying it to a poisonous extent), or to the local mercurial treatment, which was not regularly continued. For two hours the canula was withdrawn; the respiration was still noisy and sibilous; but the cough had lost a little of its hoarseness. Some portions of concrete matter were perceived in the muco-puriform secretion, which was expelled from time to time through the opening of the wound, and a small fragment still preserved a degree of thickness and consistency which led us to believe that the local treatment had not been sufficiently prolonged. The lips of the wound were closing so rapidly that it became urgently necessary to replace the metallic tube in order to keep open the fistulous passage which allowed us to apply the calomel directly to the interior of the affected organ. It was necessary to dilate the passage of the wound with great force in order to replace the canula.

The curved ends of the forceps facilitated and directed its introduction with great certainty.

In the meantime the edges of the wound had sunk, and the canula, by penetrating more deeply, excited an irritative cough, which was accompanied by a muco-serous expectoration. Twice in the day nine grains of calomel mixed with a few drops of water were instilled through the wound each time that the canula was withdrawn. The cough was certainly less hoarse, and as soon as the passage of the air through the course of the wound was intercepted, the mucous matters and the discharge from the fistulous tube were expectorated with great facility. The next day, the night had been tranquil; and the hopes and fears, which had alternately succeeded one another, at last gave place to a certainty of success. The last two ligatures had not yet come away. During the greater part of the day the canula was not kept in the wound, the orifice of which was contracting so rapidly that the air and the tracheal mucous matters no longer passed through it except at the time of coughing. Nevertheless the pulse still preserved its frequency (98 to 104), the respiration seldom fell to 22 and most usually reached 25. In the evening, the presence of the canula excited a convulsive cough which necessitated its withdrawal: it was replaced during sleep by means of a powerful dilatation made with considerable force, which did not, however, cause any discharge of blood. Two small portions of concrete matter, rapidly expelled at the moment of the re-introduction of the canula, came undoubtedly from the fistulous passage of the wound.

The respiration when it was performed only by the natural passages, was noisy and snoring, especially during sleep. The parents of the child assured me that this habit of breathing had existed for a long time.

On the seventeenth day, and the eleventh after the operation; the sleep had not been interrupted during the night more than three times by the cough. The respiration which was performed through the tube, was noiseless (22 to 26 inspirations in a minute) pulse 90 to 102. A piece of prepared sponge which was substituted for the canula with the intention of keeping the wound dilated appeared to cause uneasiness. After remaining six hours it was withdrawn, and its place supplied by a tent lightly held. The sustained cheerfulness and the lively movements of the little patient proved the more clearly that the wound was not the seat of any painful feeling, because the least painful sensation generally caused her to complain. The voice remained

low and very indistinct. The canula was not replaced. The next day, at the period of waking, the respiration which had been tranquil, became noisy. The cough, which was still loose, was attended with the expulsion of voluminous, yellowish-white, opaque, muco-puriform sputa. There was hoarseness; 19 to 21 inspirations in a minute: pulse 102. Some sneezing, which had become more frequent since the air no longer passed except by the natural channels, indicated that a slight coryza had augmented the guttural irritation, kept up by the discharges from the wound, and by the secretions which were still furnished by the surfaces which had been the seat of the pellicular inflammation. The appetite was good, and a healthy appearance was observed after each dressing.

On the nineteenth day, and the thirteenth from the operation; the sleep had been interrupted only by two fits of coughing. The cheerfulness of the patient, her vivacity and her appetite were all that could be desired. For six months the respiration had never been so free and noiseless as on this day (18 inspirations in the minute). The sneezing was still more frequent. The cough remained hoarse. The ligature was removed; the aperture of the wound contracted; and a small tent was lightly placed in its orifice, in order to allow the cicatrization to take place from within outwards.

On the twentieth day, and the fourteenth from the operation; the sleep had been interrupted only by a single paroxysm of cough. After an easy expectoration of muco-puriform sputa, the respiration became quite noiseless, and was performed by movements as slow and inconspicuous as in a state of health (pulse 84 in a minute). The surface of the wound, which was contracted, was slightly granulated, and presented nothing more at its centre than a narrow aperture which would scarcely admit a probe of the size of a straw.

A superficial ulceration which still remained round this aperture was soon cicatrized, and the health was quickly re-established. On the nineteenth day from the operation, and the twenty-sixth of the disease, the voice had recovered its natural tone, but up to this time the deglutition of liquids had almost always excited a little cough. This slight inconvenience was scarcely remarked the following days, and soon afterwards it ceased entirely. The assiduous care taken of the patient contributed greatly to the success of the operation, and indeed, in this respect, I could not have been more ably assisted. Sometimes the respiration was suddenly accelerated, and in order to

render it difficult, it was only requisite for some of the concretions to become entangled in the canula, or that its orifice should be narrowed by some dried mucus. This dyspnœa, which I attributed to the extension of the pellicular inflammation and to its propagation into the bronchi, had at first caused me the most serious uneasiness; but at a subsequent period I understood the cause better, and I felt that I could not pay too much attention to prevent the obliteration of the artificial tube.

I have become thoroughly convinced that, in the last stage of Malignant Angina, the success of tracheotomy depends upon the amplitude and the freedom of the passage which is opened to the air, and I have therefore always insisted upon adopting all the means which were necessary to secure these conditions. If we examine the works of those who have written upon Croup, we shall find that most of them agree in thinking that the smallest aperture must be sufficient to allow enough air to enter for the necessities of respiration. Although these authors might have assured themselves that in the most intense Diphtheritic Angina, the occlusion of the glottis was never complete: and although they had heard patients articulate sounds, which were feeble, indeed, but distinct, up to the last moment, yet they did not attribute death to its true cause, namely, to the simple contraction of the aperture of the air-passage, but to a spasmodic condition which does not exist. When we see that the slightest mechanical obstacle is sufficient to prolong the agonies of suffocation, and to aggravate them and render them fatal:—when we see long fragments of membrane presenting themselves at the aperture of the canula, protruding and again receding, and escaping from the fingers which are trying to seize them, we then recognize the importance of guarding against the obstruction of the artificial tube, and the narrowing of any part of its dimensions.

PHARYNGEAL DIPHTHERITE.

Case 11.—M., a soldier of the 44th regiment of the line; of a strong constitution, entered the General Hospital on the third day of his illness. There was considerable swelling of the lymphatic glands, and of the sub-cutaneous cellular tissue of the sides of the neck. There was fetid smell of the breath, and painful deglutition. Some thick pellicular membranes, partly detached, and of a grey

or whitish colour, extended from the surface of the right tonsil, which was much increased in size, as far as the corresponding edge of the uvula; the pulse was not very frequent. (Local treatment, concentrated hydrochloric acid, eighty drops; honey, four drachms.)

On the fourth day, the tumefaction of the cellular tissue was dispersed, and the lymphatic glands alone remained swollen. The tonsil was much smaller, and the exudations which covered it had lost a great part of their dirty hue. After three more applications, repeated once a-day, there no longer remained in the pharynx the slightest trace of inflammation; and on the sixth day from the admission of the patient, the cure was completed.

A larger number of special cases of this kind would present no interest. Diphtheritic Angina, left to itself, may sometimes be confined to the pharynx, without attacking the air-passages, and in that case, may present the most repulsive appearance. I have seen this affection simulate ulcerated scirrhus of the pharynx. The soldier, who was affected by it to this degree, declared that he did not begin to feel any difficulty in the act of swallowing until within ten or twelve days. I could scarcely understand how the disease which I discovered in the back of the mouth could have acquired so much intensity in so short a space of time. A tumour of considerable size occupied the place of the left tonsil, and pushed forward the velum palati. The livid hue of this tumour, and the nodulations on its surface, gave it the most exact resemblance to a cancerous excrescence. The right tonsil, which was much less swollen, was covered by pellicular exudations of a dirty-white colour. The lymphatic glands of the sides of the neck had attained a considerable size, especially on the right side. From the account given by the patient, who spoke with great difficulty, the swelling which was still observed at the left angle of the jaw had been much more considerable.

If some other examples, collected during the epidemic, had not already given me an idea of the enormous swelling which sometimes accompanies diphtheritic inflammation of the tonsils, and, if especially, the conclusions drawn from the acuteness of the disease had not cleared up the diagnosis, I confess that under such an unusual appearance, I might have been unable to recognize Malignant Angina. A few applications of concentrated hydrochloric acid were directed upon the tumour, and the first result which was obtained was a speedy diminution of its size. The breath had lost its insufferable fetor. The swollen tonsil was then covered with white or

yellowish membraniform exudations, and exhibited the usual characters of Pharyngeal Diphtherite. That of the right side no longer formed any projection. The sounds of the voice were more clearly articulated, and the patient scarcely complained of any difficulty in swallowing. At the same time the lymphatic glands gradually lost their increased volume, and on the tenth day of the treatment, there remained no traces of an illness which had presented such serious appearances, except a slight enlargement of the left tonsil, which was not reduced after the lapse of several weeks, and which no doubt will still continue.

TRACHEAL DIPHTHERITE.

ANATOMICAL CHARACTERS.

Autopsy of Five Young Subjects, who died in the same week, at the end of November, 1819.

Case 12.—I have not been able in this case, to obtain more than a few particulars upon the progress of the disease and the treatment which was adopted.

N. L., four years old, of a good constitution, ill for thirty-four hours; deglutition easy during the course of the disease; all the symptoms of Croup; death by asphyxia; during the last moments fetor of the breath was observed.

Treatment.—Repeated doses of kermes mineral; vomiting and purging were produced; a collar of blisters was applied round the neck.

Autopsy, thirty-six hours after death.—The portion of the tonsils and of the velum palati, which could be discovered by half opening the mouth, was in a healthy state, with the exception of a slight swelling. A membraniform crust of a yellowish-white colour, extended over all the parts which were beyond the isthmus of the throat. The pseudo-membranous exudation was thickest and most consistent upon the surface where the tonsils correspond to one another. Over all this extent, it had already assumed a greyish tint indicating that here was the origin of the disease; the exudation extended, becoming gradually thinner, behind the velum palati, from which it ascended as far as the posterior aperture of the nasal fossæ, then it descended into the pharynx as far as the œsophagus, covering the two surfaces of the epiglottis, but not extending beyond the ventricles of the larynx.

The trachea was coated with a thick white mucus, not very ductile and slightly coagulated*, and the same kind of mucus obstructed the aperture of the bronchi.

The mucous membrane of the trachea was neither red nor swollen; it was only slightly injected; that of the bronchi and of their principal ramifications presented a few traces of inflammation; there was no indication of inflammation in the pulmonary spongy tissue, the most depending portions of which were only engorged with blood and marked with dark livid spots.

The membraniform exudation was detached with more or less facility from the parts which it covered; and on lifting it up, we saw that it was united to the mucous membrane by very slender, elastic filaments, which were stretched and lengthened before they could be broken. It was difficult to recognize any alteration on the organic surface thus denuded; we perceived no erosions except some upon points of no great extent, where the accidental membrane was more adherent. The surface of the exudation which corresponded to these points was spotted with blood. A superficial examination might have led to the belief that there was a deep ulceration of the tonsils. The exudation which covered them penetrated into their furrows, and when it was removed only from their more prominent points with the back of the scalpel, the white matter which remained in the mucous crypts of these organs might be mistaken for pus. But by pressing laterally, we squeezed out pseudo-membranous fragments, instead of pus; and when the mucous tissue was thus cleared from them, it would have been difficult to suspect that it had been the seat of a morbid affection.

Case 13.—M. A., a child of four years old. The disease had been evident for forty-eight hours: there were all the symptoms of Croup. The membraniform exudation was perceived upon the tonsils, on inspecting the throat: still the death of this child was attributed to the presence of ascarides by the medical man who had attended him. The treatment consisted of leeches to the neck, an emetic, and vermifuges.

* I have many times made this observation in the course of the epidemic. The coagulation of the mucus exuding from the surfaces which are beginning to be affected with diphtheritic inflammation, is a marked character by which this exudation is distinguished from the tenacious product of catarrhal inflammation.

Autopsy, thirty-six hours after death.—There was the same state of the pharynx, the tonsils, and the velum palati as in the preceding case. The false membrane extended, becoming gradually thinner, as far as the first ramifications of the bronchi; it was easily detached from the trachea, and was found rather more adherent in the larynx and the back of the mouth.

Case 14.—E. V., a child seven years old, of feeble constitution. During the last three or four days, a white spot was observed behind one of the tonsils; there was general uneasiness; the deglutition was unimpaired. The spot increased in size, and on the fourth day all the symptoms of Croup broke out with violence; the paroxysms returned during the night; towards the fifth or sixth day, there was expectoration of false membranes; the respiration was less embarrassed, and this amelioration excited the most sanguine hopes, but death occurred between the seventh and eighth days. We were informed that, during the last moments of life, no membraniform exudations were observed in the back of the mouth. The treatment consisted of baths and pediluvia; kermes mineral in strong doses frequently repeated; a collar of blisters descending below the clavicles, and sinapisms to the feet and legs.

Autopsy.—The examination of the body was delayed till six days after death, and in consequence, decomposition had commenced. A thick, membraniform layer covered the back of the mouth and the posterior aperture of the nasal fossæ. It was no doubt in consequence of the commencing putrefaction that the false membrane was softened on the most prominent points, but it was still consistent in all the depressions which it invested.

If former researches had not already taught us to distrust fallacious appearances, we should have seen in this case only some ulcerated surfaces, moistened with an abundant suppuration; and yet, when the fragments of the false membrane were detached, removed, or pressed out of the mucous folds into which they penetrated, it was evident that there did not exist any true loss of substance in all the extent of the pharynx. In the trachea the membrane was diffluent only on its free surface: it adhered in patches to the mucous coat which was scarcely reddened, and it was much thicker in the larynx.*

* In this case, attempts had been made to ascertain, during life, whether the walls of the pharynx were really covered with a pseudo-membranous

Case 15.—P., aged four years. From the first attack of the disease, membraniform exudations were observed in the back of the mouth. On the third day there was croupal cough; no marked fetor of the breath; deglutition easy; and death was caused by a paroxysm of suffocation on the fourth day.

Autopsy.—The false membrane extended as far as the last divisions of the bronchi (a considerable swelling of the cervical lymphatic glands was remarked in this subject, and in the three preceding ones).

Case 16.—Three days after the death of the last child, his sister, aged eight months, appeared to experience general uneasiness; there were crying, agitation, febrile heat, and refusal of breast-milk; on the next day the case was better marked. On the third day there was cough with difficulty of respiration: the eyes were dull; there was swelling of the parotid regions. At this period the back of the mouth was covered with a greyish incrustation. A sponge moistened with concentrated hydrochloric acid was applied to the isthmus of the throat; two leeches were applied to the mastoid processes. The next day, the countenance was less dull, and there was less fever. (The same treatment was followed for three days, and the applications of concentrated acid were repeated night and morning without the cough becoming more frequent.) Still the difficulty of respiration became increased; the pulse was small and frequent; and death took place at the commencement of the sixth day. It was suspected that the applications of hydrochloric acid had been too frequent and too strong.

Autopsy.—The villous coat of the tongue appeared rather deeply altered by the action of the local remedy. The uniform white tint of all the anterior part of the velum palati and of the tonsils was manifestly due to cauterization. The membraniform exudation was not discovered till beyond the isthmus of the throat. It ascended towards the guttural aperture of the nasal fossæ, where it presented considerable thickness. It did not descend, in the larynx, beyond the

coating; and yet the pellicular membrane which extended over the walls of the back of the mouth was confounded with the naked surface of the mucous membrane. May it not have happened in many cases, that the affection of the tonsils and of the isthmus of the throat has been misunderstood, where the symptoms of Croup have alone attracted attention; and is it not more than probable, that at the period referred to, the researches of physicians were limited to ascertaining the presence of the false membrane in the air-tubes?

epiglottis. The mucous membrane of the trachea was not reddened at any point; it was also without any coating and without any alteration at the commencement of the bronchi. The solidity of all the posterior part of the inferior lobe of the left lung appeared to be due both to cadaveric exudation and to an inflammatory hepatization. A membraniform exudation which was extremely thick, but not very adherent, extended from the pharynx as far as the cardiac orifice of the stomach. Under this exudation the mucous membrane of the œsophagus appeared in a healthy state. It is not very probable that its formation was determined by the application of the acid, for every cauterization occasioned efforts of vomiting.

These five children, together with an appearance of stoutness, seemed to possess a degree of strength suitable to their age, and in each of them, the abdominal viscera, although examined with great care, offered no traces of inflammation.

MERCURIAL TREATMENT.

CASES.

After the departure of the legion of La Vendée, the Western Barrack was occupied by the soldiers of the forty-fourth regiment. A few days after their admission, three of these soldiers were affected with Malignant Angina. In the first two the disease was arrested at its commencement by local treatment. The third, admitted into the Hospital, was placed in one of the clinical wards (December, 1821).

Case 17.—Some exudations covered both tonsils, and extended into the pharynx, beyond the reach of sight. This man, aged twenty-three years, of a tall stature, had habitually a clear complexion and enjoyed good health.

The right tonsil, which had been the first affected, but on which, however, diphtheritic inflammation had not begun to show itself until four days before, rested upon that of the opposite side, which was also very much swollen; it carried forward the velum palati. Those exudations which extended beyond the point of junction of the two tonsils, and also those which bordered the uvula, were of a yellowish-white colour. By strongly depressing the base of the tongue so as to excite nausea, we discovered, at the moment of opening out the isthmus of the throat, the surfaces which were in contact. Their colour was

of a dirty grey, and the fetor of the breath was insupportable. There was considerable swelling at the sides of the neck, at the position of the angle of the jaw. The face was sullen, the pulse strong and frequent; since the night before there had been a catarrhal cough, with mucous, transparent, frothy expectoration.

Although in some respects blood-letting appeared still to be indicated, yet experience had taught us how useless, and even dangerous, it would be, to have recourse to it. A mixture of equal parts of honey and concentrated hydrochloric acid was gently applied between the tonsils, by means of a sponge fixed at the extremity of a short and flexible stick of whalebone. The tone of the voice did not yet indicate the existence of a false membrane in the trachea; but the abundance and the limpidity of the expectorated mucus left no doubt that the irritation and inflammation which preceded the membranous exudation were already being propagated in the air-passages.

Now, it matters little, that by the aid of the local treatment, the diphtheritic inflammation is modified in the pharynx, if by its extension and its continuous progress in the air-passages it determines the closure of the larynx or the obliteration of the bronchi.

None of the numerous facts which had been collected in the course of the epidemic allowed us to hope that general treatment could be of much service. The mercurial treatment, which was less dangerous than the hydrochloric fumigations was, therefore, of all the therapeutic means which had been employed, that which offered the greatest hope of recovery.

Calomel was at first administered every hour in the dose of three grains. The tongue, which was covered with a whitish coating, began, in the evening, to be moist and to clean towards its point. The swelling of the tonsils was already diminished; we no longer perceived so much fetor of the breath, and yet the cough was becoming hoarse and croupal. Mercurial frictions, every three hours, each of one drachm, on the neck, the chest, and the arms, were prescribed for the night.

On the morning of the fifth day, the mouth did not exhibit any sign of mercurial affection. The tongue was still cleaner, and over a greater extent of its surface. Some membraniform exudations floated in the expectorated matter, which was mucous, abundant and semi-transparent. It was certain that these exudations were not detached from the pharynx, and that they came from the trachea; they were shaped like narrow bands, denticulated and jagged at their edges. Some

were as much as three inches long, by two lines, or two lines and a half broad; they were far from having acquired all the force of cohesion of false membranes which have formed complete tubes. We distinguished in their thick part, on observing them by transmitted light, some rounded pores, or rather some transparent bullæ, which might be a quarter of a line in diameter; in fact, they presented all the characters of commencing diphtheritic exudations. The nature and origin of these transparent points, which were observed in the substance of the exudation which was beginning to concrete, did not appear at all doubtful; they were in fact globules of unaltered mucus, furnished by the muciparous follicles which were not yet affected in the same degree as the surfaces which surrounded them. The so-called hydatids or vesicles observed on the surface of the tonsils at the commencement of Malignant Angina, and mentioned by some authors, appear to me to be due also to the partial elevation of the false membrane, which is slender and imperfect, and distended by mucus, which is not yet coagulated.

The frictions were continued at longer intervals. A painful and confluent eruption of pimples which occupied the base of the hairs, was attributed to the rancidity of the mercurial ointment. The frictions were continued with recently-prepared ointment upon the surfaces where the cutaneous irritation did not oppose its absorption. Calomel was administered as on the preceding day. In the evening, the cough was less hoarse; and the expectorated matter which was less abundant, was distinguished from that of the previous night by greater opacity.

The sputa remained distinct in the vessel appropriated to receive them, and were isolated by more liquid mucous matters, instead of forming a homogeneous mass as on the preceding days. Some fragments of false membranes were found in the vessel in great numbers, and were separated from the other matters with difficulty; they were less long, and less porous than those of the previous day. (Alvine evacuations of a deep green colour.)

On the sixth day, after eight frictions and the administration of a drachm and a half of calomel, the gums and the tongue presented no indication of mercurial affection. The false membranes of the pharynx, which were almost entirely detached, left bare the greater part of the mucous surfaces which they covered, and which were resuming the appearance of health.

The sputa remained still more separated and more opaque, and it

was difficult to separate them from the pellicular strips with which they were intimately united. To accomplish this, we were obliged to shake or rather mash them with water; the mucus was thus diluted, and the concrete matter, which no longer formed anything but small fragments, was precipitated to the bottom of the vessel. The frictions were discontinued and we directed an interval of two hours between each dose of calomel which was now reduced to two grains.

On the seventh day the pharynx was entirely cleared; the cough was loose and catarrhal. We could not suspect that the expectorated matter, which was abundant, opaque, and muco-puriform, still contained any fragments of false membranes; still, by means of the process indicated above, a mixture of two pounds weight of water, and of some ounces of sputa, allowed the deposition of a great quantity of pellicles, which bore a close resemblance, except in colour, to the coarse bran of wheat. There was three or four alvine evacuations during the twenty-four hours. We ceased the mercurial treatment. Since the previous night, there had been considerable emaciation. In the space of two days, an ounce of strong mercurial ointment had been rubbed in, while two drachms and a half of calomel were administered internally in less than seventy-two hours.

The pulse was frequent, the thirst rather urgent. On the following days, the cough, which was simply catarrhal, became less and less frequent, and the sputa, which were not very abundant, lost their opacity; the appetite was voracious; and convalescence was now certain.

The severity of the season, prevented me from sending this soldier back to his Barracks, and for a month, during which he still remained at the Hospital, he did not experience any mercurial affection of the mouth; he regained his usual stoutness, and enjoyed perfect health. This man, who was seen again some months afterwards, still continued well.

Case 18.—M. T., aged eight years, of a delicate constitution. For the last three days, he had suffered from sore-throat, accompanied with fever. There was swelling of the sides of the neck, with tumefaction and redness of the tonsils, which were covered by *enveloping* white exudations. Local and not very active treatment, was repeated three times a-day.

On the fourth day, there was a slight amendment; apyrexia; in the

evening, we perceived a membranous spot at the base of the pharynx; it descended in a parallel direction to the posterior pillars of the velum palati, and sunk down beyond the reach of sight. On the fifth day, the appearance of the pharynx remained the same; we used local treatment, and the instant the tonsil was touched, the little patient made a convulsive inspiration. The cough was attributed to the passage of a small quantity of the acid mixture into the trachea. Towards the evening, the cough became frequent and croupal.

Mercurial treatment was substituted for the local applications. Calomel, in doses of two grains, was administered every hour during the night and moderate purging was produced. On the sixth day, there was an abatement of the cough, and the swelling of the sides of the neck was diminished. On the seventh day, the cough ceased, and the doses of the calomel were given less frequently: the false membranes were raised, and in a great measure detached. On the eighth day, there only remained some small portions of concrete matter sunk in the clefts of the tonsils. We ceased administering calomel, and the convalescence was rapid and easy. This child, notwithstanding all the care which was taken by his parents to preserve him from the inclemency of the season, was attacked a few days after his cure, by a bronchial catarrh, which lasted for several weeks.

Case 19.—V. J., aged thirty months. There was croupal suffocation, the danger of which we did not recognize until after three days' fever and uneasiness, attributed to the process of dentition. There was swelling of the sides of the neck; croupal cough; some white exudations covered the tonsils and the lower part of the fauces. Two grains of calomel were given every half hour,—it seemed scarcely probable that life could be prolonged until the following day. On the fourth day, there was slight amelioration of the most serious symptoms: the treatment was continued. Moderate purging was produced; at intervals, there was imminent suffocation, stupor, coma, lividity of the countenance; asphyxia was making fearful progress; but a slight remission followed some of the efforts of coughing. On the fifth day, the cough, which had been more loose and catarrhal during the night, became hoarse and dry. Five grains of senega and two of calomel were given alternately every hour. The emetic effects of the senega were almost instantaneous. There was a more prolonged interval between the paroxysms of

suffocation, and the cough became moist. During the night, there was imminent danger of suffocation; there was also cough, and convulsive efforts of deglutition; but the symptoms of Croup suddenly ceased.* Liquids were vomited almost as soon as they were swallowed. The administration of calomel was suspended, and the doses of senega, which had been already diminished in frequency, were at last discontinued. The child had now taken, in sixty hours, three drachms of calomel and a drachm of senega, and he appeared to be almost restored to his usual state of health. Two days later, his emaciation and paleness were much more marked. After some days of satisfactory progress, he was harassed, like the subject of the previous case, with a loose and frequent cough, unaccompanied by fever, but eventually he completely recovered.

Case 20.—P. J., aged six years, of a healthy appearance. For two days there had been difficult deglutition and considerable swelling of the sides of the neck; the skin was hot and moist, the pulse frequent. On the third day, the deglutition had become more painful; some lichenoid growths, of a yellowish-white colour, and of irregular figure, covered a great part of the surface of the tonsils, which were red and swollen; hydrochloric acid was applied locally. The swelling of the sides of the neck was diminished, especially on the left side. On the fourth day, the morbid growths extended to the borders of the uvula; the acid was again applied, and portions of a coriaceous, pellicular membrane remained attached to the sponge. There was cough; the mercurial treatment was substituted for the local application. The white precipitate, obtained by the precipitation of the protonitrate of mercury by hydrochlorate of ammonia, substituted by mistake for English calomel, caused nausea, followed by three alvine evacuations, accompanied by occasional colicky pains. During the rest of the day the cough was rather frequent and in its tone resembled that of catarrh. On the fifth day, the false membranes were no longer detached, or rather they were being again formed; they were circumscribed by an œdematous inflammation. The tonsils

* It was supposed that a membraniform tube, expelled from the larynx, had been swallowed with the mucous matters which children of this age are unable to spit out. Notwithstanding the most minute attention, however, we were unable to discover the remains of it in the vomited matters; but the same thing had happened in the case of the pharyngeal exudations, they having been broken up and detached without our even being able to collect the fragments.

were touched with two grains of white precipitate mixed with honey; and half a drachm of mercurial ointment was rubbed into the right side of the neck. The cough remained catarrhal, but did not become more frequent; the application of white precipitate was repeated in the evening. On the sixth day, the false membranes were losing their size, and especially their thickness; they were being detached without being renewed, and the redness which circumscribed them, was of a more vermilion colour. The cough, still catarrhal, had become more soft and less frequent. The cervical lymphatic gland of the right side had slightly diminished in size, but it was still hard and painful on pressure; this was the only inconvenience which remained during convalescence. For some days, the return of the appetite and the child's generally healthy appearance, left nothing to be desired, but the swollen lymphatic gland became subsequently the seat of lancinating pains; it augmented in volume and suppurated rather slowly. The opening of the abscess allowed some pus of good appearance to escape, and the health was soon completely restored.

It cannot be denied that the mercurial treatment has several times given rise to serious and fatal consequences.

Case 21.—E. D., aged thirteen, who had a month before been cured of Diphtheritic Croup by the mercurial treatment, and who had been often exposed, night and day, in consequence of the misery and carelessness of her parents, to the influence of cold, died after two or three days' illness. Not only had she suffered a mercurial salivation, but her teeth had been loosened, and three or four of them had dropped out. Convalescence scarcely appeared to be established when the patient suddenly complained of a circumscribed pleuritic pain, which, however, yielded in two days to antiphlogistic treatment. On the third day, she complained only of an intolerable pain in the right leg, and after having uttered continual cries for a whole night, she died suddenly.

The opening of the body took place thirty hours after death.

Thorax.—The right lung was crepitant; but on the left side, the portion of the pleura which covers anteriorly the lower lobe of the lung, was slightly rugous, and had a very unusual greenish tint. The third of the left lung was hepatized. The quantity of rather deep-coloured yellowish serosity amounted to about five ounces. The mucous membrane of the trachea was thickened and of a very bright

red colour, as far as the division of the bronchi; the latter were not obstructed by mucus. The heart and the other viscera of the chest and abdomen did not deviate from the healthy state. The leg which had been the seat of acute pain during life was examined with care. It was not swollen, but the cellular tissue appeared by comparison to be a little more injected than usual. No appreciable lesion was discovered in the neurilemma or in the nervous filaments of the sciatic trunk. Several teeth remained loose; but there existed no other traces of membranous mercurial inflammation. Still the last lesion which I have just indicated was much more serious than had been at first suspected. The gums no longer adhered to the neck of the teeth, which yielded to the slightest pressure. On carefully removing the periosteum, in order to examine the state of the sockets, I discovered a complete necrosis of the two alveolar borders. The formation of the sequestrum was already sketched out; it was indicated by an irregular denticulated line, which was advancing more or less on the body of the maxillary bone, following from within outwards the two alveolar borders, which would have necessarily exfoliated, if the patient had survived.

The Poisonous action of Mercury.

The various preparations of mercury (sometimes employed to cure supposed syphilitic symptoms which might have yielded to ordinary habits of cleanliness) may occasion severe and obstinate ulcerous inflammations of the skin and mucous tissue; and the bowels themselves are also often affected. In general, additional mercurial treatment is prescribed for inflammations which are caused by mercury, and there are some facts which induce me to believe that in certain cases this kind of treatment may dissipate the symptoms by carrying back the chronic affection to the acute state; but most frequently the disease is aggravated.

This difference in the action of mercury, or rather this action in an opposite direction, appears to me to depend principally upon the mode of administering the drug, which is sometimes given rapidly and energetically, sometimes more slowly and in a mild form.

The most deleterious effects of this mineral are manifested after alterative courses, during which it is introduced into the economy in divided doses. It has been shown, in some of the preceding cases, that considerable quantities of calomel have been

administered in a very short space of time without producing any inconvenient results. This difference in the effects of mercury deserves the utmost attention on the part of the practitioner. I am certain that in some cases three grains of calomel have been sufficient to excite salivation; that five grains, prepared with suitable precautions, divided into three unequal doses, and taken in the space of six hours, have also produced salivation, and caused on the surface of the gums, on the edges of the tongue, and the inside of the cheeks, pellicular ulcerations which for several weeks have resisted a multitude of therapeutic measures.

The chemical nature of the preparation, the temperature of the air, and the habits and age of the patient, exercise considerable influence over the result; though these circumstances operate in a less degree than the vital manifestations of the organic tissues, which receive the immediate and direct action of the medicine. The exhalation, for instance, not being at all augmented, except in proportion as absorption diminishes, these functions are exercised in an inverse manner. Thus it may happen that the swallowing of a few grains of calomel, if followed by constipation, may excite salivation; and such an effect will be the more rapid, if a discharge, maintained by a carious tooth, or any pre-existing irritation, draws towards the mouth the action of the metallic preparation which has been rapidly absorbed. These circumstances were combined in the cases which I have just quoted.

The morbid alterations which arise from prolonged mercurial courses, are often manifested at a very distant interval of time, and indeed after many years. The most formidable of these affections, perhaps, is a cachectic state, resembling, in some measure, the scurvy of seafaring men, but differing from it in several special conditions, and particularly by its resisting the greater part of the hygienic measures which are so successfully employed in the cure of true scurvy. The gums seldom become fungous, and whatever quantity of blood they allow to escape, the flow of it is not increased by touching them; but the hæmorrhage which takes place at their surface, is suspended and paroxysmally renewed. In all the cases which I have observed, the pulse has exhibited considerable frequency (100 to 110), and it habitually preserved a certain degree of hardness.

This is not the place to give an account of some researches in pathological anatomy bearing upon this subject, and therefore I shall

confine myself to observing that I was not able to discover any perceptible alteration in the viscera of two subjects who died of mercurial cachexia, after having presented some of the symptoms which I have just pointed out.

I have endeavoured, by means of experiments on the lower animals, to ascertain the effects of some mercurial preparations, and more particularly to determine the degree of activity of that which is called by chemists, the protochloride.

First, it was my object to ascertain if we could produce on the lower animals, effects analogous to those observed on man. One of my chief aims was also to know if the alterations in the bones were not constantly preceded by inflammation of the tissues which cover them.

Three dogs, of average height, were subjected to these experiments in the winter of 1820. Distinctions of a sufficiently positive character were marked between the effects of calomel prepared by sublimation, and that obtained by precipitation of the protonitrate of mercury by means of chloride of sodium or hydrochlorate of ammonia. These mercurial salts had a very well-marked, emetic and purgative action. The protochloride, obtained by sublimation through the steam of water, and known under the name of *English calomel*, was the least emetic of all the preparations, and that which exhibited the most uniform mode of action. These results did not differ much from those which had been observed in children affected with epidemic Croup, except that the strongest dogs could not endure, without experiencing hypercatharsis, a third of the doses of calomel which had been administered to the youngest children.

After twelve to fifteen days of this treatment by the protochloride in divided doses, which were sometimes suspended, the mouth began to be affected. Chancrous, fungous ulcerations appeared on the internal surface of the lips; these ulcers were arranged symmetrically, and corresponded to the projections of the teeth; the line of insertion of the canines exhibited also the commencement of erosion. When I wished to increase these effects, I obtained only hypercatharsis, whatever precautions I might take.

I tried the experiment of substituting the protoxide of mercury for the protochloride; but the mercurial ointment, recently prepared and administered in small doses, became also violently purgative.

The dog subjected to these experiments was very much emaciated. We were unable at last to induce it to take the drug, for it recognized

the presence of the smallest quantity of mercury, in whatever form we endeavoured to introduce it into its food.

The diarrhœa continued after the total discontinuance of the treatment; the evacuations were frequent, mucous and bloody: and the animal, after refusing all kind of nourishment, expired in the last stage of marasmus.

The gastro-intestinal mucous membrane was red in a great part of its extent. This coloration was not easily to be distinguished from the cadaveric alterations which are so rapidly and strongly manifested in the case of cachectic liquefaction of the blood; there was no other connexion with the inflammatory, ulcerative and gangrenous lesions of the buccal mucous membrane. An alteration of colour, which indicated a commencement of necrosis, was observed on the circumference of the alveolus of each of the canine teeth.

Another dog died in the same manner, and before the alterations of the osseous system had been more marked. The mercurial treatment of the third having been suspended each time that the diarrhœa had become bloody, the ulcerations of the mouth cicatrized. The skin of this animal remained for a long time rough; its emaciation was extreme, but in the following spring it recovered considerable stoutness and the appearance of perfect health.

Since these experiments were terminated, I have again subjected many dogs to the action of calomel, for the purpose of ascertaining the effects of a long irritation directed upon the mucous membrane of the digestive canal. I shall give an account, in another Memoir, of the principal results of these last attempts. I shall confine myself here to the statement that in respect to the effects of mercury, they presented remarkable varieties.

The first of these animals (a large full-grown spaniel) began to refuse nourishment, and died on the twenty-second day after having reached the last stage of marasmus. The night before its death its limbs were cold, and we could not count more than six inspirations in the minute. The globe of the eye appeared entirely collapsed; however, we discovered it again under a thick layer of puriform mucus, but so much atrophied that it occupied only half of the orbit.

Some saffron-coloured mucous, sanguinolent motions continued to be voided with tenesmus and in small quantity. Although the calomel had not been administered beyond the fourteenth day, the mercurial ulcerations, which had begun to show themselves succes-

sively opposite the projections of the canine teeth, and upon all the points of the mucous membrane of the mouth exposed to friction, had extended to the edges of the tongue. Those ulcerations which corresponded to the last molar teeth, left bare the fibres of the masseter muscle. In many points the mucous membrane was reduced to a state of greyish detritus, of the most dirty appearance. Three hundred and forty-two grains of calomel, divided into unequal and gradually increasing doses, had been administered.

The second dog (a hound of the same size and age) died in the same state, but much more rapidly. From the eleventh day, it refused all nourishment, although the strongest dose of calomel had not been carried farther than sixteen grains, and altogether it had taken only a hundred and fifty-two grains.

The third dog, a young spaniel, scarcely a year old, and of middling size, resisted the action of the calomel much longer; the drug was at first given in small doses gradually increased, namely, it was carried from two to four, eight, twelve, sixteen, twenty-four and forty-eight grains, and was continued for more than a month and a half. When the animal refused the food with which the calomel was mixed, we succeeded in making it swallow the drug in boluses of bread-crumb introduced into the pharynx below the isthmus of the throat. This animal, in spite of its extreme emaciation, preserved a considerable degree of voracity and a well-marked taste for putrefied meat. The superficial mercurial ulcerations which had shown themselves first on the upper lip opposite the projections of the canine teeth, never became fungous and chancrous. They were even seen to be almost entirely effaced a few days before death.

At the same time, a sanious discharge which escaped from the orifice of the prepuce, caused the discovery of a very extensive gangrenous erosion on the surface of the glans penis, and the rapid progress of this lesion appeared to be the immediate cause of death. It ought to be remarked, that this animal, during the time that it was beginning to experience the effects of the calomel, had made frequent efforts to cover a bitch of a rather larger size than itself. We ought also to take into account the difference of temperature; while it was submitted to the mercurial treatment, the air was constantly dry and hot (May and June, 1825). The two other dogs, on the contrary, had yielded to the poisonous action of mercury, or rather to the buccal phlegmasia which it had occasioned, but this was in the month of September, 1824, and the season had been rainy.

Still it must be admitted that the difference of conditions is far from giving an explanation of the varieties observed in the results; above all, if we consider that to the last dog the calomel was administered for a longer period, and in a larger dose than in any of the preceding cases. The gastro-intestinal mucous membrane, far from being reddened, was extremely pale, and so atrophied, like the muscular and peritoneal tunics, that the walls of the digestive canal had become nearly as transparent as gauze.

The experiments which I have just related are not sufficiently multiplied to decide the greater part of the questions relative to the variations in the effects of mercury produced by many accessory conditions; but they are sufficient to demonstrate a deleterious action analogous to that which is observed in man. We remarked in nearly all the cases, liquefaction and decoloration of the blood; prostration of the strength; marasmus and death. Although in man this action is less marked, and in the earliest infancy the mucous membrane of the mouth is rarely affected by the use of mercurial preparations, which easily occasion salivation in adults, still we ought not to resort to this kind of treatment without due precaution and adequate reasons. The practitioner who knows the danger will alone know how to prevent it, and if he does not desist in time, he will be called upon to treat the consequences of his want of caution.

Case 22.—G. M., aged fifteen months. The uvula as far as its base, the pillars of the vellum palati, and the base of the pharynx were covered with a thick exudation of a milk-white colour. There was croupal suffocation. For two days the child's health seemed slightly impaired. Calomel was given in four-grain doses every two hours. Life was prolonged for three days, and death occurred from asphyxia.

Autopsy, fifteen hours after death.—The pellicular exudation had ceased to extend over the anterior part of the velum palati, from which it was partly detached: it did not descend into the trachea much below the larynx. The investment which it gave to the epiglottis was so thick, that, if we had not paid great attention, we might have easily mistaken the augmentation of its size for an œdematous swelling. The redness which was observed under the false membrane, and circumscribed it, was rather vivid. At the posterior part of the velum palati, the membranous covering was more than a line in thickness, and it lined the whole of the cavity of the nostrils.

Case 23.—L. F., aged thirteen years, of a feeble constitution, had been affected, from the age of nine years with a chronic bronchial catarrh, which was usually modified by the vicissitudes of the atmosphere, although the symptoms were never completely relieved. There was an habitual, very abundant, muco-puriform expectoration, which became still more abundant during the period of the exacerbations.

On the first day there was sore-throat, and during the night there was intense fever, accompanied with delirium: the swelling of the lymphatic glands was scarcely perceptible; there was swelling of the tonsils without any appearance of spots. On the second day we observed, in the middle of the right tonsil, an excavated spot, of a yellowish-white colour, the appearance of which did not allow us yet to establish positively the diagnosis of the disease. The right tonsil in the greater part of its extent, was of the colour of a piece of flesh whitened by the action of boiling water. On the third day, the spot which had been observed on the previous night was elongated, and now formed a deep, sanious, and greyish furrow. We saw upon a projecting, isolated point, in the space between the pillars of the velum palati, a small lichenoid mass, of a yellowish-white colour. Other similar masses, of an orbicular form and semi-transparent, were seen upon the surface of the left tonsil. The most distinct of these, which was elevated by mucus still in the fluid state, formed one of those vesicles described by Marteau under the name of hydatids. Two hours later the spots, which had become more opaque, had extended; the points, which had presented only a simple alteration of colour, were now covered with a commencing exudation. There was swelling of the lmphatic glands on the sides of the neck.

Local treatment was adopted; forty drops of hydrochloric acid and one ounce of honey. This application was repeated in the evening, and was followed by an appreciable subsidence in the size of the lymphatic glands on the right side. (This treatment was continued for two days, and the disease remained quite stationary.) On the fifth day the cough had become frequent. On the sixth day the cough was more frequent, and was no longer loose and catarrhal as usual. The expectorated matter was also very much changed; it was semi-transparent, frothy, and abundant. The membranous inflammation of the pharynx continued to extend. The swelling of the lymphatic glands and of the cellular tissue returned on the right side of the neck, and at the same time it was much increased. Towards the evening, there was cough with croupal suffocation, and

the languishing countenance of the patient was expressive of fear.

On the seventh day, the respiration became sibilous; there was somnolence, and lividity of the complexion; two grains of calomel were given every half-hour. A cup of coffee dissipated the somnolence. The dyspnœa was increased during the night, and the full use of the intellectual faculties was preserved until the last moment. The little patient, whose religious principles were a subject of great consolation to his parents, entreated them to moderate the expression of their grief. He told his mother that he should soon be with God and the angels, and that he would pray for her. Death occurred in the morning from the gradual progress of asphyxia without any return of somnolence.

The local treatment, which was begun at the onset of the disease and strictly followed up, was not attended with the slightest success. The conclusions which might have been drawn against its utility in some cases apparently more desperate, would nevertheless be found to be totally false. I have arrived at the conviction, that two acccidental circumstances exerted a very unfavourable influence on the results of the treatment. The antecedent catarrhal phlegmasia had no doubt hastened and favoured the propagation of diphtheritic inflammation, and the acid, which was prescribed in small doses, had not half the strength which it was supposed to possess.

Autopsy, eighteen hours after death.—The body was moderately stout; the swelling of the sides of the neck was diminished; the *Head* was not opened. *Thorax.*—The pleuræ were in a healthy state; both lungs were perfectly crepitant, and did not exhibit the slightest trace of hepatization, either recent or chronic, and we could not discover the least trace in those organs of any tubercular disease. The final ratifications of the bronchi were filled with a thick, yellowish, viscid mucus, completely resembling that which had for so many years formed the substance of the habitual expectoration. The croupal exudation reached, on the left side, as far as the fourth subdivisions of the bronchi, but on the opposite side it penetrated less deeply. On tracing the course of the air-tubes upwards, we found the false membrane very adherent; it lost its consistency and thickness in the trachea. This unusual circumstance was probably due to the fact that the diphtheritic phlegmasia had been heightened by the old catarrhal irritation, which no doubt had its principal seat in the bronchi.

Three days after this child's death, his mother, who was of a delicate constitution, and thirty-eight years old, complained of sore-throat, but we could discover only one greyish spot on the surface of the right tonsil. On the following morning, the spot had became larger, though it did not appear to be the commencement of Malignant Angina. Still I warned the woman that this slight affection might become serious, and that it required careful attention. During the night between the third and fourth day, the pain become more acute, added to which there was well-marked fever. We then perceived three other spots, of a yellowish-white colour, grouped around the first. The tonsil was swollen, the deglutition was very painful, and the lichenoid pellicles, which formed the basis of the spots, were circumscribed by a violent redness of limited extent. A lymphatic gland, near the angle of the jaw, was very much swollen.

The spots were touched with a sponge dipped in a mixture of honey and concentrated hydrochloric acid. A part of the exudations adhered to the sponge; they were coriaceous and elastic, and they left uncovered a surface of a bright-red colour. The fever did not reappear on the following night. On the morning of the fifth day, the swelling of the lymphatic glands was much diminished, and the difficulty of swallowing was less marked. The local application was repeated on the following day, although no vestige of exudation remained, and the patient did not feel any difficulty in deglutition.

Is it not probable that the affection of the mother and that of the child were identical? And does not the difference of age and disposition sufficiently explain the reason why the progress of the disease was more rapid in one case than in the other?

Case 24.—E. N., aged nine years, of lymphatic appearance, and stout.

It was only towards the seventh day of the Malignant Angina (which was mistaken by the parents for a catarrhal sore-throat, and was considered as a slight indisposition), that the cough and croupal suffocation attracted attention. The pharynx was lined with exudations. I employed only one local application of hydrochloric acid, somewhat concentrated, and two drachms of calomel were administered in divided doses. On the third day of the treatment, the imminence of the danger induced us to have recourse to frictions, or rather to repeated mercurial inunctions: we used nine drachms of strong mercurial ointment.

There was a rapid diminution of the symptoms, and the expectoration became more easy and catarrhal. On the second day, the cough again became drier and more croupal; continued vomiting was excited by the calomel, or rather by the frequent passage of lumbricoid ascarides, which ascended into the œsophagus. Eight or ten of the worms were thrown out by this passage. A similar number were found in the alvine discharges, which were rather frequent. On the third day of treatment, and the tenth of the disease, the cough remained croupal, but the respiration was free, quite regular, and scarcely differed from the rhythm of the healthy state; the same was the case with the pulse. The tongue was cleaning, and the frequency of the vomiting induced us to suspend the use of the calomel. During the night the vomiting ceased, and some spoonfuls of broth were taken without loathing. On the eleventh day, there was some appetite, and two spoonfuls of soup were allowed. During the course of the morning, there was sudden aphonia and imminent suffocation without rhonchus; the signs of asphyxia were more and more marked, and death supervened before it was possible to perform tracheotomy.

The mercurial treatment had been pushed with activity, and yet we could not succeed in producing any sensible affection of the mouth. The tongue alone was slightly moistened and cleaned, and from the time when the passage of the worms and the vomitings were produced by the calomel, the cough became permanently dry and croupal. I am induced to believe that I have since had recourse, in similar cases, with some advantage, to the administration of polygala.

It was not unimportant to ascertain how far the diphtheritic phlegmasia had been modified by the mercurial treatment, and anatomical researches might still teach us if it would really have been possible to perform tracheotomy with any chance of success.

Autopsy.—The tonsils exhibited, at the base of their folds, scarcely any remains of the thick exudations with which they had been covered. We remarked, on the surface of the right tonsil, a slight erosion, accompanied by an ecchymosis of the sub-mucous tissue, circumscribed by a pale spot. This spot was composed of a very slender layer of semi-transparent, very adherent, concrete matter. A pellicle equally delicate, lined the mucous crypts at the base of the tongue. We were obliged to look there carefully, in order to ascertain the existence of this thin layer of concrete matter, which was removed only with difficulty. At first we thought that we saw the mucous tissue naked, and only paler than in the healthy state.

The mucous membrane of the bronchi showed no trace of alteration. Near the middle of the trachea, some violet-coloured points, which were pale and faded, and nearly effaced, were the only indications left of the diphtheritic phlegmasia. The larynx was covered with a pultaceous exudation of a greyish-white colour, the surface of which was as if worn out, and detached in strips. At the position of the ventricles, one of these fragments fell back and obstructed the aperture of the glottis. The lungs and the rest of the viscera presented no appreciable morbid alteration.

TRACHEOTOMY.

Practical Observations.

It is evident that in the case just quoted, tracheotomy could not be expected to have had immediate success, and that we could not have avoided placing a tube in the trachea. But it is certain that by introducing a flexible rod of whalebone, furnished with a fine sponge, through the aperture of the wound, and pushing it towards the larynx, we might easily have caused the expulsion of the last shreds of concrete matter.

From that time the air would have had a double means of entrance into the respiratory passages; and even supposing that the surfaces which had been most deeply affected had preserved some tendency to throw out a new membranous exudation, it was not impossible that by insufflating calomel in a very fine powder into the larynx, across the wound, this remnant of morbid tendency might have been efficiently counteracted. Such local treatment would not have caused us any fear of the inconveniences which result from the inhalation of acid vapours.

But in order to facilitate these proceedings, it would be necessary to prolong, as much as possible towards the sternum, the incision of the integuments and the trachea, which cannot much augment the danger of the operation. The facility which would result from this enlarged incision in withdrawing the detached strips of the false membrane, in introducing a tubular sound, and applying a sponge fixed upon a flexible rod, from below upwards, across the larynx, can only be well understood after having performed this operation upon a young

subject. In infancy, a great thickness of adipose cellular tissue is interposed between the skin and the air-tube, the diameter of which is, in proportion, much less than in the adult. The morbid intumescence adding besides to the depth of the passage made by the wound, it happens, if this passage is too limited, that the gum elastic sound can neither be introduced nor maintained conveniently in its position, and we find still more difficulty in introducing, into a sinuous channel, the blades of a pair of forceps, even when we have taken the precaution to give them the most favourable curve.

The immediate entrance of air into the lungs, before it has been warmed in the cavity of the mouth and the nose (I had almost said, before it had undergone a kind of digestion) has been regarded as a circumstance which adds to the danger of the operation. This mode of respiration is certainly without inconvenience in the lower animals. I have left, for more than ten days, a gum elastic tube in the trachea of a young bitch; the animal did not appear at all incommoded, and the wound cicatrized in a few days after the extraction of the foreign body.

I have every day occasion to see two horses which breathe by means of a tin tube of twelve lines in diameter. This tube is fixed to the centre of a plate which serves to keep it in its place, and which embraces the anterior part of the neck. These two animals, which were operated upon three or four years ago, perform their work in a redlead manufactory; they had contracted in this establishment a noisy difficulty of respiration, which rendered an artificial aperture necessary for the admission of the air. The tube which had been placed in the trachea of the animal first operated upon, not having sufficient dimensions, the respiration remained embarrassed; but it became perfectly free from the period when more amplitude was given to this channel. During repose, the animal was not too much out of breath, and the small tube, which was from six to seven lines in diameter, was sufficient for the necessities of respiration; but as soon as an attempt was made to set the horse to work, it began panting, and could only be made useful when a tube of an inch in diameter was substituted for a smaller one.

The best argument in favour of this operation would be an example of cure obtained by its means, in the last stage of tracheal Diphtherite. In the case which I am about to quote, it prolonged life only a few moments.

Case 25.—P. C., aged four years. Had sore-throat; on the second day of this slight indisposition, the ordinary medical attendant of the family prescribed an emetic. On the third day, I was called in in consultation and recognized pellicular Angina. As both tonsils were covered with exudations, I advised the application of a sponge dipped in hydrochloric acid and honey. During the two following days, the differences of opinion as to the case, caused the suspension of the local treatment, but the alteration of the tone of the voice and the cough, which became croupal, induced us to return to it. On the sixth day, asphyxia seemed imminent, and the parents requested that tracheotomy should be performed. During the preparations for the operation, and before the trachea was opened, the little patient appeared to have ceased to live. Atmospheric air was introduced through the wound, and alternating pressure was made upon the walls of the chest. The functions of life appeared to be completely suspended for two minutes; there were doubtful efforts of respiration, and then deep, noisy, rattling, inspirations, accompanied by spasmodic movements. The child raised himself and then fell back again; there was convulsive cough; and mucous matters mixed with blood issued through the aperture of a portion of gum elastic tube placed in the trachea. This instrument, which appeared to be obstructed, was removed for a moment, and some slender and tubulated fragments of false membranes, mixed with mucus, were expelled through the wound. The respiration became more calm and easy; the leaden tint of the face and extremities was changed to an animated hue. By the movement of the lips the child seemed to ask for drink. The pulse was regular and moderately frequent; the respiration was executed with facility through the tubular sound. In the evening the pulse became rapid: there was agitation, anxiety, panting, but not very noisy respiration. The frequency and the smallness of the pulse increased every instant; and death took place twelve hours after the operation. Up to the last moment, the air had free access into the respiratory passages.

Autopsy, sixteen hours after death.—The closure of the larynx was almost complete. The thick, coriaceous false membrane adhered strongly to the glottis: it was detached more easily from the walls of the larynx below the ventricles; in the vicinity of the incision it had not been reproduced. The mucous membrane of the trachea and bronchi was slightly reddened in several places, and dotted with points of a deeper red colour. To a considerable distance in the bronchial

tubes, small partial exudations covered the centre of the broadest spots, and these fragments of pellicle were removed with so much facility that they appeared to be only applied upon and not attached to the surface. A common fly had reached as far as one of the subdivisions of the bronchi; it had probably been drawn in by inspiration, after having introduced itself by the tube. The lungs were crepitant over their whole extent. We observed on their sharp edge an emphysematous swelling which extended over their surface following the interstices of the pulmonary lobes. The lesions observed in this case do not explain the suddenness of the death. Did not the duration of the asphyxia add to the danger arising from the extension of the diphtheritic phlegmasia?

BLOOD-LETTING.

Numerous facts have proved to me that blood-letting does not retard the progress of the diphtheritic phlegmasia. Its inefficacy has already been proved by the cases above recorded. In the case of a young Englishwoman who was affected with Malignant Angina, apparently in a mild degree, I saw the symptoms of Croup break forth immediately after the application of leeches. The flow of blood had been so abundant and so much prolonged, that the face, the tongue, and the lips were completely blanched. (The clots and the portion of blood soaked into the clothes, might be estimated at nearly two pounds.) The diphtheritic affection of the air-passages made rapid progress and became quickly fatal. Five or six days after her death her youngest sister was also seriously affected with Pharyngeal Diphtheritic Angina. The extension of the disease to the air-passages was prevented by local treatment, to which was joined the prophylactic employment of calomel. This young person's governess had died before her of the same affection, and there could be no doubt that it had been transmitted to the two sisters by contagion.

I subjoin an example of the inefficacy of blood-letting, and I have chosen it among many others not less striking.

I was called to give my opinion upon the nature of an anginal affection with which a child of six years old had just been attacked, and I at once recognized Pharyngeal Diphthérite, seeing that a whitish, lichenoid, pellicular exudation already covered a third of the surface of the left tonsil, which was red and swollen. The cervical lym-

phatic glands of the same side were considerably enlarged. Twelve leeches had already been applied, and after an abundant flow of blood, deglutition was rather less painful. The medical man in attendance, encouraged by this first success, ordered a second application of leeches. The blood continued to flow for several hours. The next day, thick diphtheritic membranes covered the pharynx. In the evening, there was frequent cough, with mucous, frothy expectoration. In the night, the cough became less frequent, and it was at the same time short and hoarse. The following day, there was no longer any doubt that the air-passages were attacked by the diphtheritic inflammation. The left tonsil extended beyond the anterior pillar of the vellum palati, and appeared to be carried as far as the front of the ascending ramus of the inferior maxillary bone. The last symptoms, which had just appeared, characterized epidemic Croup; they became rapidly aggravated, and the patient died forty-eight hours after their appearance.

Autopsy.—The false membrane did not reach beyond the first divisions of the bronchi; it penetrated far forwards into the nostrils. The projecting body which had been mistaken for the tumefied tonsil, covered by a membraniform pellicle, was nothing else than an agglomeration of concrete matters, formed of successive layers, and more than eight lines thick.

Not only does blood-letting fail to retard the symptoms of the diphtheritic phlegmasia, but the latter even seem, on the contrary, to be developed with unusual rapidity in cachectic persons, whose blood has been decolorized and attenuated by any previous disease.

Case 26.—R. C., aged sixty-two years, of a feeble appearance. This woman, who had suffered from cold since the commencement of the severe weather, and had endured all the privations of indigence, appeared to have been attacked with a chronic pulmonary catarrh. On her admission into the Infirmary, the matter expectorated, the percussion of the chest, and the pale-yellow tint of the face indicated that pleuro-pneumonia was joined to the catarrh. This state lasted for a month, and then appeared to improve a little. There was slight pain in the throat, neglected by the patient, who passed the day out of bed. The difficulty of deglutition and the alteration in the tone of the voice at length induced a student to examine the state of the back of the mouth; but no redness could be perceived there; the uvula and velum palati appeared only swollen. The next

day, at the morning visit, there was depression of the pulse, which was tremulous and irregular; the movements of respiration were feebly performed in an almost doubtful manner, and without the least noise. The patient replied in a feeble voice, but with accuracy and presence of mind, to the questions addressed to her. There was no other pain except a slight smarting in the throat. An alteration of the features was added to the other signs of imminent danger; the approach of death prevented the exploration of the pharynx.

Autopsy, twenty-four hours after death.—A great quantity of serosity, of a greenish-yellow colour, flowed out of the cavity of the thorax; it escaped in much less quantity from the opposite side; the total amount of liquid effused into the pleuræ might be estimated at about two quarts. There was greyish and rather compact œdematous hepatization of a great portion of the left lung.

At first sight, the mucous membrane of the trachea and the larynx seemed pale, and that which lined the back of the mouth, appeared at once pale and swollen. The edges of the epiglottis especially were remarkably thickened. A redness, with points of a more deep-red colour, exactly resembling that which characterized diphtheritic inflammation, was observed towards the middle of the trachea, where it formed unequally prolonged striæ. This peculiarity caused a pellicle to be observed, the existence of which might not have been even suspected if we had not seen it separated and elevated, on the edges of the incision made into the windpipe.

This pellicle was so easily removed, that it was evidently only a slender, semi-transparent false membrane, which became thicker in the larynx, and was extended, though becoming thin again, over all the mucous membrane covering the back of the mouth. The apparent swelling of the edges of the glottis proceeded from a sheath which was furnished to it by this same covering. Although the false membrane was not very transparent in any of the points where it had acquired thickness, yet the deep-red colour of the subjacent parts, and the interposed blood had given it the colour and appearance of the mucous coat, while on the other hand, the uninterrupted continuity of this membraniform layer completed the illusion.

For some time there had existed a serous effusion in the left cavity of the thorax, and it had suddenly increased. Whatever may have been the influence of the diphtheritic phlegmasia upon the termination of the primary disease, the points worthy of remark, were the

rapidity and intensity of its development in a worn-out subject, all of whose tissues presented an anæmic paleness.

It is probable that, notwithstanding the thickness and extent of the false membrane, the lesions peculiar to pellicular phlegmasia would have been mistaken if this case had not been observed towards the end of an epidemic, during which my attention had been so often attracted to this kind of alteration.

Case 27.—G. M., aged nine years, had been convalescent for three weeks from an attack of autumnal tertian fever, and had remained emaciated, feeble, and pale. She suffered from some febrile excitement, which, in the first instance, was thought to be a relapse of the first illness. An abundant excretion of limpid, transparent rose-tinted sputa led us to suspect that the gums were affected with diphtheritic inflammation. They were examined and found very pale. More than a month had elapsed since the epidemic affection had ceased to exhibit itself, and the terror which it had inspired was beginning to abate.

The sides of the neck and the lower part of the throat could be rather roughly pressed, without the child evincing the slightest pain. It appeared to me useless to depress the base of the tongue and to examine the pharynx. There was apyrexia in the morning, slight fever at night, and catarrhal cough. On the third day, a considerable swelling, which appeared under the right ear, behind the angle of the jaw, and which ought to have excited a salutary apprehension, became an object inspiring confidence. It was mistaken for the result of the contagious and epidemic inflammation of the parotid gland, known by the name of *oreillons* (mumps). The febrile excitement which had been noticed was attributed to the affection of the salivary gland. However, the region of the larynx and the sides of the neck were touched and pressed, and the little patient assured us that she did not suffer any pain, and that she had no sore-throat. In the night there was croupal suffocation, and the pupil in attendance found the tonsils covered with pellicular exudations. (Local treatment of concentrated hydrochloric acid and fumigation of chlorine.) A membraniform tube, more than three inches long, floated in the midst of the expectorated mucus. The attacks of croupal suffocation were renewed three times during the four-and-twenty hours, but with less intensity.

On the fourth day the same treatment was pursued, the attacks of

suffocation were less frequent, the swelling of the sides of the neck were sensibly diminished. On the fifth day, the tonsils were no longer swollen, the voice still remained hoarse. (Inhalation of chlorine in the morning.) The patient was up all day, and in the evening she joined several other little girls in going into the court-yard of the establishment, and carried a bunch of flowers. On her return to the Infirmary, she lay down without feeling any difficulty of respiration, slept calmly until three o'clock in the morning. and died in a few moments from an attack of suffocation.

Autopsy, twelve hours after death.—The tonsils and velum palati were in a healthy state. The false membrane reached as far as the large divisions of the bronchi; it was thin, and floating in the inferior part of the trachea, and adhered feebly to the walls of the larynx. The passage of the air appeared to have been intercepted less by the immediate occlusion of the glottis, than by the detached portions of the false membrane which had performed the office of valves. The punctiform redness of the mucous coat was not very apparent.

Fumigations had already been employed at the General Hospital, and with much more successful results, upon a young female orphan of the same age, and in whom the pellicular inflammation seemed to have been propagated further into the trachea. A long portion of tube having been at first expectorated, each fumigation had afterwards excited the expulsion of large fragments of membraniform layers, and on the third day of the treatment, after having had recourse, for the fifth time, to the inhalation of the hydrochloric vapour, the attacks of croupal suffocation were no longer renewed. During several weeks, the voice was only hoarse and indistinct.

Case 28.—Z. L., aged twenty-seven years; an epileptic idiot, convalescent from a putrid fever (*dothinentérie*), had been reduced, by her first illness, to a state of weakness and exhaustion which was showing some signs of amendment, when it was perceived that the deglutition was embarrassed, although the patient took, without complaining, and indeed with a voracious appetite, the food which was brought to her. The next day, there was swelling of the sides of the neck, with livid redness and swelling of the tonsils, of the velum palati and of the uvula: some lichenoid, greyish-white exudations, extended irregularly upon the swollen parts; the cough was frequent, short, and hoarse; there was abundant spitting of transparent frothy

mucus; fetor of the breath, the same appetite as on the preceding days, and the same coolness of the skin. Pulse, sixty-seven.

Diagnosis.—Pharyngeal and Tracheal Diphtheritic Angina. Mercurial treatment. *Prognosis.*—Approaching death. The next morning the anterior third of the tongue became moist and clean; dyspnœa in the evening; the cough less frequent; aphonia; puffiness and lividity of the face; and death occurred in the night.

Autopsy.—There was considerable enlargement of the lymphatic glands of the neck. The membraniform tube which lined the trachea did not extend below its inferior third; it was terminated by irregular prolongations bordered by diphtheritic redness, which was very well marked on all the parts which were the seat of the affection. The false membranes of the pharynx were raised with the same facility as those of the trachea. A complete sheath of concrete matter enveloped the uvula.

These last three cases show at least that the diphtheritic phlegmasia does not lose any of its intensity in subjects weakened by previous disease.

BLISTERS.

The insufficiency of the general measures which were resorted to during the continuance of the epidemic has been so often proved, that I have, perhaps, been induced too exclusively to restrict the treatment to special remedies. Although these measures are incapable of modifying the diphtheritic phlegmasia, it is yet possible that they may be of some utility as auxiliary resources.

Will not flying blisters, which exercise such a remarkable influence over inflammatory swelling of the cellular tissue, diminish also the swelling of the sides of the neck? Does not the œdematous affection of all the tissues which are in the vicinity of the larynx and trachea act in the same manner as the immediate causes of strangulation? The affection of the adjacent parts undoubtedly contributes very little in diminishing the dimensions of the air-tubes; but the slightest addition to the obstacle opposed to the passage of the air becomes of the greatest importance.

We may prove this fact by trying to breathe through the tube of a pen, the extremity of which presents only a small aperture. It will be easy to show that a slight difference in the diameter of the orifice induces a very great alteration, both in the possibility of supporting

the dyspnœa always manifested after a certain degree of contraction, and in the rapidity of the progress of suffocation which necessitates the interruption of the experiment.*

The greater part of those who died of epidemic Croup, still bore on their necks the traces of blisters, the suppuration of which had been excited and maintained; but, by this very circumstance, the desired object may perhaps have been frustrated.

By flying blisters, I strictly mean those the application of which is not continued beyond the commencement of vesication. I have noticed that an irritation which extends beyond the surface of the derma often increases the inflammation which we wish to modify. I say modify, and I purposely make use of so vague an expression, for I am far from understanding how a blister can dissipate the redness of erysipelas in a few hours; how, in this case, the swelling and the pain of the inflamed surface disappear in proportion as the epidermis is raised; and how, on the contrary, the rather more prolonged action of the same agent determines, in other cases, an erysipelatous affection. Circumstances, apparently of little importance, produce so great a variety in therapeutical results, that the inflammatory redness of the papillary body, occasioned by the accidental removal of the epidermis, sometimes counteracts the good effects which had already been obtained.

This kind of treatment, therefore, requires scrupulous attention, and the application which is nearest the seat of the phlegmasia is the most efficacious; but, in this case also, it is more to be feared that the irritation of the skin may be transmitted by contiguity to the tissues already affected, and it is then especially necessary to limit and to proportion, in some manner, the effects of vesication.

The temperature of the skin, its healthy or morbid state, its dryness or moisture, the thickness of the epidermis, and other peculiarities which depend on the patient, and are not under the control of the physician, may cause variations in the action of cantharides. The qualities of the vesicant and its mode of application are also causes of uncertainty which can be more easily determined.

To M. Robiquet we owe the demonstration that the blistering principle of cantharides is very soluble in fatty bodies. I have been led, by the analysis which he has published, to employ vesicatories slightly moistened with oil, and I have never failed to perceive that

* This observation is of the highest importance in the choice of the canula in the operation of tracheotomy.

their action thus become more prompt and energetic; that it was not even sensibly diminished by the interposition of a sheet of paper, which was easily penetrated by the solution of the active principle. This mode of application, which I believe is used in England, appears to me to have been employed with the intention of attenuating the effects of the blister, which, however, become on the contrary, more rapid and certain.

The epidermis, not being in contact either with the powder of cantharides or with the matter of the plaister, is sound, and does not adhere at all to the plaister at the time when it is necessary to remove it. It is therefore easy to manage the plaister and to prevent the redness of the derma, since we avoid, on the other hand, the influence of the air, and on the other, the prolonged action of the particles of the epispastic substance, which in the ordinary proceedings, it is often difficult to remove. I have already stated, that the inflammatory redness of the derma, far from acting in the same manner as a superficial vesication, may aggravate the phlegmasia which we wish to subdue. It is another mode of irritation, very different from that which is solely due to the simple and isolated action of cantharides; for I repeat, that the erysipelatous redness does not begin by progressively advancing: it is dissipated and extinguished in proportion as the vesication is effected.

The serosity of the phlyctenæ therefore should be allowed to escape only by little drops. Another advantage results from this measure; we avoid those brown spots, more or less deep in tint, and sometimes indelible, which blisters never leave unless the derma has been reddened.

Six or seven hours of the application of such a blister are sufficient, in ordinary cases, for obtaining a very well-marked effect. When it is desirable to limit the action of the epispastic to a superficial vesication, we must not even wait until the epidermis begins to be elevated, for it is sufficient for the surface of the skin to be slightly wrinkled in order to develope a phlyctena in a very short period.*

* During six years when the mode of application I have just described was adopted at the General Hospital, ischuria was not once caused by the most extensive vesications.

Action of Polygala (Senega).

The effects of this medicinal substance are very energetic; in the dose of a few grains it is emetic and purgative. It also exerts a special action on the inflamed mucous membrane of the air-passages, the secretion of which it promotes and modifies. A great number of cases have proved to me that immediately after the administration of senega, given in divided doses, the muco-puriform expectoration peculiar to chronic catarrh, either simple or complicated with tubercular pulmonary phthisis, becomes more fluid and abundant.

The suspension of the medicine was followed by such an immediate modification in an inverse direction, that this kind of influence permits me to entertain no doubt on the subject. This property has particularly induced me to associate senega with calomel, especially in the cases where the dryness of the mucous surfaces, indicated by the hardness of the cough, appeared to have been the principal obstacle to the expulsion of the false membranes.

LOCAL TREATMENT.

Hydrochloric Acid.

Concentrated hydrochloric acid, applied to the healthy mucous membranes, developes a fibrinous inflammation. A superficial touch, when made for the first time, whitens the epithelium, which is detached and renewed without causing any erosion. But if the action of the acid is prolonged, or its application repeated at short intervals, it produces an ulceration, which is covered with a whitish coating, and takes more or less time to cicatrize. It is necessary to be aware of this mode of action when we have recourse to applications of hydrochloric acid in modifying diphtheritic inflammation, in order not to confound the phenomena of the medication with those of the disease; otherwise we might prolong the treatment much further than is necessary. It is best for the first applications to be energetic and less frequently repeated. I have tried various methods; the following is that to which I have finally given the preference.

In order to apply the acid to the base of the pharynx and upon the tonsils, I make use of a fine sponge* fixed firmly at the end of a flexible rod of whalebone, and I give to this rod a suitable curve after warming and softening it at the fire. Before touching the membranous spots on the throat, I take care to dip the sponge in concentrated acid and to press it so that it shall remain simply moistened. I take this precaution so that, in the convulsive movement of the isthmus of the throat, the expressed liquid may not extend its action beyond the point I intend to cauterize.

In this way it is easier to direct and to graduate the action of the caustic than by weakening it with different proportions of honey. Although this latter mixture has less activity, yet the quantity we are obliged to employ does not allow us to circumscribe its effect within a determined space : it flows and spreads far beyond the point which has been touched. It is therefore only in the cases in which the diphtheritic inflammation of the pharynx extends beyond the reach of sight that this last mode of application should be preferred.

The first effect of this local treatment is to give a more serious aspect to the commencing diphtheritic inflammation ; the exudations appear at first to be thicker and more extensive; but twenty-four hours later the effects of the acid are limited, and have attained their final point. If the exudations do not increase in extent, or they begin to be detached, we are sure that the specific inflammation is already modified; from that period the local applications ought to be used at more distant intervals (from twenty-four to thirty hours) restricted in number (two or three are sufficient) and also in strength and duration (they ought to be more and more slight and confined to the affected surfaces).

The authors of the sixteenth century agree in reprobating the forcible removal of the false membranes, and also scarifications, together with all roughness of frictions and applications. I have had occasion several times to convince myself of the justice of these precepts, and I have seen pellicular inflammation aggravated by all kinds of mechanical irritation. When the disease is not arrested in its progress by two energetic applications, made at an interval of twenty-four hours, and the signs of the affection of the air-passages begin

* For an adult, the sponge at first moistened and afterwards well wiped, ought to be as large as a pigeon's egg. When shrivelled by the action of the acid, it is reduced almost to half its volume by suitable pressure.

to be manifested, the local treatment offers very uncertain chances of recovery, and it would be imprudent not to abandon it in order to have recourse to mercurial medicines.

DISEASES WHICH PRESENT THE SAME APPEARANCES AS DIPHTHERITIC ANGINA.

The name of Croup, given by Francis Home to Malignant Angina, has become the source of misunderstandings which have not been dissipated by the labours of many able writers who have been called upon to furnish the results of their knowledge upon this subject. This is one of the innumerable examples of the magic influence of a word. In the same manner, the denomination of Gangrenous Sore-throat, employed to designate this disease, has often prevented us from recognizing it in an affection which offers no trace of true sphacelus.

Under a new name, Malignant Angina, an affection observed for many centuries, has become a new disease of a totally different nature, and one which, far from demanding the same treatment, requires a totally opposite one. Although the authors of some of the Memoirs presented to the *Concours* of 1809 were led, by the force of truth, to discuss the question of the identity of Croup and Malignant Angina, they resolved it in the negative, and although the most positive opinions on this disease had been collected from age to age, the influence of the word prevailed, and they have been regarded as valueless.

It is true that at a period when the importance of anatomical researches, necessary to elucidate the nature of the morbid lesions, was not generally felt, the character of the alterations which render Pellicular Angina so formidable was imperfectly understood. But it cannot be denied that the whole of its symptoms, its epidemic propagation by means of contagion, and the danger which it causes by its extension into the respiratory passages, are found very accurately recorded in the treatises left us in relation to this disease by the physicians of the sixteenth century. During the progress of the destructive epidemics which ravaged Spain and Italy, experimental investigations, made upon a large scale, had also demonstrated the inefficiency of the general and most rational kinds of treatment.

The new disease had scarcely been described by Home, when every practitioner, fearing lest he should mistake it, did not fail to meet with it. It now became so frequent, that popular instructions were addressed to parents to put them on their guard against the danger with which their children were threatened. Several methods of treatment, placed within their reach, were also advised, as if technical words, the value of which remains undetermined, and which every reader interprets as he thinks proper, were capable of transmitting the difficult art of distinguishing diseases, supplying the habit of seeing and comparing, and, in a word, of taking the place of that medical education of the senses so well described by Corvisart, and which he himself so studiously pursued; as if a mother, distressed by the anxiety she has caused herself by reading these kinds of books, could comprehend and distinguish the importance of every symptom! Still the observations on Croup were multiplied, and a great number of special accounts of this disease were collected in the medical journals, or published in works professedly devoted to the subject. Distinctions have been drawn between sthenic and asthenic Croup, acute and chronic, variolous, morbillous, scarlatinal, &c. It cannot be doubted that Diphtheritic Angina is not named sufficiently often among some of the stridulous lesions of respiration, especially among those, the termination of which was fatal; while on the contrary, in the cases where the antiphlogistic and derivative treatment was followed by rapid success, it is probable that another phlegmasia, of a serious or mild character, but of a different nature, was confounded with this formidable disease.

Diphtheritic Pharyngeal Angina is simulated by Scarlatinal Angina, by common membranous Angina, and by different inflammations of the mucous membrane of the larynx or trachea.

I have already noticed, in the second part of this work, the obscurity which is thrown over the diagnosis of Malignant Angina, by the difficulty of discovering the distinctive characters peculiar to the different affections presenting themselves under the same appearances. We shall succeed only by the aid of observation and by directing considerable attention to the subject, in determining the limits which separate them. In giving a greater scope to this part of my researches, I shall confine myself to pointing out the principal distinctions by which I have seen Scarlatinal Angina, common Membranous Angina, and some cases of Laryngeal Angina resembling Tracheal Diphthérite, separated from one another, and from

Malignant Angina. I purposely avoid speaking of Phlegmonous Tonsillitis, of apthous inflammation of the back of the mouth, and of Catarrhal Angina, these three kinds of Angina having too well marked characters to make us liable to confound them with Diphthérite.

The special phlegmasiæ of the mucous tissue are besides so diversified, that I have never met, in my practice, with examples of all those which may assume the appearance of diphtheritic inflammation.

Scarlatinal Angina.

Although the cutaneous eruption which usually accompanies Scarlatinal Angina presents a character which is easily discerned, it cannot be doubted that the phlegmasia of the pharynx proper to Scarlatina often exists without being accompanied by the other symptoms of Scarlatina. It is especially in this case that the membranous inflammation of the tonsils presents a fallacious resemblance to pellicular inflammation. Some characters, however, still assist us in distinguishing them. In Scarlatinal Angina, the superficial ulceration of the tonsils is rather coated with an intimately adherent membranous exudation than covered with membraniform pellicles. Although a white, opaque, caseiform secretion appears to cover the bright redness of the velum palati and the walls of the pharynx, it soon becomes furrowed, and assumes neither the lichenoid aspect nor the coherence of a false membrane. The tonsils are in fact the principal seat of the inflammation, but the whole cavity of the back of the mouth and nostrils is simultaneously attacked by an acute inflammation, and the origin of the morbid affection is not, as in Diphthérite, at first limited and circumscribed. Lastly, there is a more important differential character of the scarlatinal phlegmasia of the pharynx; it has no tendency to propagate itself into the air-tubes.* I will not now mention the cases which have been observed by myself: let it suffice to say, that I have thrice ascertained by autopsy, that the larynx

* During the course of several epidemics of Scarlatina which I have had occasion to observe for twenty years, and some of which have been sufficiently serious as to cause the death of a great number of patients, I have never once seen death caused by the propagation of phlegmasia into the larynx, and by closure of the glottis.

and trachea remained perfectly free from inflammation, although the membranous ulceration of the tonsils presented itself under an appearance most resembling sphacelus of the back of the mouth, and although the prolonged rattle of the death-struggle made me doubt whether the difficulty of respiration was not the result of a mechanical obstacle.

A small number of isolated facts would not suffice to determine a question of such importance; but unexceptionable evidence may be adduced in abundance in the same direction. Since the publication of this opinion, the results of my first observations have been confirmed by new necroscopical researches which I have had occasion to make on the dead bodies of six individuals carried off by scarlatina. It has been more and more demonstrated to me that death did not occur from any appreciable inflammatory lesion. The blood unequally distributed in the splanchnic cavities, was abundant in the head, superabundant in the thorax, and was wanting in the abdomen. The danger of this disease is not at all proportionate to the intensity of the membranous inflammation of the pharynx; I have seen it become fatal eighteen hours after its invasion, and without the redness and swelling of the tonsils becoming very apparent. Even in the very cases in which the sore-throat had presented the greatest intensity, I became convinced that this symptom, which especially attracts attention, had little influence on the result of the disease. This affection was very destructive in several communes of this department, but how could we believe that death was caused by an inflammation which is often limited to a slight tonsillitis, when after a more or less painful convalescence, we saw a number of individuals recover, in whom the membranous inflammation of the back of the mouth resembled the last stage of sphacelus. Pathological anatomy no longer permits me to doubt that those inflammatory lesions, whether severe or mild, which do not extend beyond the pharynx, are not the causes of death, an event attributable to a miasmatic poisoning leaving no traces behind it. It is to this same poisoning that we are obliged to refer the frequency and the ever increasing difficulty of respiration; the frequency and the irregularity, and in a word, that extreme disorder of the circulation, which does not allow of the pulse being counted for a quarter of a minute.

It is sufficient to read the learned dissertation of Fothergill to be made aware that although Diphtheritic Angina was the object of his historical researches, it was really Scarlatinal Angina which he ob-

served and described. Thus the disease which he has in view, is very different in its progress, course, mode of termination, and the combination of its symptoms, from the true Malignant Angina with which he continually wishes to associate it, and it is astonishing that he was not struck by their remarkable diversity.

In no epidemic of Scarlatinal Angina do we find mention of stridulous suffocation as one of the symptoms of the disease; even in those in which membranous inflammation of the tonsils has principally attracted attention, and which have been described under the denomination of *gangrenous sore-throats,* it is most generally diarrhœa, leucophlegmasia, and hectic fever which precede the slowly supervening secutive fatal termination.

During the course of a destructive epidemic observed at Peruwelz, a great number of patients fell into a state of general swelling and died slowly. Although some of them were more rapidly carried off, no particular or notable lesion of the respiration was joined to the ordinary symptoms of Scarlatina. (See the *Description of the epidemic and gangrenous sore-throats which prevailed at Peruwelz in Hainaut, Journal de Medecine,* tom. xxxi. December, 1769.) Although the practitioner to whom we owe this notice is manifestly prepossessed with the idea of finding, in the disease which he observed, the gangrenous sore-throat described by Marteau de Grandvilliers in the same Journal some years before, yet we perceive that the *crasse aphtheuse,* of which M. Plauchon speaks, "*which,*" says he, "*covers the inflamed velum palati and afterwards is insensibly detached,*" cannot be confounded with the coriaceous, membraniform, diphtheritic pellicles, mistaken by Marteau for eschars or exfoliations.

The distinctions existing between two such opposite affections overcome the preconceived views of the author, for he himself makes the remark that "few persons died at the height of the disease," and he concludes by adding; "This detail compared to that which has been given to the public by M. Marteau, allows us to catch a glimpse of a notable difference between the two epidemics, the nature of which was the same, without producing the same effects; ours was mild, and its termination was not so treacherous."

The distinction would have appeared to him still more striking, if Marteau had not comprehended, under one generic distinction, the Pellicular and Scarlatinal Angina, diseases which he describes separately, but afterwards unites together, and which unques-

tionably he met with separately and consecutively in his practice, so that his opinions on the true character of Malignant Angina, which at first were pretty exact, appear to have been altered by the subsequent examination of the analogous lesions presented by Scarlatinal Angina.

In fact, Dr. Albers, of Bremen, who shared with Dr. Jurine, of Geneva, the prize decreed to the best Memoir on Croup, says, that he has often met with the complication of Croup with Scarlatina. The following passage occurs in the Report addressed to the Minister by the Commission intrusted with the examination and adjudication of the works sent to the *Concours* :—

"The most formidable of all the complications of Croup is, that of Scarlatina. The author has unfortunately had numerous opportunities of observing it, and he has related several examples. He has only thrice seen Croup assume a sthenic character; the disease was generally typhoid. In the first of these two kinds, the inflammation was violent; but the prompt administration of remedies succeeded in arresting the mischief; in the second, the patients almost all died, and the author admits having lost as many as thirty-six. The symptoms of Gangrenous Angina were found in these cases united with the symptoms of Croup; such an acrid discharge escaped from the nostrils as to corrode the alæ nasi and the lips. An excessive swelling was remarked in the parotid, sub-lingual and sub-maxillary glands.* The author quotes the case of an infant three years old, in whom he found the respiration painful and sibilant, the cough sonorous and tearing, the expectoration absent, the deglutition very difficult, the pulse excessively small and of extraordinary frequency.† He has often observed gangrenous eschars on different parts of the

* It is more than probable that the swelling of the lymphatic glands in the vicinity, and that of the cellular tissue which surrounds them, may have been mistaken for the swelling of the organs which secrete the saliva. In the observations made by myself, whether in cases of Scarlatina or Diphthérite, I convinced myself that the salivary glands which had appeared to me, during life, to be the seat of tumefaction, did not at all participate in the enlargement, and did not in any respect deviate from the natural state.—BRETONNEAU.

† This difficulty of respiration, which was evidently guttural, is very well distinguished, even in Malignant Angina, from that which is due to the incomplete occlusion of the larynx, even when the two conditions are met with together in the same subject.—BRETONNEAU.

body; but the *post mortem* examinations which he has made, never showed the gangrene propagated as far as the trachea, as some authors had alleged."

But can we conclude from this formal declaration of Dr. Albers, that no membraniform exudations existed in the air-tubes? He confines himself to arffiming that gangrene had not propagated itself in that direction. Is it not probable, on the contrary, that a false membrane really lined the trachea* since, even after opening the bodies, he still regards the disease as a complication of Croup and Malignant Angina; otherwise, whence could have arisen the idea of a croupal affection?

An article in the Report (page 80), replies in the clearest and most positive manner to this objection. We read there:—"In some circumstances, Croup puts on an adynamic form at the very moment of its attack, and that is the kind which the author calls *asthenic* or *typhoid*. A naturally weak constitution, former diseases, and the complication of some exanthemata, are the principal causes which impress upon it this character. We never in such cases see the appearance of the symptoms proper to synochus. The disease declares itself without violence, and without spasmodic movements; the pain in the larynx is not acute; the thirst is inconsiderable; the febrile disturbance is feeble and low; the perspiration is extremely scanty, and always cold and viscid. In this class of patients, death supervenes quietly and without suffering, and when the bodies are opened, the air-passages are found filled *with an abundant lymph, but without consistence, and of a tenuity similar to that of water.*"

We may see by this passage that the character of Croup does not rest, in the opinion of Albers, upon the existence of a false membrane in the respiratory passages, a circumstance which proves how variable and vague are the opinions of physicians who wrote upon this disease towards the end of the last century and the commencement of the present. I ought to remark, that in his dissertation, Dr. Albers, of Bremen, designates Croup under the denomination of Tracheitis in Children.

A weak solution of acetate of lead which I have found to possess no efficacy in Diphtheritic Angina, dissipates the painful inflamma-

* May it not even be objected that at the period when Dr. Albers wrote, the false membrane, which could no longer be confounded with an eschar, may have appeared to him a lesion very distinct from the membranous affection of the throat, which was still reputed as gangrenous?

tion of the pharynx and accelerates the cicatrization of the fibrinous ulcerations which often affect the tonsils during the first week of Scarlatinal Angina.

Common Membranous Angina.

Common Membranous Angina is of all the affections which are frequently met with in practice, the most difficult to distinguish, at its commencement, from Diphtheritic Angina. It is of this affection that Aretæus says :—"Ulcera in tonsillis fiunt, aliqua mitia familiaria, non lædentia; mitia quidem sunt munda, exigua, non alté descendentia, non inflammata, dolorem non excitantia."

With the exception of the last two characters* which distinguish the Membranous Angina only partially from the Diphtheritic Angina, none of the principal differences presented by these two affections are omitted in the description of this able observer. Every practitioner has had occasion to meet with this disease, which is often reduced to a slight indisposition. The *herpes labialis* of Willan is often exhibited around the mouth or at the orifice of the nostrils, at the same time when the membranous erosion occupies the surface of one of the tonsils. A moderate degree of swelling and a redness of slight extent circumscribe the white spot. Although the corresponding lymphatic glands are sometimes swollen and become painful, we never see them acquire, as in Malignant Angina, an enormous volume, appearing out of all proportion to the extent and the intensity of the inflammatory lesion of the mucous tissue.

Notwithstanding these distinctions, it must be admitted that during the course of an epidemic of Malignant Angina, the diagnosis of these two affections often becomes very obscure. The question can only be decided by the dangerous tendency of Diphtheritic Angina to propagate itself from the tonsils to the parietes of the pharynx and to the respiratory passages. It is a fortunate circumstance that, in cases of doubt, the local applications proper for arresting the progress of diphtheritic phlegmasia, far from aggravating the membranous eruption proper to common Angina, actually abridge its duration.

* Contrary to the statement of Aretæus, deglutition becomes in general rather painful, and the pain of the throat often extends as far as the ear.

This affection, like *herpes labialis*, is almost always symptomatic, and the febrile state, the wandering pains in the articulations and the anorexia which accompany it, generally yield to the administration of an emetic. The local treatment becomes especially useful, when the fibrinous ulceration of the tonsils has become deep, either because the administration of the emetic has been too long delayed, or because the inflammation assumed a great degree of intensity in the first instance. A strong, but superficial application of hydrochloric acid, limited to the extent of the spot, and the use of the lead gargle, generally induce a prompt cicatrization of the ulcers.

I have had occasion to observe three cases of distinct Laryngeal Angina, which resembled Diphthérite of the air-passages. The first was very mild, and resembled Diphtheritic Angina only in the tone of the cough, the loss of voice, and the sibilous nature of the respiration. I shall call it *Stridulous Angina*. The second was a case of tracheitis, consisting in an acute and deep inflammation of the tracheal mucous membrane. As in the preceding species, there was no production of false membranes. These membranes were observed, on the other hand, in the third species. I think that the latter differs in its nature, and the circumstances in which it is manifested, from Pellicular Diphtheritic Angina. Still it is no longer distinguished from it except by less certain characters, and the epithet of *membranous* or *polypous* appears to me to suit it.

In order to avoid adding, by new names, to the confusion of our nomenclature, I shall borrow from the synonymes of Croup those which I make use of to distinguish the affections confounded with it, and I shall confine myself to restricting and determining the sense in which I employ them.

Stridulous Angina.

The Pseudo-Croup of M. Guersant.

The anatomical characters of this indisposition are not known to me. The lesions of the glottis or of the larynx, which produce the cough and modify the tone of the voice, are, undoubtedly, very slight, since the general symptoms with which they are accompanied are so transient and of so little severity. I suspect that they consist of a catarrhal inflammation, of a simple œdematous tumefaction of the

mucous folds of the ventricles of the larynx; a tumefaction which produces a kind of obstruction in the glottis.*

I have previously shown under what a fearful aspect this affection is at first exhibited; there are, in a few moments, the symptoms of Croup carried to the most intense degree. At the period when Malignant Angina was sacrificing a great number of victims at Tours, a little girl, aged four years, brought up under my inspection, whom I had left quite well in the morning, had in the evening, the same cough, the same dyspnœa, and the same loss of voice which, in another child, had announced the rapid progress of Tracheal Diphtheritic Angina, and had preceded her death by a few hours.

The pellicular inflammation which was generally preceded by a more or less marked difficulty of deglutition, had surreptitiously made sufficient progress for the respiratory passages to be already attacked. We did not observe the least swelling in the lymphatic glands which are situated at the angle of the jaw; the tonsils and the walls of the pharynx were neither reddened nor swollen. This could not be the Diphtheritic Angina, for, in the case in which the larynx had been affected in the first instance, the sides of the neck had been found swollen. But was there not reason to fear that this croupal sporadic affection, although different in its nature from Diphtheritic Angina, was not less formidable? The child did not complain of any pain in the larynx. We held ourselves in readiness to resort to mustard pediluvia and the application of leeches; we also thought of administering an emetic. But during these preparations the little patient had fallen asleep, and the pulse was not accelerated; every inspiration was sibilous; the movements of respiration did not become more hurried. The cough, which was

* A sudden exposure to cold and prolonged crying are sufficient, in adults, to cause loss of voice, which is dissipated in a few days without any other inconvenience. I have seldom found that the lesion of the larynx corresponded to the alterations of the tone of the voice in pulmonary phthisis, even when a rather acute pain and a complete aphonia had been the predominant symptoms of the disease; I have often found nothing, to my great astonishment, except a superficial erosion with or without thickening of the cords. In a case of chronic aphonia, in which serious alterations were suspected, there was no notable lesion in the interior of the larynx; perhaps its internal surface had lost something of its polish; but far from being reddened, it presented, on the contrary, a tint of a duller white than in the healthy state.

infrequent, short, and hoarse, interrupted the sleep only for a moment; it was dull, and caused the same impression on the ear as if it had been heard at a much greater distance. It soon began to soften, which induced me to defer the application of leeches. A slight perspiration which we did not wish to interrupt, hindered us from using the foot-bath. The cough became more and more catarrhal, and on the morning of the following day, it scarcely differed from that which accompanies a slight cold; and on the day after, the health of the child was completely re-established.

I saw four other children affected by the same indisposition, but in a less alarming degree. Notwithstanding the intense anxiety of the parents, I succeeded in abstaining from any active treatment in the first three cases. When I was called in consultation to the fourth, mustard poultices had already been applied to the calves of the legs: the redness thus produced was very vivid, and several atacks of vomiting had been excited by syrup of ipecacuanha; the cough was beginning to soften. Far from thinking that the treatment had brought about this slight amelioration, I was led to attribute to it the fever which was manifested, and which was rather violent during the night. The febrile state yielded on the morning of the second day. The cough had become quite catarrhal, and if the tumefaction of the legs, caused by the application of the mustard poultices, had allowed the child to walk, he would have enjoyed complete health.

I do not think that a spasmodic constriction of the glottis either produces or aggravates this affection. The intermittent nature of many morbid phenomena has too often induced us to look upon them as nervous affections. The observers who have attributed the croupal suffocation to the spasm of the trachea, cannot have paid any attention to the structure of this tube, for it is sufficient to glance at the cartilaginous semi-circles of which it is formed, to perceive that the action of the muscular fibrils entering into its composition must be very limited, and that it is no less capable of resisting the contraction of the muscles which surround it, than it is capable of resisting the atmospheric pressure.

This opinion on the influence of spasm is expressed in the greater part of the works which appeared upon Croup at the time of the *Concours* of 1809. It is the opinion of Vieusseux, of Albers of Bremen, and of Jurine, and it is easy to recognize, in the subjoined passages, that it was shared by the Commission. "We had equally," they say, "recognized the intervention of spasm in the production

of the phenomena of Croup, but we had not ascertained in so exact a manner the part which it played, nor had we determined with so much precision the degree of action which it exercised. Not only does the author demonstrate the existence of a spasmodic irritation; but he proves that it is essentially to this irritation that we ought to attribute the development of the attacks, and the suffocation which accompanies them." (Analyse du Mémoire de Jurine; rapport de la Commission sur les ouvrages, etc. p. 70.)

The Commission expresses itself in a still more positive manner in the analysis of the work by Albers of Bremen.

"The true cause of this extraordinary difficulty of respiration is the spasm of the trachea, a spasm which is itself produced, either by the inflammation of the mucous membrane of that organ, or by the presence of the plastic lymph which is poured out into it, or in fine by one or other of these agents combined. Sometimes also the plastic lymph, by its quantity, its consistency, and the membranous form which it assumes, becomes a purely mechanical obstacle to the passage of the air; but these cases are extremely rare, and *generally it is the spasm alone which arrests or embarrasses the respiration by contracting the air-tube.* The author dwells forcibly upon this latter opinion, and the alterations of attacks and remissions which are observed in Croup, especially appear to him an unexceptionable proof in support of it; he will not, however, allow that like certain authors, we should therefore admit two species of Croup, the one inflammatory, and the other purely spasmodic. This distinction is, in his eyes, only an empty hypothesis constantly falsified by the exact observation of the disease. The remissions certainly demonstrate the existence of spasm, but this spasm is secondary and not primitive." (Analyse du Mémoire d'Albers de Bremen, rapport sur les ouvrages, etc., p. 78.)

No constriction can contract or diminish the dimensions of the nostrils, and yet the snuffling ceases and augments several times in the same hour; only a slight change of temperature is sufficient to produce these vicissitudes. At the commencement of coryza, the transition from cold to heat often occasions a sudden turgescence of the pituitary membrane, which causes a momentary closure of the nostrils. Nevertheless, in this case, the channel which gives passage to the air is double, and much more widely open than the cleft in the glottis, and the mucous secretion which is accumulated, in greater or less quantity, at the contracted orifice of this single passage, must

evidently leave it either more free or more obliterated. We see, therefore, that the air may have alternately a more or less ready access into the air-passages without spasm taking any part in the proceeding.

The convulsive efforts of the inspiratory muscles during the paroxysms of suffocation, have undoubtedly suggested the opinion that even in the cases in which a mechanical obstacle was opposed to inspiration, the dyspnœa arose in part from a spasmodic constriction of the glottis; for I shall say nothing more of the spasm attributed to the bronchial canals, as it cannot even be supposed to exist. Everything leads us to believe, on the contrary, that the construction of the muscles of the larynx then tends simultaneously with all the inspiratory powers, to enlarge the passage which is to allow the air to penetrate into the lungs.

The Stridulous Angina which I have just described is very probably the Acute Asthma of Millar in its first stage. The historical researches of Dr. Albers prove how undecided and vacillating the diagnosis of Stridulous Angina has remained, and especially how the influence of preconceived ideas has modified the opinions offered as to its nature, causes, and treatment. It is also to this disease to which we ought to refer the kind of Croup spoken of by Dr. Jurine, and concerning which he quotes an instance of spontaneous cure.

"A cure may be effected at all the stages of the disease; it is announced by the diminution of the symptoms, and above all by the weakening of, and the interval existing between, the paroxysms; it sometimes takes place spontaneously, and the author (Dr. Jurine) relates an example of it on the authority of one of his fellow-practitioners who was accustomed to observe and recognize Croup, but it must be confessed that it is very rare to see so dangerous a disease thus disappear of itself; it is true, however, that very slight measures are sufficient, occasionally, to make it yield. This favourable result is pretty frequently obtained by a single application of leeches, and the author has even cured it by means of a simple fumigation of mallow-water charged with sulphuric ether." (Rapport sur les ouvrages envoyés au Concours sur le Croup, p. 21. Paris, 1812.)

Quite recently, and since the publication of this article, I have seen a child affected with Stridulous Angina to a really fearful degree.

On the 2nd of September, 1825, M. L., aged thirty months, of a healthy constitution, after coming out of a bath, remained naked and

wet, running and playing in an apartment the temperature of which was moderately elevated. In the evening there was hoarseness; in the night, dyspnœa, frequent noisy respiration, nasal expiration, sibilant and stridulous inspiration; the head was thrown back at each inspiration. The cough was infrequent and hoarse, less short than in epidemic Diphtheritic Angina, was maintained during pretty long intervals, and was then very noisy; each inspiration, which was laborious and sonorous, was accompanied with convulsive extension of the extremities; at the same time the face and the lips became of a violet colour; the skin remained cool, the respiration was not accelerated, and in the interval of the paroxysms, the child continued to play; there was no tumefaction at the sides of the neck. Mustard pediluvia were employed; leeches were to be applied to the sides of the larynx, and subsequently a blister, if the dyspnœa did not yield to the employment of the pediluvium. On the second day, the tonsils were not reddened, nor where they either swollen or covered with exudations; I ascertained that the lymphatic glands preserved exactly their natural volume. During the night the child had several fits of suffocation, the voice was feeble, and the cough preserved all the characters which it had on the previous night; it was only a little less dry, a new inducement not to delay any longer the application of the leeches. (Jalap, four grains; calomel, two grains; an emulsion of castor oil in a laxative dose.) The appetite remained, the cough became more soft, but at the same time the frequency of the pulse and the heat of the skin indicated rather intense febrile excitement. The leeches were not applied, but the two pills were given in the evening, and the emulsion the next morning. On the third day, the respiration was less frequent and more easy, the cough had become more soft and less painful; the little patient then remained exposed to the cold, and the cough again became more dry and hoarse; but on the same evening the amelioration of all the symptoms prognosticated a rapid convalescence. The sixth day, there remained nothing more of a state apparently so dangerous, except a little hoarseness, which soon completely disappeared.

I never met with such a severe case of Stridulous Angina. The mucous membrane of the larynx was undoubtedly affected with a rather acute catarrhal inflammation; such at least appeared to me to be indicated by the febrile excitement, and the intensity and the duration of the paroxysms.

Of Tracheitis.

I have collected three cases of Tracheitis. The first is very incomplete; the information which I was able to procure offered me only a vague idea of the symptoms and the treatment; but I was able myself to make an examination of the body.

Case 29.—E. L., aged three years, had been ill six days when he died. The physician who attended him considered that he died of Croup. I was assured that to a hoarse cough was added a slight alteration in the tone of the voice. (Emetic tartar in repeated vomiting doses; a blister to the nape of the neck.)

Autopsy, thirty hours after death.—The base of the tongue was very red; the mucous membrane of the trachea and of the bronchi was thickened, and of a uniform deep-red colour. The back of the mouth was filled with mucous matters of a grey-greenish tint; the same matter also obstructed the bronchi. The lymphatic cervical glands were slightly reddened but scarcely at all swollen. The tonsils presented no appearance of morbid alteration.

The disease terminated favourably in the next case.

Case 30.—N. D., aged six years; constitution strong and plethoric. On the first day there was coryza attributed to catching cold. On the second day there was dry cough, which was frequent and rather short, soon becoming hoarse; the tonsils and the pharynx, examined with care, exhibited no swelling, nor spots; there was acute pain referred to the larynx and increased on pressure; the lymphatic submaxillary glands were not sensibly swollen; the pulse was accelerated (110 in the minute); the cough became more and more hoarse, and assumed a fearful resemblance to croupal cough. On the third day there was dyspnœa and frequent respiration; inspiration gave rise to a remarkable sibilous sound; twelve large leeches were applied on the sides of the larynx, and caused an abundant flow of blood; the difficulty of respiration diminished; the cough remained dry and hoarse (syrup of ipecacuan was given with the addition of ipecacuan in powder, one spoonful every hour, which caused vomiting). The cough became moist and assumed the character of that which accompanies tracheal or bronchial catarrh; there was general moisture. Abundant alvine evacuations were produced in

the evening by the administration of an emollient glyster. On the fourth day the cough was soft, the expectoration muco-puriform, scanty; there was some appetite; the skin was constantly perspiring (pulse 90). On the sixth day the patient became convalescent.

Case 31.—N. F., a child six years old, habitually enjoying good health, had coughed a little for three days, as if he had been affected with a slight cold. The cough soon became dull and hoarse, and was accompahied with an acute pain, referred to the larynx. I saw the patient only a few hours before his death; forty leeches had been applied on the previous evening, at two intervals, to the sides of the larynx. The blood had flowed so long and so abundantly, that a great paleness of the face had been induced; the cough remained the same; the voice was more feeble; the pulse was extremely frequent, and the respiration became more and more painful and hurried. No painful swelling was remarked at the angles of the jaw or at the sides of the neck. The walls of the pharynx and the tonsils were neither reddened nor swollen; the cough appeared to me to have more extent than in Diphtheritic Angina; I found it less short, less suddenly interrupted, and, indeed, I recognized a simple case of tracheitis. The treatment had been eminently antiphlogistic. The patient had taken only a little syrup of gum in water, and a mustard pediluvium was up to that time the only derivative stimulation which had been employed; some spoonfuls of syrup of ipecacuanha were administered a few hours before death, which was announced by rattling in the throat.

Autopsy, sixteen hours after death.—The dorsal surface of the body, which had remained in a supine position, was dotted with bloody spots. The opening of the body confirmed the opinion which had been offered, that no false membranes existed in the trachea. The mucous coat of the larynx and trachea was thickened and of a very bright red. A small quantity of creamy puriform mucus (about three drachms) filled the first divisions of the bronchi; the lungs were crepitating, and no other alteration was discovered in the rest of the viscera. I did not pay sufficient attention to ascertain whether the dimensions of the glottis were sensibly diminished by the tumefaction of the mucous folds of the larynx. It did not appear possible that the mucus accumulated in the principal divisions of the bronchi would have opposed an insurmountable obstacle to respiration.

Membranous or Polypous Sporadic Angina.

I have already had occasion to make the remark that some special accounts of Membranous Angina did not appear to refer to Malignant Angina, and I have quoted a case which leads me to believe that there may be developed in the larynx certain exudations which are not the product of diphtheritic inflammation. It is from memory that I have pointed out the particular characters which seem to be presented in a case in which false membrane was expectorated by an adult woman, affected with Sporadic Membranous Angina. In comparing the detailed accounts which are found scattered over different periodical works, we find that this affection has always shown itself in an isolated form; and it appears generally to be the consequence of appreciable causes. The inflammatory symptoms which accompany it are much more marked than in Diphtheritic Angina. An acute pain is felt in the larynx from the commencement of the disease; it becomes still more acute after the expulsion of the false membrane, which does not appear to increase and propagate itself like the diphtheritic pellicles.

SPORADIC DIPHTHERITE.

Tracheal Diphtheritic Angina, like every other epidemic contagious affection, may undoubtedly sometimes show itself in an isolated form. We also see smallpox, an eminently communicable disease, sometimes attack a single individual in the midst of a numerous population, without this individual communicating to another the affection which he has himself taken. It may be a varioloid fever without eruption, vaccination, unfavourable atmospheric conditions, or other circumstances still less easy to ascertain, which preserve from the contagion those persons who have had immediate communication with the patient.

In 1823, I saw a child, five years old, die of Tracheal Diphtheritic Angina. The symptoms of the disease of which he died were exactly the same as those observed during the course of the epidemic of 1819; there could be no doubt as to the identity of the morbid alterations. The false membrane extended from the larynx to the last ramifications of the bronchial tubes. On the third day after the disease was recognized and established, the mercurial treatment was

adopted. The cough, which was already infrequent, short, and hoarse, began to be moist eight hours after the commencement of the administration of the calomel. It was impossible, until the following day, to succeed in inducing the patient, whose self-will and obstinacy were inflexible, to take a single dose more of this medicine. The cough became more and more dry and hoarse, the voice was feeble, and every inspiration gave rise to an acute sibilous sound. We succeeded at last in administering pretty regularly some fresh doses of calomel, and we made some mercurial frictions round the neck; a slight amelioration was at first obtained. From the sixth to the seventh day, the disease appeared to be stationary; the pulse was scarcely febrile; the dyspnœa augmented and diminished alternately. The eight day the pulse had become small and rapid; somnolence was joined to a kind of agitation, or rather the sleep was interrupted by sudden movements; respiration remained after that time more constantly embarrassed, and on the ninth day death supervened, without being preceded by a more violent paroxysm of suffocation. The temper of the patient was preserved up to the last moment; with his finger, he examined the temperature of the drink which was offered to him, and if we persisted in making him drink it before he found it to his taste, he succeeded, by using as much force as dexterity, in making the vessel fall from the hands of the person who presented it to him. The calomel, the doses of which had been sometimes given at longer, sometimes at shorter intervals, had constantly produced a laxative effect.

At the period of death, the mouth presented no appearance of mercurial affection. The diphtheritic inflammation had been sensibly modified on all the points which had been longer and more immediately in contact with the calomel. The exudations were in those parts worn away and almost destroyed. Behind the velum palati they had preserved a considerable degree of thickness and were prolonged irregularly as far as the aperture of the nostrils. The false membrane which descended into the bronchi, and which we followed up almost into their last subdivisions, possessed considerable tenacity and consistence. It was more than probable that tracheotomy, which we had been on the point of performing, might not have had any advantageous result at this stage of disease in the air-passages. The idea of resorting to it, as to a last resource, had been suggested in the hope that, the diphtheritic phlegmasia having been modified by mercurial treatment, the reproduction of the exudations would

not be so likely to occur. I thought at first that rather positive signs indicated the extension of the disease to the bronchi; but the more I endeavoured to distinguish them, the less valuable and certain I found them.

During the epidemic of 1819 and 1820, three other children of the same family died of Diphtheritic Croup. Can we suspect that the germ of this affection had been preserved and transmitted after so long a period of time?

THIRD MEMOIR. (*November*, 1825.)

EPIDEMIC OF LA FERRIÈRE.

The epidemic of Malignant Angina which commenced at La Ferrière in the month of November, 1824, and of which I have already had occasion to speak, has not yet ceased. In a population of two hundred and fifty individuals, twenty-one were attacked and eighteen died. The disease remained circumscribed in this hamlet, and has not been observed in any other commune in the neighbourhood. In a single neighbouring farm, a man, forty-five years old, was affected with it; but he had frequented a house in La Ferrière at the time when two children were dying from Diphtheritic Angina; his cure was scarcely accomplished by means of local treatment when one of his children died of Croup.

It was particularly young subjects who were carried off by this disease. Of the total number, however, we reckoned three adults, and two children who were approaching puberty. Malignant Angina had never before been observed in this locality in the memory of man, and not only was it reproduced there with all the symptoms under which it had shown itself at Tours in 1819; but it has preserved, as an epidemic affection, a particular character which has already been often described; it has only reappeared from time to time, and at long intervals.

In the month of November, 1824, three children died in this locality from Croup. For three months there did not appear any other instance of the disease, but after that period, five other individuals were attacked. Four months elapsed, and six persons more were carried off in a few days by epidemic sore-throat. From this time to the month of October, 1825, the disease ceased to appear, and the inhabitants of La Ferrière began to hope that they would be in future delivered from this scourge, when a child of thirteen years old, a young girl of eighteen, and a woman of thirty, were attacked and died.

At the period when I was sent into this commune, the symptoms of Croup were manifested in a child four years old; but before giving an account of the facts which I had occasion to observe, I

think I ought to call attention again to the irregularity of the progress of Diphthérite. I have already made the remark, that it is not according to the habit of cutaneous exanthems, nor of other epidemic diseases, that it is maintained and propagated in one canton. Mr. Guersant says in the article *Angine Maligne* of the Dictionnaire de Médecine, that the disease sometimes appears suddenly in one of the wards of the Hôpital des Enfans, and that it ceases there as soon as three or four have been attacked, but reappears in another ward, after a longer or shorter interruption. Marteau de Grandvilliers, in his Treatise on *Gangrenous Sore-throat*, expresses himself on this subject in the most distinct manner. "This disease," he says, "like the smallpox, passes from one village to another, but it does not resemble other epidemics which seize a great number of persons on a sudden, and then pass away like a storm. It attacks in detail, and in this respect it is most treacherous, because it excites less alarm and attracts less attention from those who are appointed to watch over the health of the citizens. In great national maladies, the ministry opens its eyes, and sends assistance; but here the multitude of sick people is not striking, and yet a whole household is insensibly undermined and depopulated. They are the persons who are the most solid hopes of the state, they form the posterity which is to succeed us, who are swept away by this cruel contagion. The little village of Elcour, composed of forty households at the most, lost forty-two children in one winter; Nullemont, fifteen in five weeks; Goureleis, seven in a week, of whom four were in one house. What disasters are these!"

This affection is undoubtedly contagious, as is attested by observation at all periods; but it is certainly under particular conditions, and those which are peculiar to itself, that it is transmitted. How is the germ which preserves it reproduced? Four days after the death of the woman of thirty, the child she was suckling died of the same disease. A young woman who had nursed her complained of sore-throat, and died a week afterwards in a paroxysm of croupal suffocation. It is easy to arrive, in these two cases, at the origin of the contagion; but the child, who, at the same time, presented all the symptoms of the last stage of Croup, lived in a farm a quarter of a league distant from the village, and his isolation appeared sufficient to protect him from the contagion.

If the symptoms of the disease of this child had allowed me to entertain the least doubt as to the nature of the case, it would have

been dissipated by the inspection of the throat. Membraniform layers of an opaque-white colour covered the tonsils and extended into the pharynx beyond the reach of sight. The dry, infrequent, short, and hoarse cough, was altogether croupal, and every inspiration was accompanied by a very well-marked sibilous sound. It therefore became almost useless to endeavour to verify the anatomical characters of an affection, the diagnosis of which left not the least uncertainty. Still, I opened the body of the woman thirty years old, and it was clear to me that the propagation of the diphtheritic phlegmasia into the respiratory tubes had been the cause of her death. Tubular membraniform layers extended as far as the subdivisions of the bronchi. The false membrane formed a tube in the trachea of more than half a line thick, which, in the greater part of the extent of this air-channel, was free and floating. Towards the bifurcation of the bronchi, we easily distinguished, in the thickness of the false membrane, several distinct layers, partly separated from one another; but the detachment I have first mentioned did not leave the mucous membrane naked; it was already being covered with little grains of pseudo-membranous matter, arranged more or less closely together, which was evidently the rudiments of a new membraniform layer.

The pellicles covering the tonsils retained but little thickness or extent, and it was easy to ascertain that the diphtheritic inflammation had been irregularly modified in the pharynx by the immediate action of the calomel, the administration of which had been commenced thirty-six hours before death.

Except a slight emphysematous tumefaction which was observed at the extremity of the lobes of the lungs, these organs did not exhibit any deviation from the healthy state. All the depending parts of the intestinal canal were very much injected. Still, notwithstanding the distention of the venous ramifications, and although the body had been opened twenty-nine hours after death, the blood had not yet been extravasated, and there did not exist any hypostatic ecchymosis on the surface of the gastro-intestinal mucous coat.

The results of this examination left no doubt as to the nature of the epidemic affection. This new proof was even superabundant, for one of the officers of health of the district had already found the same morbid alterations in a child who had died in the month of July in the same year.

Abundant general and local blood-letting, emetics, blisters, and mustard pediluvia, had been prescribed without success for this

dangerous disease; and as I have already said, of twenty-one individuals who were attacked, only three escaped death. One owed his recovery to local treatment. The well-established inefficacy of this therapeutic agency at an advanced period of the disease had generally dissuaded us from resorting to it. The mercurial treatment, preceded by the application of hydrochloric acid to the tonsils, had been employed in the second case. Notwithstanding the prolonged administration of calomel and emetics, the third patient, who was a child eight years old, of a delicate constitution, appeared many times on the point of death, and it was only after several convulsive paroxysms of suffocation that he expectorated fragments of membrane and long tubulated masses, which had certainly lined the first divisions of the bronchi. This child in the interval of the paroxysms had scarcely any febrile excitement; he recovered his health slowly, and his voice was for a long time inaudible. The wound of a flying blister which had been applied to his neck, and which was dressed with simple cerate, was covered with membraniform exudations, and increased so much as to extend from the anterior part of the neck to the front of the chest. The cure was accomplished only with difficulty and after a long space of time.* I myself was able, by the extent of the scars, to judge of the size which the wound of the blister must have attained.

The same inefficacy of general treatment had been demonstrated to me during the epidemic of Tours, and I had but too often been called upon to witness the failure of the mercurial treatment, whether it was resorted to at a too advanced period of the disease, or had not been followed up with sufficient perseverance, or whether it offered only a feeble opposition to the too rapid progress of the disease. With still less success was calomel administered several times at La Ferrière.

The little child to whom I was called, presented such positive symptoms of the extension of the pellicular inflammation into the respiratory passages, that very probably the closure of the larynx could no longer be prevented by the action of the calomel. Since the night before, nine doses of this medicine, of two grains each, every two hours had been administered, without the cough having lost anything of its dryness, and judging by the increasing progress of the dyspnœa and by the propensity to stupor, it could not be

* Samuel Bard made the same observation during the epidemic at New York.

hoped that life would be prolonged beyond twenty-four hours. In such a pressing danger I saw no hope except in tracheotomy, which could not be performed under more favourable auspices. The diphtheritic inflammation had only very recently extended into the air-passages. The little patient, who was of a strong and healthy constitution, was almost free from fever, and whatever might have been the difficulty of respiration, he seemed scarcely to suffer from it. Ought not the operation to be performed immediately? I had ascertained that the possibility of introducing the calomel into the air-passages and of thus modifying the diphtheritic inflammation was one of its principal advantages. But there remained the chance of expelling the false membrane; and besides, as I was obliged to leave the patient immediately after the operation, I was not able to take the most appropriate measures for securing its success; on the other hand, it was easy to take the child to the town in a few hours, and the inconvenience of this short delay was amply compensated by the possibility of seizing the most favourable moment for performing tracheotomy, for arranging the preparations for it, and for following up the after treatment.

I recommended that suitable precautions should be taken for the convenient removal of the patient, and before leaving him, I saw the preparations for his departure being made. But I waited in vain, and I was grieved to learn that the parents having allowed themselves to be diverted from their project, the child had fallen into a deep state of somnolence, and that it had died on the evening of the day after that on which I had left him.

The young woman whose case I have already mentioned, began, three days after the death of the neighbour whom she had nursed, to experience symptoms of Malignant Angina, but although she knew all the danger of her disease, which was prolonged to the eighth day, it was impossible to persuade her to allow us to perform tracheotomy.* I had

* The symptoms of her disease were followed out from day to day by M. Brault, who communicated to me the subjoined account to complete the history of the epidemic of La Ferrière.

CASE 32.—M.C., aged twenty-two, whose constitution had not been affected by any previous illness, began to feel a slight pain in the sides of the neck on the 21st of October, 1825. On the 22nd, the deglutition had become painful. On the 24th, she was visited. Pellicular exudations entirely covered the left tonsil, and seemed to pass beyond it. Superficial cauterization was practised with concentrated hydrochloric acid; some white

flattered myself with the hope that by means of this operation, one at least of the two patients would escape death, and I confess that it was with the deepest regret that I was disappointed both of the occasion for better understanding the advantages of tracheotomy, and of the hope of a success which was the more desirable inasmuch as the medicines

points were perceived on the right tonsil. On the evening before, the patient had applied fifteen leeches on the sides of the neck. (Three grains of calomel every two hours, and eight grains of polygala after every third dose of calomel.) Only one emetic action has been produced; four blackish stools. On the 25th, the pellicular exudations were stationary on the left tonsil; they were increasing and extending on the right, which on this day was also superficially cauterized. The same dose of calomel was given every two hours, and three grains of tartar emetic were given in three doses. Abundant vomiting was obtained with facility; there was no more cough; no change in the tone of the voice; abundant expulsion of frothy matter; four stools similar to those of the previous evening. On the 26th, some membraniform pellicles which appeared to have come from the tonsils were discovered in the sputa. The affection of the back of the mouth was assuming a better aspect, but the voice began to be hoarse, and the cough which followed excited an abundant expectoration of frothy sputa. There was constipation, which did not yield either to tartar emetic or to calomel. The latter medicine was given in the same doses as on the previous evening. On the 27th, the cough was more frequent and hoarse. In the night the dyspnœa increased, the patient left her bed, opened the window, and endeavoured to breathe the external air; the sputa preserved the same appearance; some strips of false membrane of small dimensions were found mixed with them. Three grains of tartar emetic and eighteen of ipecacuan were administered in a single dose, without any vomiting being produced. A blister was applied to the nape of the neck, and sinapisms to the feet. The mercurial treatment was continued, and at noon eight grains of calomel were given in a single dose. On the 28th there were frequent paroxysms of croupal suffocation; but the cough had become more moist, and the expectoration was muco-puriform. Death took place at noon. The gradual progress of lividity and paleness of complexion had marked the advance of asphyxia. This decoloration was remarkable.

The obstacle offered by the embarrassment of the respiration to the return of the blood, and its accumulation in the venous system, sufficiently explain the lividity of the complexion; but it is less easy to understand how paleness is joined to, and at last succeeds, this lividity. Without doubt, it is one of those phenomena which M. Laennec calls semi-cadaveric; at least, it is certain that it constantly marks the fatal progress of asphyxia. The same succession of tints is observed upon the buccal mucous membrane of animals which have been made to die by strangulation.

hitherto employed against such a fatal disease had been utterly inefficient.

I do not conceal from myself that in the case described at the commencement of this Memoir, the false membranes reached as far as the subdivisions of the bronchial tubes, and that in such a deplorable conjuncture, it would be undoubtedly useless to open the trachea, not to mention the danger which might result from the obliteration of the bronchi. The difficulty of expelling a voluminous mass of false membranes, would in itself present a great obstacle to the success of the operation; nevertheless we ought the less to allow ourselves to be deterred by this apprehension, inasmuch as we have sometimes seen patients disembarrass themselves from long tubular false membranes by the natural aperture of the glottis. We may easily conceive how rare such a favourable termination must be without the help of an artificial opening, if we consider that the anfractuosities of the larynx, arrest, at the narrow passage of its orifice, the strips of false membrane at the very time when they are ready to yield to the efforts which have prepared the way for their expulsion. The affection of the air-tubes is, perhaps, less to be feared in children than in adults. In the latter, the ample space of the glottis retards the period of its closure, and leaves time for the pellicular inflammation to extend itself. We have seen that in fifty-five *post-mortem* examinations, its extension to the subdivisions of the bronchial tubes was found only in the proportion of one to nine. I have not remarked that it was much greater in adults.

Besides, in a subject old enough to understand our motives, tracheotomy may be performed with facility, and if further observations should be favourable to the effects of calomel applied immediately to the mucous membrane of the air-passages affected with pellicular inflammation, we should then admit that we ought to hasten to perform an operation which of itself does not expose the patient to any danger. By this proceeding we should not only open a free passage for the air, and favour the expulsion of the false membranes, but, besides, we should have in the air-tubes a mode of access which would permit of our using, in time, a more sure method of stopping the progress of diphtheritic inflammation, which is always superficial, and does not become dangerous, except by its situation and its extension.

For two years, Scarlatina had progressively extended in this department of the country, and it had already run through the greatest

part of its course, when, towards the commencement of the summer, it reached La Ferrière. It showed itself there as destructive as in most of the other rural communes, and six individuals of different ages were carried off by the disease. But whether the Scarlatinal Angina was accompanied with a cutaneous efflorescence, or the eruption was wanting, it was always possible to distinguish it from Diphtheritic Angina, by the signs I have indicated. I was convinced that these two diseases had not a common origin, and that, with the exception of one single symptom (the membranous inflammation of the tonsils), they differ very much from one another. One last proof is decisive; one of these affections is not a preservative against the other, for many of those who were at last carried off by Diphtheritic Angina had had Scarlatina.

SPECIFIC CHARACTERS OF THE DIFFERENT KINDS OF ANGINA.

Six distinct inflammatory affections of the isthmus of the throat are pretty frequently met with, and at first they seem to present almost the same aspect; but they afterwards exhibit such varieties in their progress and modes of termination that it is impossible to deny to each a special and distinctive character.

In treating of the diseases which resemble Pharyngeal Diphthérite, I have already described the distinctive marks of the affections which it is most essential to avoid mistaking for this formidable disease. I shall not return to this subject except to trace, in this new Memoir, after the manner of nosographers, the specific characters of the different kinds of Angina, in order, by this comparison, to present a better picture of the peculiarities which exclusively belong to each. The greater or less embarrassment of the deglutition is a character common to all of them.

Catarrhal Angina.

Redness of all the mucous surface of the isthmus of the throat; moderate tumefaction of the tonsils; enlargement of the muciparous follicles, which at first allow the escape of an abundant secretion of limpid mucus, gradually becoming more opaque. There is a pungent pain without any remarkable obstacle to deglutition; scarcely appreciable tumefaction of the cervical lymphatic glands, and more or less intense fever.

Tonsillar Angina. (Amygdalitis or Tonsillitis.)

Tumefaction of one of the tonsils, often of both; painful deglutition, subsequently augmentation of volume and hardness of one of the tonsils; deglutition becomes more and more difficult and painful; œdematous swelling of the parotid region without considerable enlargement of the lymphatic glands; termination by resolution, by suppuration before the end of the second week, or by induration.

Mercurial Membranous Angina.

(*Too often designated as Syphilitic Angina.*

Fibrinous, corroding, and chronic ulceration of the tonsils, and velum palati; deglutition not very painful as long as the disease has not made much progress—Apyrexia.

Common Fibrinous Angina.

Tumefaction of one of the tonsils, sometimes of both; a central ulcerated depression of a yellowish-white colour. This tint is due to a fibrinous and intimately adherent coating. Deglutition very painful, fever generally rather intense; the elevated papillæ of the tongue are dirty with a slimy coating; a yellowish tint of the circumference of the mouth. A slight herpetic eruption often shows itself in the vicinity of the lips; the cervical lymphatic glands are moderately painful and slightly swollen. Even when the duration of this disease is not shortened by suitable treatment, it is rarely prolonged beyond the seventh day.

Scarlatinal Angina.

The symptoms of this kind of Angina are accompanied and generally preceded by fever; there is frequency, smallness and irregularity of the pulse. The difficulty of respiration and its acceleration often foretell the nature and danger of the disease. The deep redness of the velum palati and tonsils, and the swelling of these glands, precede the appearance of multiplied white points, closely arranged together, and forming by their union on the velum palati a whitish coating, which is easily furrowed. The tongue, the surface of which is a little slimy, presents almost the appearance of the healthy state; the deglutition is at once painful and difficult and a membranous incrustation covers a more or less extensive portion of the surface of the tonsils.

From the beginning of the disease the cervical lymphatic glands*

* It pretty frequently happens that the inflammation of the swollen glands terminates in suppuration. During the course of an epidemic which has just been spreading over the greater part of the rural commune of this department, we have so often seen scarlatinal glandular tumours

which are situated at the angle of the jaw, and especially those which are under the superior attachment of the sterno-mastoid muscle, acquire a considerable volume and become sensitive to the touch. Fever, always characterized by the frequency and disorder of the circulation, continues to accompany this second period.

The tongue, denuded of the coating which invested it, is sometimes dry, sometimes moist, and assumes a very deep-violet colour. In the cases in which this Angina has the greatest intensity, the membranous coating adhering to the tonsils becomes corrupted, changes its colour, is partly detached, exhales a fetid smell and resembles a gangrenous affection; but even in this case, the membranous inflammation of the pharynx is not the most dangerous symptom of the disease. At the same time that the cutaneous eruption, which is generally manifested from the second to the third day, begins to grow pale, and when the epidermis is raised and detached in scales and shreds, the inflammation is rapidly dispersed, and generally, from the eighth to the tenth day, there remains no trace of a disorder which appeared so dangerous.*

Diphtheritic Angina.

Redness and tumefaction of one of the tonsils, rarely of both; erratic fever, generally slightly marked. Some white spots are soon discovered on the surface of the swollen tonsil. These spots, which are more or less numerous, are due to the production of a pellicular, lichenoid exudation, which falls off spontaneously and is very easily detached. There is considerable enlargement of the lymphatic glands of the sides of the neck. From the beginning, this enlargement is marked by its disproportion with the extent and intensity of the inflammation of the mucous surfaces; the deglutition is not very painful, and it becomes less and less so; the tumefaction of the tonsil, which has been first affected, augments; a redness, of a very variable tint, circumscribes the exudation, which is sometimes rapidly extended to

yield immediately under the bites of leeches, that the local bleeding has undoubtedly exerted some influence over this mode of termination. Perhaps we ought to search for the cause of this result in the morbid alteration of the fluids, but at present this discussion would be premature.

* It seldom happens that the membranous inflammation of the pharynx is prolonged beyond this period, and from this time it loses its special character, in the same manner as, after a certain time, the ulcerations which succeed confluent smallpox, preserve none of the inflammatory characters which are proper to that disease.

the velum palati, the uvula, the pharynx, and the tonsil of the opposite side. After this sudden extension, the progress of the diphtheritic fibrinous inflammation most frequently remains temporarily suspended. The intumescence of the lymphatic glands either diminishes or does not continue to increase; there is no fever, or hardly any. After a more or less prolonged absence of symptoms for a few days, sometimes for a few hours, the cough begins, which is either dry or accompanied with a frothy expectoration; it soon becomes hoarse, and indicates the first symptoms of the propagation of the diphtheritic inflammation into the air-passages.

I shall not add Aphthous Angina to the affections of which I have just treated, because it is distinguished by characters which are too well marked, and because it is most frequently an affection which is only symptomatic of another disease.

In bringing together in this succinct manner the characters which are peculiar to different special inflammations of the pharynx, generally well known to practitioners, my object has been to show that each of these inflammatory conditions is limited to a particular course, and shows itself invariably under the same forms. However severe Scarlatinal Angina may really be, we shall never see it, even under the influence of the most stimulating treatment, putting on the character of Diphtheritic Angina, passing beyond its own limits, or extending into the air-passages. The closure of the glottis will not be the cause of the fatal termination of the disease, while even when the Diphtheritic Angina has shown itself only in a form of extreme benignity, the extension of the pellicular inflammation cannot be retarded by the most energetic antiphlogistic treatment; thus it is not by the intensity of any of the phenomena which characterize phlegmon that the pellicular inflammation becomes formidable. Being essentially superficial, we find that it cannot cease being so, without losing its principal character, and without a fibrinous incrustation, or a purulent secretion, taking the place of the pellicular exudation which accompanies it, and which constitutes the whole of its dangerous character. It is, besides, the nature of diphtheritic inflammation to be encroaching, and it is precisely this union of characters which constitutes its peculiarity and speciality, that "quid divinum" which cannot be seized, and which, according to the avowal of Hippocrates, escapes all explanation. We cannot conceal from ourselves that the laws of the physics of organized bodies, which are

still so little known, are incapable of furnishing us with a knowledge of the cause of this disposition which is manifested by different phlegmasiæ to run through their successive periods in a determinate time, to affect in preference, one tissue, and one region of this tissue, and to modify, in a certain manner, both its texture and its appearance.

Duration and Mode of Termination of Diphtheritic Inflammation.

After so many treatises published on Croup and Malignant Angina, the question may still remain whether Diphthérite is capable of yielding, when in its acute form, to general treatment, or whether it can only be efficiently subdued by special medication. Being obliged to leave a question of so much importance undecided, I may at least affirm that the former mode of termination must be very rare, since it is so difficult to meet with authentic examples of such cases.*

I feel how paradoxical this proposition must appear, but I beg it may be understood that I do not here intend to speak of anything except Diphthérite properly so called, and that I do not compromise under this name the numerous dissimilar affections too generally confounded under the denomination of Croup.

It is extremely rare for the diphtheritic inflammation not to extend from the pharynx into the air-passsages, and the disease then becomes so rapidly fatal, that two of the principal and truly characteristic features of this inflammatory condition have escaped the attention of practitioners; it has not been noticed that it is the nature of diphtheritic inflammation to encroach from spot to spot, and not to be extinguished on the points which it previously occupied. I insist upon these tendencies of Diphthérite, because in them resides all the danger of Malignant Angina, and because it will almost always happen, if they are mistaken, and if the most efficacious therapeutical plans are not directed against them, that the extension of the disease into the air-passages cannot be prevented.

Lastly, it must be stated that these plans should still be taken into consideration, even after an artificial opening has been made in the trachea, for, if we do not then redouble our precautions, the persistence of the pellicular inflammation in the larynx, or its extension into the bronchi, will invincibly oppose the success of the operation.

* This remark applies only to Diphthérite, which is still recent and in its acute stage; for by being prolonged and becoming chronic, it loses, like certain cutaneous phlegmasiæ, some of the characters which are peculiar to it.

FOURTH MEMOIR. (*March*, 1826.)

EPIDEMIC OF CHENUSSON.*

Since the end of October, 1825, Diphtheritic Angina had not re-appeared at La Ferrière, until, in the early part of November, a child died of Croup at Souchet, a small hamlet to the south of that town, and at a short distance from another hamlet, where, at the beginning of the preceding month, a child had died of the same disease. Some days later, Malignant Angina carried off a third child in an isolated house, situated in the midst of the woods, halfway between Chenusson and Souchet, still in the same direction from north to south. Some ties of relationship existed between the inhabitants of this latter farm and those of Souchet. In the middle of November, two children died suddenly at Chenusson, in the same house, their death being preceded by croupal cough and dyspnœa. Soon afterwards, a young woman, eighteen years old, suffered from a slight sore-throat; cough supervened, and on the sixth day of the disease, she died during a paroxysm of suffocation, after having expectorated some strips of false membrane and tubular exudations, which were seen by M. Brault.

I have already had occasion to notice that this young surgeon had attended the chief part of the patients at La Ferrière and that he had observed and noted with great accuracy all the diagnostic signs of the disease. By the end of December, eight children and one girl of fifteen or sixteen years old had suffered the same fate as the first three subjects just mentioned.

In most of these cases, leeches were applied in small numbers to the sides of the neck, and some of the patients had their tonsils scarified. After the local application of hydrochloric acid, calomel was given in small doses, frequently repeated, to two children who appeared to be in a state of convalescence, but, in both cases, the wound caused by a blister placed on the nape of the neck, became gangrenous and the children died tranquilly without feeling the

* A small market town a league south of La Ferrière, with a scanty population residing in fourteen or fifteen houses.

slightest inconvenience in respiration. Uncleanliness and want of care perhaps contributed to this termination; but we shall soon see whether there is not reason to suspect that it may have been caused by a cachectic state of the system, produced by the mercurial treatment.

Tracheotomy had been proposed in vain as a last resource; it was impossible to obtain permission to perform it on any of the patients who died. Perhaps the fear which the epidemic sore-throat had begun to create, might have triumphed over a remnant of prejudice, if several persons had not expected a cure to be performed by scarification of the tonsils. This mode of proceeding, generally censured by the physicians of the seventeenth century and the inconveniences of which had been ascertained by Van Swieten himself, was far from being attended with any favourable results, and indeed it appeared to aggravate the disease. In some subjects who had not even a catarrhal Angina, it was employed as a prophylactic agent. A boy fourteen years old, who was admitted into the General Hospital, had just had the anterior pillars of his velum palati scarified, although we could not discover the slightest trace of inflammation in his pharynx. A few days afterwards, he was attacked with Malignant Angina.

It is no doubt in consequence of a mistake in diagnosis, too often committed, that this erroneous practice, which has always been censured by experienced physicians, has been retained. Scarifications practised in Scarlatinal Angina, which tends to a favourable termination, generally of a spontaneous and rapid character, may have been considered beneficial for this very reason, namely, that they are not opposed to the cure. In Malignant Angina they are hurtful by their direct effects; but perhaps their most serious drawback is, that they are substituted for efficacious remedies, the opportunity of employing which, if it is allowed to escape, cannot be regained.

On the 1st of January, 1826, seventeen persons had already been attacked with epidemic sore-throat, and as not one had escaped death, the resolution was at last taken to convey all those who were affected with this malady, to the General Hospital. Out of twelve persons admitted in succession, three died.

I have collected, with great care, the practical facts which were presented to my notice, after an interval of five years, by an epidemic affection the dangerous character of which had so long attracted my attention, and I am now about to record the results.

Case 33.— —. O., aged five years, of a good constitution, had been taken from Chenusson to Tours, on the 26th of December, 1825, with the intention of removing her from the contagion. On the previous night the back of the mouth had been examined with great attention, but nothing remarkable had been observed in the pharynx. During her removal there was rather acute febrile excitement; either from the fear of being subjected to a painful examination, or because deglutition was really unattended with any pain, the little patient constantly denied having any sore-throat. Yesterday the same feverish excitement continued and the appetite was diminished.

On the 29th of December the child was seen for the first time at ten o'clock in the morning. On the third day of the disease, notwithstanding the feverish excitement, the strength was not impaired. Since the middle of the night there had been coryza without sneezing, and only marked by a snuffling, which rendered the respiration by the nose, noisy and difficult. There was swelling of the lymphatic glands of the neck, principally on the right side. Some white, thick lichenoid masses covered a portion of the surface of the tonsils, which were moderately reddened and swollen. Beyond the posterior pillars of the velum palati, the pharynx was lined with pellicular exudations as far as the base of the tongue, which was slightly covered with a slimy fur. Pulse 100. The skin was cool, the respiration easy, and there was no cough.

Some concentrated hydrochloric acid was lightly applied to the affected parts, and induced nausea, followed by the expulsion of a thick, elastic, membraniform layer, of the size of the thumb-nail.

At six o'clock the child was taken to the Hospital, and a second cauterization was performed by one of the resident pupils. There is reason to believe that it was not extended over the whole of the affected surfaces, and a third cauterization, which was much stronger, was applied with care, and the pharynx was thus entirely liberated from the membraniform pellicles with which it had been covered. There was no alteration in the tone of the voice. (Pulse 116. Resp. 20.) A collar of mercurial ointment was applied round the neck. A grain of calomel was given every hour, and a mixture of calomel and gum in powder was ordered to be inhaled in the same manner as snuff. On the fourth day, some membranous exudations, of a grey, or rather of a yellowish-white

colour, covered the surface of the tonsils. The elongation and tumefaction of the uvula prevented our discovering the state of the pharynx beyond the isthmus of the throat. Ten grains of calomel were given internally every hour, and the child also frequently inhaled some through the nostrils.

This morning the snuffling was less; opaque mucous matters flowed from the nostrils; the swelling of the lymphatic glands was not diminished. (Pulse 104. Resp. 20.) The calomel to be continued. On the fifth day, respiration was so tranquilly performed, that it was difficult to count it. A white, opaque, slender pellicle covered all the surfaces touched by the acid; the uvula was less swollen; the child complained of no pain, and there was no cough (Pulse 104; resp. natural); one ounce of castor oil to be given in an emulsion. On the sixth day, the tumefaction of the cellular tissue on the sides of the neck was diminished; but the sub-mastoid lymphatic glands preserved their volume and hardness; some opaque membranes, having the whiteness of curdled milk, still covered the uvula and the tonsils; the lower part of the pharynx could not be explored; the cough was rather infrequent; there was hoarseness, and guttural embarrassment of the respiration. (Pulse 88. Resp. 16.) Infusion of polygala, eighteen grains to two ounces of water; one ounce of castor oil.

The guttural embarrassment of the respiration remained during the sixth and seventh days of the disease; the cough was even a little hoarse, but on the eighth, it became moist and altogether catarrhal. The membranous coating of the surfaces affected with the diphtheritic inflammation was being worn away and attenuated; a deep, vivid redness circumscribed the semi-transparent spots which were still being formed here and there on the tonsils and on the sides of the uvula. A purgative draught prepared with an infusion of polygala and an ounce of castor oil, was given on the sixth day; on the seventh, ten grains of jalap and four drachms of castor oil; on the eighth, eight grains of jalap and three grains of scammony in one dose; and every day several alvine evacuations were obtained. Sixty-five grains of calomel had been taken internally, forty grains of the same substance were inhaled like snuff, and two drachms of mercurial ointment were applied by inunction round the neck.

There was emaciation and anorexia: a superficial erosion of the lips and the chin, produced by some hydrochloric acid which the child had applied to her mouth, at a time when the phial containing

it, had been imprudently left within her reach, was cicatrized in a few days; from the twelfth to the sixteenth day, there was slight puffiness of the face, without mercurial ulceration of the mouth. The pulse remained habitually frequent; but still the appetite began to return. On the twentieth day, a small scabby ulceration was still seen at one of the commissures of the lips; but the health in other respects was completely restored.

Case 34.—F. R., aged fourteen, of a strong constitution, living in the same house with the subject of the last case, experienced some feverish excitement accompanied with difficulty of deglutition, on the 29th of December, 1825, and on the 30th she was admitted into the Hospital. There was swelling of the cervical lymphatic glands, œdematous swelling of the sides of the neck, redness and swelling of the tonsils. A semi-transparent pellicle extended, growing thinner as it advanced, from the edge of the anterior pillars of the velum palati to the surface of the tonsils; a topical and superficial application of concentrated hydrochloric acid was ordered; a grain of calomel was given every two hours; a mixture of calomel and powdered gum was used like snuff; and a collar of mercurial ointment was applied round the neck. On the third day, the pellicular exudations were more opaque; the base of the throat was lined with mucous matters, which were seen descending from the nostrils, and which were loaded with calomel. Deglutition was painful; the same treatment was pursued. On the fourth day, a vivid redness circumscribed the exudations, or rather the membranous, slender, and semi-transparent coating which covered a part of the surface of the tonsils. (Pulse 64.) No snuffling or hoarseness. (An ounce of castor oil in emulsion.) The mercurial treatment was discontinued. On the fourth day there was painful sensibility of the incisor teeth; one ounce of castor oil emulsion was given; there was anorexia, and slightly-marked emaciation. On the fifth day, fifteen grains of jalap were given, and four drachms of castor oil in an emulsion. On the seventh day, twelve grains of jalap were given with five grains of scammony. Every day two or three evacuations were procured; on the twelfth, the patient had recovered her stoutness and the freshness natural to her age; forty grains of calomel had been taken internally, and twenty grains had been inhaled like snuff. A drachm of mercurial ointment was employed by inunction on the neck.

Case 35.—J. B., aged fifteen, of a strong constitution, was admitted into the Hospital on the same day as the subject of the last case. The first symptoms of Diphtheritic Angina were developed twenty-four hours later than in the former girl, and they yielded still more rapidly to the local applications and to a less prolonged mercurial treatment.

Case 36.—N. B., an infant at the breast, aged one year, of a pale and delicate appearance, but in other respects in good health, was admitted into the Hospital on the 4th of January, 1826. White, opaque, pellicular exudations covered the tonsils and extended to the walls of the pharynx. There was considerable swelling of the sides of the neck. The health of the child appeared altered for the preceding two days, the alteration commencing on the day after the death of one of its brothers, who had just died of Diphtheritic Angina. An application of concentrated hydrochloric acid was ordered superficially, but to be frequently repeated, and exactly extended over all the affected surfaces; a part of the pellicles covering the tonsils adhered to the sponge. One grain of calomel was given every hour; calomel in powder mixed with gum was applied to the nostrils by means of a little pledget of lint, and a collar of mercurial ointment was ordered round the neck. On the fourth day the swelling of the lymphatic glands was a little diminished. The white, opaque exudations which covered the tonsils, did not appear to be larger than on the previous night; the mercurial treatment was continued. On the fifth day the swelling of the lymphatic glands of the left side was completely dissipated, and it was sensibly diminished on the opposite side; a vivid redness circumscribed the pellicular exudations which had become less extensive; four drachms of castor oil were given. On the sixth day, we could no longer distinguish anything on the tonsils except some membranous spots which were rapidly being effaced; some of the lymphatic glands had returned to their normal size. The child continued to suck, and refused every other kind of food. The mercurial treatment was discontinued. The convalescence made rapid progress, and by the tenth day the child was quite well. The mouth had shown no trace of mercurial affection.

Case 37.—F. B., aged ten years, brother of the last patient, and who had been admitted into the Hospital on the 30th of December, had remained there until the 3rd of January, affected with a slight

sore-throat. In the night of the 3rd to the 4th, there was intense fever, redness and swelling of the tonsils with painful tumefaction of the lymphatic sub-maxillary glands. Although no pellicular exudation was yet observed on the inflamed surfaces, twenty grains of calomel mixed with powdered gum were used for the next two days like snuff. In exploring the state of the back part of the mouth, the mucous matters were seen to descend from the nostrils into the pharynx, whitened by the protochloride of mercury. From the third day, the swelling and redness of the tonsils were completely removed. Had this child been really affected with Diphtheritic Angina? I am the more induced to think so, as the lymphatic glands of the right side, the swelling of which had at first diminished, became swollen again afterwards, and formed an abscess. After the opening of this abscess, recovery made rapid progress, and when the child left the Hospital, his health was perfectly re-established.

Case 38.—F., aged ten years, of a slender stature and pale complexion; had painful deglutition since the 25th of December. Forty grains of calomel had been administered in two days by M. Henri Brault. The calomel was discontinued on the 28th of December. The parents of the patient had given him some garlic boiled in vinegar. On the fourth day he entered the Hospital; he was hoarse, the voice was feeble; there was swelling of the sides of the neck; the tonsils were tumefied, of a livid-red colour, partly covered with greyish shreds of exudation; they touched each other, and the deglutition remained difficult and painful. (A grain of calomel was given every hour, and a collar of mercurial ointment was applied.) On the fifth day there was the same appearance of the pharynx; the same state of the patient, and the same treatment. On the sixth day there was a diminution of the swelling of the lymphatic glands; the tonsils were laid bare, but they preserved a violet colour and remained swollen; the hoarseness and feebleness of the voice remained. (Four drachms of castor oil.) On the seventh day the tonsils had subsided, the engorgement of the lymphatic glands was dissipated, deglutition was easy, and the appetite returned. On the eighth day the mercurial treatment was discontinued; the appetite was very keen, the voice became clear, and from this period the progress of the convalescence was no longer interrupted. On the ninth day four drachms of castor oil were given, and ten grains of jalap. On the twelfth day ten grains of jalap were given with four grains of scammony; the

health was completety restored. The little patient, placed near a stove, enjoyed, during the whole of the treatment, the advantages of a temperature which was never lower than ten degrees.* The diphtheritic inflammation of the pharynx appeared to have been already modified by the mercurial treatment when the child was admitted into the Hospital; no local treatment was resorted to; forty-eight grains of calomel were taken internally and forty were inhaled.

Case 39.—L. Bodier, aged twenty-four, of middle stature, generally enjoying good health, was admitted into the Hospital on the 6th of January, 1826. For five days there had been sore-throat, accompanied with fever; scarifications had been practised on the tonsils, which, on his admission, were swollen and covered with pellicular exudations. Before his departure from Chenusson, the patient had taken twenty-eight grains of calomel administered in fourteen doses. He was afterwards, during a journey of five leagues, exposed to cold and wet. On the fifth day, at nine o'clock in the evening, the tonsils were swollen, livid, bloody, covered with greyish pellicular strips; there was hoarseness and feebleness of the voice; tumefaction of the sides of the neck. One grain of calomel was ordered every two hours. On the sixth day, in the morning, there was puffiness of the face, membranous mercurial ulcerations of the edges of the tongue and of the internal part of the cheeks; a dirty and bloody appearance of the surface of the tonsils, which remained swollen; hoarseness and anorexia; four grains of calomel had been taken in the course of the night; the mercurial treatment was discontinued. On the seventh day, the state was the same as on the previous night, but the tongue was more painful. For the last two days the temperature had fallen, and the patient had remained in a ward without a stove, where he suffered much from cold; he was removed into a warmer apartment; there was anorexia, with mercurial salivation. On the eighth day there was mercurial membranous inflammation of the internal part of the lips and cheeks; the œdematous swelling of the face was increased; there was emaciation and constant thirst; deglutition was more easy; the tonsils, less livid and less swollen, were covered here and there with a diphtheritic membranous coating, which was progressively becoming thinner and disappearing; the swelling of the cervical glands had subsided. On the ninth day there was some appetite. From the tenth to the eighteenth day, hunger was more and more

* M. Bretonneau does not state what thermometer was used, but it was probably the centigrade.—Ed.

felt, the ulcerations of the mouth were circumscribed and gradually disappeared; the complexion was more animated, but the œdematous swelling of the cheeks and chin had not diminished. In spite of our remonstrances, the patient insisted on leaving the Hospital; he was cautioned to protect himself with the greatest care against the influence of cold and moisture. I learned that this patient, on his return to his parents, enjoyed pretty good health for four days; but that he complained of severe illness as soon as the temperature had again fallen, and that at last he died on the 10th of February of an attack of hæmoptysis, which lasted for several days, and that it was constantly accompanied with dyspnœa.

Case 40.—T., an orphan, aged thirteen, who had been kept at the Hospital in consequence of a relapse of intermittent fever, had not been more intimate with the children brought from Chenusson, than two other girls of her own age; she had only inhabited the same ward, and been warmed at the same stove. On the 10th of January, 1826, she had had rather intense fever since the previous day; deglutition was difficult and painful; there was swelling of the lymphatic sub-mastoid glands; redness and swelling of the tonsils; a slender, semi-transparent pellicle covered their surface, some hours later this pellicle became opaque and lichenoid; the treatment was local. On the third day, the pellicular exudations were detached; the surfaces touched by the concentrated acid preserved only a whitish tint. (Calomel was given in grain doses every three hours; and two grains suspended in gum-water were injected into the nostrils three times a day.) On the fourth day, fresh pellicular exudations were produced, but not to any great extent. From the fifth day they began to wear away and disappear; the mercurial treatment was interrupted; deglutition was no longer painful; scarcely twenty-four grains of calomel had been administered. On the seventh day, there was œdematous swelling of the face. The patient, who was placed near a door, had suffered from cold; she was removed near to a stove. On the eighth day, a large membranous mercurial ulceration extended to the inside of the cheeks; the blood which exuded from the ulcerated surfaces was deposited around the teeth, and there it formed thick clots; the swollen tongue preserved the impression of the teeth; its edges were ulcerated, and the swelling of the face was considerably increased. (Gargle of hydrochloric acid.) On the twelfth day the breath was fetid; the exudation of blood had ceased; the membranous ulcerations were more painful, but they were beginning to clean; the tongue was less

swollen, the pulse was scarcely febrile. On the fourteenth day the ulcerations were less painful, were beginning to clean, and to become circumscribed, and the puffiness of the face was rapidly disappearing. On the fifteenth day, in the place of the membranous ulcerations, only some superficial rose-coloured excavations were seen, and they were on the point of disappearing; mastication was less painful. On the seventeenth day all the mercurial ulcers were cicatrized, and on the twentieth the health was completely restored.

Case 41.—B., aged fourteen, of a feeble constitution, was admitted into the Hospital on the 15th of January, 1826. This boy had accompanied the man Bodier (Case 39), on the 6th of January, and although he had no swelling of the tonsils, he bore, on the anterior pillars of the velum palati, the traces of scarifications to which he had been subjected two days before. During his residence at the Hospital, none of the symptoms of Malignant Angina had been manifested, and he had gone out in perfect health. On the 15th of January, the tonsils were swollen, reddened, and covered with white, opaque, lichenoid exudations. Two white points were distinguished at the base of the uvula, and three or four spots, also white, of a lenticular figure, beyond the posterior pillar of the velum palati, on the walls of the pharynx. The sub-mastoid lymphatic glands were considerably swollen. Concentrated hydrochloric acid was repeatedly applied locally; the diphtheritic exudations adhered to the sponge. The patient said that on the previous night he experienced some febrile symptoms followed by pains in the sides of the neck, and by difficulty of deglutition. On the third day, the mucous membrane of the tonsils appeared to be slightly whitened by the contact of the acid; it was not covered by exudations; deglutition remained painful; the swelling of the lymphatic glands was diminished; the nostrils were injected with water having calomel suspended in it. On the fourth day, some slender pellicles were again formed on the surface of the tonsils, and others bordered the sides of the uvula; the mercurial treatment was continued. On the fifth day, the pellicular exudations were not extended in surface, but they had increased very much in thickness. Some were seen between the base of the anterior pillar of the velum palati and the base of the tongue. The parts surrounding the pellicles were lightly touched with a little sponge soaked in concentrated hydrochloric acid: no more swelling remained except in the lymphatic glands of the right side. On the sixth day, the appear-

ance of the pharynx was the same; for two days the doses of calomel were less frequently administered. The patient was brought near the stove and the temperature was not allowed to sink below ten degrees in the part of the ward where he was placed; a superficial application of concentrated hydrochloric acid was again made. On the seventh day, the diphtheritic exudations assumed a grey tint; they were partly detached and had diminished in size. The mercurial treatment was discontinued. From the eighth to the tenth day the swelling of the lymphatic glands had altogether disappeared, and no further trace of morbid affection remained except two little white spots towards the base of the uvula, and a red fringe following the free and floating border of the velum palati. On the twelfth day, the two little white spots at the base of the uvula had extended; each of them was formed by a concrete matter which assumed the figure and the dimension of a lentil. Hydrochloric acid was applied; deglutition was easy and the general state of the health left nothing to be desired. On the fifteenth day the two spots had disappeared. Each day two or three alvine evacuations had been procured by giving a few grains of jalap or an emulsion of castor oil.

Case 42.—N. Rameau, aged ten, of a plethoric constitution, an idiot and epileptic, admitted into the Hospital on the 14th of January, 1826, began to experience some difficulty in deglutition on the 1st of January. He was seen on the third day of the disease by M. Brault, who found the pellicular inflammation of the pharynx too extensive for the trial of any local application. On the fourth day, at ten o'clock in the evening, the tonsils were so much swollen that they touched one another; these organs as well as the uvula were covered with a greyish exudation; the fetor of the breath was insupportable; respiration was accompanied by a guttural rattle. A great abundance of viscid, semi-transparent mucous matters flowed from the commissure of the lips and from the orifice of the nostrils. Some swollen lymphatic cervical glands formed a great projection behind the angle of the jaw; the papillæ of the tongue were erected and covered with a slimy coating; the respiration was frequent. (Pulse 94 to 96.) Concentrated hydrochloric acid was twice applied locally by means of a sponge slightly soaked in it; a grain of calomel was given every hour. A mixture of powdered gum and calomel to be applied to the nostrils and inhaled like snuff. On the fifth day of the disease, the difficulty of deglutition was not diminished; the swelling and

hardness of the lymphatic glands were still more marked; the mercurial treatment was continued; there was no cough; the fetor of the breath was diminished. On the sixth day, the state of the patient was the same, and the treatment was the same. On the seventh day, there was a sensible diminution of the swelling of the lymphatic glands; deglutition was rather less painful; the tonsils were less swollen, but still covered with greyish exudations, and the uvula, falling very low, prevented anything from being discovered below the isthmus of the throat; the redness of the borders of the tongue made us anticipate and fear mercurial salivation; the administration of calomel was therefore suspended. On the eighth day, the swelling of the cervical lymphatic glands was sensibly augmented. During every inspiration the passage of the air through the glottis caused a hissing sound to be heard. The attendants stated that the patient had not yet coughed. Still the alteration of the tone of the voice made us fear that the pellicular inflammation had attacked the air-passages; and very soon the croupal cough excited by the examination of the pharynx no longer permitted us to doubt that this dangerous symptom had escaped the attention of the nurse. Semi-transparent mucous matters flowed abundantly from the nostrils. It was decided that tracheotomy should be performed as soon as the difficulty of respiration should threaten suffocation. The patient was left at eight o'clock in the morning, to be re-visited at noon, and I was ready to come before the time indicated, if the symptoms should become aggravated. At eleven o'clock, the dyspnœa increased; the imminence of the danger led to the administration of extreme unction, and it was only after having fulfilled this pious office with a somewhat inconsiderate zeal that the sister of the ward sent for me. The operation, for which preparations had been made beforehand, could not be performed until twenty minutes after death. The movements of respiration having been for a long time fruitlessly imitated, the commencement of cadaveric rigidity permitted the opening of the body two hours afterwards.

Autopsy.—None of the abdominal viscera were altered from the healthy state; the mucous membrane of the stomach was of a pale-rose colour, becoming a little deeper at the dependent part of this viscus; a slight, very superficial erosion, of a line and a half long in its greatest diameter, was the only lesion to be discovered. In general the mesenteric vessels were moderately injected, and the mucous coat was pale in the small as well as in the large intestine.

Thorax.—The lungs were crepitant and very permeable to air, except where there were two small, partial, very circumscribed hepatizations, which were seen on the surface of the right lung. The mucous membrane of the bronchi was pale, and it was only towards the middle part of the trachea that the punctiform redness peculiar to diphtheritic inflammation was seen; it fringed the slender semi-transparent floating border of a tubular membraniform exudation which became very thick and more and more adherent in proportion as it was traced into the larynx. We found it again less intimately united to the epiglottis. The grained redness was converted into a violet colour, which was uniform and more deep in the regions where the false membrane could only be detached by the aid of strong traction, or by means of the back of a scalpel. It was easy to discover that the inflammation of the air-passages had not acquired more intensity in any part than below the arytenoid notches, that is to say, beneath the only parts which gave a more easy passage to the exudations from the pharynx.

Over the whole extent of the back part of the mouth, the exudation, being closely adherent to the surfaces which it covered, so exactly resembled the appearance of eschars in its aspect and fetor, that it was necessary to guard against this fallacy, in order that we might not confound the putrid alteration of the inorganic pellicles with a true gangrenous lesion. A thick and soft mass of concrete matter obstructed the upper part of the pharynx, and, in the nostrils, was converted into a supple, elastic membrane, of a yellowish-white colour, which projected beyond their orifice. It is difficult to conceive how this exudation did not completely intercept the passage of the air. A pseudo-membranous sheath, more than two lines thick, adhered so closely to the uvula, that it could be separated from it only with great difficulty. The alteration of the appearance of the tonsils was now reduced to a fibrinous ulceration, presenting a dirty aspect.

Although the operation was not a certain method of remedying this accumulation of diseases, it cannot be doubted that it might have prolonged life, and offered a chance of recovery. What might have been, in this case, the mode of termination of the diphtheritic inflammation in the nasal cavities?

Having performed the operation on the dead body, I found, by the dissection which followed, that the incision of the trachea ought to have been commenced immediately below the thyroid body, which might have been divided without danger. Three serious considerations

forbid the prolongation of the incision below the supra-sternal depression. First, the danger of meeting with the right carotid artery, the direction of which at this point, obliquely crosses the trachea. Second, the risk of dividing the thyroid veins near their origin, an accident which would have the inconvenience of giving a passage not only to the blood which they themselves carry, but also to that which is flowing from the dilated venous trunks. In the present case, for example, the jugular veins were so much dilated, that they would easily admit the thumb of an adult. Third, the depth at which the trachea is situated, for this tube follows the curvatures of the vertebral column, and thus it tends to retire more and more behind the integuments which cover the supra-sternal depression.

In the night preceding the death of this child, its mother, aged forty-three, who had remained at Chenusson, died of the same disease.

Case 43.—Cormery, aged eight years, of a feeble constitution, was received into the Hospital on the 12th of January, 1826. After some lengthened attacks of autumnal fever, this child was affected with anasarca, from which he was scarcely convalescent when he experienced the first symptoms of Malignant Angina. He was brought from Chenusson during a severely cold day, and had travelled five leagues, being still able to ride alone on a donkey. The matter which he had spit up was frozen on his clothes. For the last four days, deglutition had been painful and difficult; the voice was hoarse, the cough harsh and frequent, accompanied with a viscid, frothy, semi-transparent expectoration.

Some white, lichenoid, pellicular exudations were seen upon both tonsils, which were moderately reddened and swollen. These exudations occupied only a portion of their surface, and no other similar appearances were observed in the pharynx, with the exception of two small, isolated white points on the sides and towards the base of the uvula. There was a painful and very prominent swelling of the lymphatic glands of the neck; those of the right side, which were the most hard, formed a mass, of the size of a pigeons's egg, under the superior attachment of the sterno-mastoid muscle.

Two hours after the arrival of the patient, his cough became more frequent; it was hoarse, and, although often repeated, was generally reduced to two expirations. The respiration, which was already accelerated, was not yet stridulous, and was only beginning to be rattling (*râleuse*), when the child fell into a state of somnolence

after each attack of coughing; the matter expectorated was very abundant, four ounces being collected in a spittoon in two hours; it was frothy, fluid, semi-transparent, and sometimes marked with streaks of blood. A great quantity of these mucous secretions certainly proceeded from the back of the mouth; skin cool, pulse 120. The functions of the life of relation were normally performed. A grain of calomel was given every half hour, twenty grains more were to be mixed with powdered gum, the patient to inhale from time to time a pinch of this mixture in the same manner as snuff. A collar of mercurial ointment to be placed round the throat. On the fifth day of the disease, at six o'clock in the morning, the cough, which was short and hoarse, was still frequent; the lymphatic glands of the neck were painful, although less swollen; the respiration was more stridulous; respirations 20; the sides of the uvula were bordered with concretions.

At eight o'clock, the cough had become less frequent, but there was the same rapidity of breathing; the depression and irregularity of the pulse, rather than its frequency, prevented us from counting it; there was the same integrity of the functions of the life of relation; the skin was cool; the expectoration retained the characters already indicated; powdered gum was dissolved in water and injected at intervals through the nostrils into the back of the mouth. At eleven o'clock the inspiration became sibilant, and was only performed by great muscular effort. During its performance, the interval between the sterno-cleido-mastoid muscles, and the interstices between all the muscles of the neck which are fixed to the clavicles, were strongly depressed.

The infrequency of the cough, and the abundance of matters which were expectorated (an abundance which allowed us to presume that the diphtheritic inflammation was already propagated over a great extent of the mucous membrane of the air-passages) induced me to hasten the period of the operation, with the double object of preventing the danger of suffocation which proved so rapidly fatal in the subject of the last case, and, by dropping in water charged with calomel, of arresting, if possible, the propagation of the pellicular inflammation.

At noon, the operation was performed; the dilated trunks of the superficial thyroid veins were easily placed out of the way on the sides of the incision, which was extended from the middle part of the thyroid body to the supra-sternal notch. A moderately abundant flow of blood was arrested by the ligature of one of the deeper veins.

The trachea was laid open, and the trickling hæmorrhage from the wound did not prevent the introduction of a steel bistoury into this canal and the division of one of its rings. The air passed out bubbling and driving with it mucous secretions mixed with blood. By the help of a narrow and button-headed bistoury, introduced during the time of expiration, into the small opening, the incision was prolonged from five to six lines. The blood flowed abundantly; it was wiped away with a sponge at the time of each expiration.* A silver canula, of suitable size and shape, was easily introduced by means of forceps with curved blades. In less than three minutes, the hæmorrhage was completely arrested. Some mucous matters mixed with blood were expelled by a fit of coughing, which produced vomiting. From this time the respiration became calm and noiseless; the pulse remained frequent and irregular. Although the respiration was extremely calm, in the evening at eight o'clock the pulse was irregular, 148 in the minute, and the respiration was 32.

On the sixth day of the disease, at six o'clock in the morning, the respirations were 32, and the pulse was 120; an injection of bark was administered. At noon, the canula was drawn out to afford an easier passage for the mucous secretions thrown up by the cough, which was excited by an application of calomel. At eleven o'clock the respirations were 52, and the pulse was 127. In the afternoon the respiration became more frequent, namely, 56; the canula was withdrawn, and it was not obstructed, but exudations were seen through the separated lips of the wound in the trachea. A band, two lines wide and two inches long, was drawn away by the brush (*écouvillon.*) A portion which presented itself at the inferior commissure of the wound could not be seized. The respiration became less noisy without losing its frequency; the pulse was 130, and the respirations 44. The canula was again withdrawn, and two masses of concrete matter, enveloped in mucus, required some tedious efforts for their expulsion.

* I was in too much haste to penetrate into the trachea, and I suspect that the fibrous threads which were afterwards expectorated, proceeded from the blood which was introduced. This hurry on my part produced other inconveniences, for, with the intention of carrying the opening of the air-tube to the left rather than remaining on the other side of the median line, just the contrary happened. The incision, also, could not have been prolonged for two lines without reaching the right carotid artery. A few moments devoted to arresting the hæmorrhage and exposing fairly the part of the trachea which is to be opened, simplify the results of the operation and secure its success.

After having mashed them in water, they were found to be composed of diphtheritic pellicles of rather slender consistence and of a reticulated branching structure, which may have been portions of fibrine, coming from the blood which flowed from the trachea at the period of the operation. At eight o'clock in the evening, the inspirations were *dry*, noisy, and irregular, 65 in the minute; the functions of the life of relation were normal. The pulse was much depressed, extremely frequent, and could scarcely be counted; it exceeded 140. At eight o'clock the instillations of calomel into the trachea and the nostrils were discontinued.

On the seventh day, at one o'clock in the morning, the respirations were 60, and the pulse was 122. After an injection of gum-water, some thick mucous matters, and a clot composed of concrete matter, of membraniform pellicles, and of dried mucus were expelled; the canula was displaced. A fresh injection was made of gum-water; mucous matters were again expelled, enveloping the thin and ragged shreds of diphtheritic exudations.

There were every day three or four alvine evacuations of a greenish colour. Two carious teeth on each side of the lower jaw became violently painful, and caused the patient much uneasiness.

From ten o'clock in the morning till ten at night, a very small quantity of gum-water was injected into the trachea at different times, and each time some tenacious mucous matters were expectorated. The membraniform pellicles which were found to be intermingled with them were now smaller in size; the anorexia still remained. Nevertheless the little patient took, of his own accord, half a cupful of broth; the yolk of an egg beaten up in two ounces of decoction of bark, was also given to him as an injection. Three alvine evacuations were passed, loaded with green mucus. In the first we distinguished two half-digested clots of blood; the functions of relation were perfect. The patient rose without help, to satisfy his wants.

On the eighth day, at seven o'clock in the morning, the pulse was 120, there was great heat of skin, redness of the cheeks, respirations 78; injections of gum-water were passed into the trachea. The expectorated matter was mixed with pellicular exudations, and exhaled a fetid odour; three or four stools were passed during the day. We succeeded in making the patient take a little broth, and an injection with six grains of sulphate of quinine was administered; this was retained for an hour. On the ninth day, about ten o'clock in the morning, the respiration became more noisy and there was swelling of the face. The

canula was taken out. The frequency of the respiration was diminished after the dressing. The edges of the tongue were at first ulcerated at all the points which were in contact with the asperities of some decayed teeth, and afterwards the same appearance was observed opposite the projections of the other teeth. (Sulphate of quinine, three grains.) Some reddish mucus and putrefied pellicles were thrown up. It was discovered that the incision did not occupy the median line of the trachea, and that some of the cartilaginous rings had been pushed back and folded in by the canula; the respirations were 44; the pulse was less frequent and more distinct. A decoction of bark was substituted for the gum-water in the injections.

At four o'clock in the afternoon, the respirations were 54; sulphate of quinine was given in the dose of four grains. The mouth of the patient exhaled a gangrenous odour, and the mercurial ulcerations of the internal part of the cheeks and of the edge of the tongue presented a very dirty appearance. The tonsils, which were no longer swollen, the uvula and a part of the velum palati, appeared actually sphacelated. A sponge, soaked in a mixture of alcohol and hydrochloric acid was applied to the pharynx. The animated expression of the countenance was succeeded by a dejected and morose appearance. The respiration, which remained noiseless, became more and more frequent. Death took place on the 18th of January, at two o'clock in the morning, without suffering and without any attack of suffocation.

Since the second day after the operation, the canula, after having remained a short time in the passage made by the wound, was always taken out blackened at the points which were in contact with the exudations of the larynx.

Autopsy.—There was an œdematous swelling of the sides of the neck; grey, mercurial, blackish ulcerations, of an exceedingly dirty hue, covered all the points of the mucous membrane exposed to the friction of the projections formed by the teeth; the gums no longer adhered to the neck of the carious teeth, and the separation was indicated by the blackish tint of their line of insertion. The part of the pharynx which had been attacked by the diphtheritic inflammation was ulcerated, grey, blackish, and from this part was exhaled an insufferably fetid odour. Some pellicular strips of membraniform exudation, still adherent, were observed at different points. There was no doubt that the mucous tissue was completely sphacelated; the gangrene was not circumscribed at any part; it was being propagated

to the base of the tongue, to the velum palati, and to the uvula; the pituitary membrane was of a deep-violet tint, and was covered, in its whole extent, with a thick, soft, membraniform exudation, both surfaces of which were speckled with greyish spots.

Thorax.—At the base of both lungs there were numerous partial spots of hepatization; below the incision in the trachea there were no false membranes in the air-tubes. Those which still lined the larynx were only slightly adherent and possessed but little consistency; their colour had become grey, and the mucous membrane beneath them was of a livid-violet colour. The child had frequently endeavoured to speak since the operation, but had never been able to articulate a word.

Abdomen.—There was extreme paleness of the whole gastro-intestinal mucous coat.

Case 44.—F. Bodier, aged sixteen years, whose previous good health was indicated by a moderate degree of stoutness, with an animated tint of the skin, and all the freshness proper to youth, experienced the first attack of epidemic sore-throat on the 3rd of January. On the 4th, scarifications were performed on the tonsils, the swelling of which had considerably increased. The patient, who had been exposed to a very cold temperature during a journey of five leagues, was admitted into the Hospital on the 6th of January.

On the third day of the disease, at ten o'clock in the evening, the tonsils were swollen so much as to touch each other, and to be pushed backwards, while they thrust forward the uvula, the point of which was directed toward the palatine vault; some thick, white and greyish exudations covered the portion of the tonsils which was exposed to view; the sub-mastoid lymphatic glands formed on each side a hard, resisting tumour of more than fifteen lines in diameter. Each inspiration was noisy, and accompanied with a guttural rattle; there was no cough; the breath was very fetid. A sponge moistened with concentrated hydrochloric acid, and suitably squeezed, was cautiously introduced between the tonsils, and applied twice, as far as the pharynx. A nauseous smell, resembling that of burnt flesh, was diffused at a distance, the moment the parts were touched. (A grain of calomel was given every hour, and a collar of mercurial ointment was applied round the neck. A mixture of powdered gum and calomel, ten grains of each, to be inhaled like snuff.) On the fourth day, the tonsils no longer touched each other; the uvula was lowered

a little; some shreds of false membrane were mixed with the matter which was spit up. The patient articulated rather more distinctly; a band covered with mercurial ointment was reapplied round the neck; the calomel was continued. The temperature fell below zero. On the fifth day the pulse was feeble and depressed; the tongue was moist and clean at its point; there was anorexia; the lymphatic glands were diminished in size; the tonsils, which remained swollen, were covered with blackish exudations; the exploration of the throat constantly caused an excretion of bloody mucus; deglutition was always very difficult, and a part of the liquid returned by the nostrils; the breath remained fetid; the mercurial treatment was continued. On the sixth day, the skin was cold, and the pulse, very much depressed, could hardly be felt in the left arm. (Pulse 76.) There was the same appearance of the pharynx, and the same difficulty of deglutition. An emulsion of castor oil, prescribed with the intention of preventing the consequences of a too active absorption of the mercury, had not been taken. (An acidulated gargle.) There was no cough; the difficulty of respiration was always guttural; the patient spoke low, but distinctly; the calomel was continued; injections of decoction of bark; injection of broth; the surface of the tonsils which was presented to view, was touched with powdered alum; there were no alvine evacuations. On the seventh day, the pulse was very weak; the tongue moist and clean in the greatest part of its extent; the tonsils, partly denuded of exudations, remained swollen, and preserved a violet, ecchymosed, bloody colour; the uvula was still covered with blackish exudations. The respiration was less noisy; the voice feeble but distinct; the fetor of the breath had ceased; an injection of vegeto-mineral water was made into the back of the mouth; a laxative draught was given with four drachms of manna, three drachms of Epsom salts, and ten grains of jalap. A very small portion of the laxative draught was taken; fifteen grains of jalap were given in the course of the day; there were one or two slight alvine evacuations; the doses of calomel were given at longer intervals.

On the eighth day, the pulse was extremely depressed; the skin cold, the tongue red and moist; a semi-transparent fibrinous layer took the place of the exudations which covered the tonsils. Some vegeto-mineral injection was thrown into the back part of the mouth; the swelling of the lymphatic glands was almost dispersed; the tonsils left a small interval between them; the respiration was easier and the voice clearer; the mercurial collar was discontinued and the doses of

calomel were given at still less frequent intervals. On the ninth day, the pulse was somewhat less depressed, but rather frequent; the face was red, there was emaciation; pain on the left side of the neck, and there was the same appearance of the tongue and the pharynx; the deglutition was difficult. The patient could scarcely swallow a cupful of broth. At a time when she was held sitting up to make her bed, she fell unexpectedly, and in her fall, she excoriated and bruised one side of her face. The mercurial treatment was discontinued. On the tenth day, the exhaustion was less; pulse 84. The tonsils were clearing; anorexia and difficulty of swallowing remained; there was a regular return of the menstrual discharge. On the eleventh day there was hoarseness; the respiration was 16, the pulse 80. There was the same appearance of the tonsils; the lymphatic glands were no longer swollen. On the twelfth day, there was hoarseness; respiration painful and stridulous, but not frequent; hoarse cough without expectoration. It was thought that these symptoms might be caused by a tracheal catarrh, occasioned by the fall of the temperature. Notwithstanding the care which was taken to shelter the patient from the influence of the cold, during several nights the thermometer was scarcely elevated more than three degrees above zero in the inside of the ward, while it sunk to more than seven degrees below zero on the outside. On the thirteenth day, in the evening, the voice was more hoarse; the cough was so dry and hoarse as to occasion the fear that the pellicular inflammation, the progress of which had been so long suspended, might have at last extended to the air-passages; the inspirations and expirations were noisy and stridulous; and pain was referred to the region of the larynx. From eleven o'clock at night to four in the morning, the respiration, instead of becoming more frequent, became slower; it sunk from 16 to 14, and then to 12. Every inspiration, as if suspended voluntarily at first, was suddenly hastened and terminated by a kind of explosion. The extreme dryness of the cough induced the belief that an erosion, with intumescence of the mucous membrane of the glottis, rather than a propagation of the diphtheritic inflammation into the larynx, was the cause of the morbid phenomena observed. Far from being accompanied by an abundant and frothy expectoration, the cough excited no expulsion of tracheal or pharyngeal mucus; still every arrangement was made for the performance of tracheotomy without delay, if it should become indispensable to resort to it.

On the fourteenth day, at four o'clock in the morning, the difficulty of respiration increased every moment without becoming more frequent. After a convulsive attack of a less dry cough, a membraniform exudation, an inch wide, and two inches and a half long, was expectorated; its edges were attenuated. Only one of its extremities, which was the thicker, was obliquely torn. It was easy to perceive that this strip of false membrane had lined the trachea, and that it had been separated from a portion which remained fixed in the larynx; it was spotted with blood on one of its surfaces, and was not more than a quarter of a line in its greatest thickness. (Pulse 96.) The dyspnœa increased, and the opening of the trachea could no longer be delayed.

Operation.—The head of the patient, a little inclined backwards, so that the extended neck made a projection, was held by an assistant. A coloured line was traced from the thyroid cartilage to the supra-sternal depression. By pinching up in succession two transverse folds, the skin and subcutaneous cellular tissue were incised in the direction and extent indicated by the line traced beforehand. The aponeurotic sheath which covers the sterno-hyoid muscles was next divided. An arterial branch, two veins and an artery, poured out so much blood, that it was indispensable to stop the hæmorrhage by ligatures. Each vein required two, because the flow of blood took place in a double direction, and because that which proceeded from a kind of reflux, caused by the efforts of respiration, was, perhaps, the most abundant. Below the upper third of this long incision (and the necessity of placing so many ligatures, made us perceive the advantage of having given it such an extent), the trachea was easily laid bare. One of its segments was at first divided with a sharp pointed bistoury, afterwards the incision which divided four other segments was completed by a narrow-bladed and button-headed bistoury. A silver canula, resembling that which has been before described, but of a much stronger construction, was placed in the trachea by means of a pair of forceps with curved blades. The sudden loss of voice caused the patient considerable astonishment mixed with fear. At the same moment, the respiration ceased to be noisy, and its number rose from 12 to 22. During the whole day, it remained noiseless and infrequent.

Some thick, white, and consistent, nasal, concrete membranes were near the orifice of the nostrils, and in raising them lightly with the smooth blades of a pair of forceps, several drops of blood escaped

The previous night, the patient could make the air pass through only a single nostril, and with great difficulty. Three grains of calomel suspended in a little water, and dropped into the trachea, induced coughing and the expulsion of some mucous secretions mixed with blood. The same application was repeated in the evening. In endeavouring to substitute a longer and stronger canula for that which had been introduced at the time of the operation, the cough which was thus excited, caused the expulsion of two layers of false membrane. One, which was thin, came from the portion of the trachea below the artificial opening, and the other, which was thicker, adhered to the portion of false membrane covering the larynx, and could be detached from it only by using considerable force. (Respiration 22. Pulse 80.) There was dejection, with anorexia; the deglutition still remained difficult, and some cups of broth were taken, but only with repugnance, in the space of twenty-four hours. Calomel was instilled during the night.

On the fifteenth day, and the second of the operation, there was œdematous swelling of the cheeks, of the eyelids, and of the supra-hyoid region; the tongue, which was slightly swollen, retained upon its edges the impression of the teeth, and two or three superficial and membranous erosions were remarked at its point. The out-door temperature was seven degrees below zero, and although every precaution had been taken to elevate that of the ward, it was, this morning, scarcely above four. Notwithstanding the appearance of symptoms which announced the near approach of a mercurial affection, the patient was conscious of feeling generally better, and her features were animated by the hope of a speedy cure; she participated in the joy of her relatives, and warmly evinced her gratitude for having been preserved from the danger which she had incurred. She took her broth without reluctance, and swallowed it with less difficulty. The tonsils preserved a dirty aspect, and remained swollen and very near to each other. In the evening, there was prostration; (respiration 24, pulse 84,) want of appetite. An injection of infusion of bark, produced a stool; the matter spit up was serous, and similar to the washings of flesh. On the sixteenth day, and the third after the operation, there had been a stool during the night, and there were two other alvine evacuations of a serous and bloody character; the last was of a vermilion colour, and like blood mixed with water. The eyes were almost closed by the swelling of the eyelids, and the puffiness extended from the sub-mental region to

the front of the chest; the respiration was still noiseless. (Respiration 28. Pulse 88.) This morning the temperature of the ward scarcely rose more than two degrees above zero. To-day, the physiognomy expressed the sadness and the resignation of despair; the mercurial ulcerations of the tongue had not extended; but the mouth was filled continually with bloody saliva; the breath exhaled a gangrenous fetor, and the appearance of the tonsils was still more dirty than on the previous evening. At four o'clock in the afternoon, there was anxiety, with sighing, and very frequent respiration; a great quantity of reddish serosity similar to the washings of flesh flowed out by the commissures of the lips and through the orifice of the canula; the respiration, which had become slower, was gradually accelerated without becoming noisy; puffiness of the face was a little diminished. The patient despaired more and more of her restoration to health; she uncovered herself continually, sought for air, and died without suffering, at six o'clock in the evening.*

Autopsy.—The general tint of the back of the mouth was livid and bloody; some remains of membraniform exudation had contracted the same colour; and the same was the case with a thin fibrinous layer, very adherent to the surface of the tonsils and penetrating into the interior of their folds. The mucous membrane, being cut through its whole thickness, exhibited different shades of slate colour, of redness, and of lividity, successively becoming fainter in proportion to the distance from the surface. The uvula was speckled internally with livid spots, which appeared to me to have less relation to a gangrenous alteration than to the black colour succeeding prolonged inflammations. In some points to which a few remains of false membrane were adherent, the polish of the mucous surface of the pharynx was slightly altered. The epiglottis was tumefied, and was lined, on its two surfaces, with a thick, very adherent exudation; shreds of false membrane still lined the larynx and extended into the trachea as far as on a level with the artificial opening into this tube; their adhesion was not the same in all the extent of the

* The parents of this girl having expressed a desire to perform the last duties to her body, and being anxious to prevent its mutilation, I acceded to their wishes, and began to open the body by removing the vertebral column from the occiput as far as the extremity of the sacrum. The incision, which comprised a part of the ribs, lays open so clearly the buccal cavity, as well as that of the nostrils and all the viscera of the abdomen and thorax, that this mode of exploration appears to me as expeditious and convenient as the greater part of those which are usually resorted to.

surfaces which they covered. In no part was it more marked than in the vicinity of the depression formed by the base of the epiglottis of the horns of the thyroid cartilage.

It cannot be doubted that the pellicular inflammation, in propagating itself into the air-passages, followed this kind of gutter. During the whole time when the epiglottis was not exactly lowered over the aperture in the larynx, it was a passage by which the exudations of the back of the mouth could be transmitted, or which, at least, was not closed against them so exactly as against the liquids which were swallowed. The false membrane which was continued into the treachea up to the level of the incision, became, at that point, free and floating, and it was easy to recognize, by its black colour, the shred which was in contact with the canula, and the extremity of which was several times seized and torn by the dissecting forceps. The mucous membrane, under the exudation, was of a rather deep-violet tint. The thyroid body had been divided as far as the half of its vertical length. The incision into the trachea occupied exactly its median line; it might have been prolonged more than six lines without reaching the right carotid artery. Below the artificial opening the mucous membrane was of a red and bloody tint. Rudiments of false membrane adhered to various points of its surface. Near the division of the bronchial tubes the mucous membrane was covered with a very slender semi-transparent pellicle, terminating suddenly on the right side, but extending on the left (the side on which the patient habitually lay) into one of the bronchial tubes, to the last divisions of which it was prolonged.

Both lungs were perfectly crepitant; only a few ecchymoses were found disseminated throughout the whole thickness of their tissue. These extravasations were no doubt very recent, since they had not at all changed either the force of cohesion, or the organic disposition of the spongy structure of the lungs. Above the middle region of each lung, we began to meet with tuberculous agglomerations, all of which were surrounded with a considerable ecchymosis. These agglomerations were formed by the union of crude, semi-transparent miliary tubercles; the most voluminous of these aggregations scarcely exceeding the size of a nut. Some isolated granulations, perceived beneath the pulmonary pleura, were also surrounded by an ecchymosis. The small, tubercular masses were not more numerous, nor more close together at the apex of the lungs than in their middle portion. The pleuræ were perfectly free from adhesions, and did not at all de-

viate from the healthy state. The spongy pulmonary structure in the vicinity of the tubercles had not lost its permeability. A very different alteration from that which has been just described was observed towards the middle part of the left lung. An abruptly circumscribed œdematous hepatization gave to the free border of the upper lobe the appearance of currant jelly. It was in this same portion of hepatized lung that the ramifications of the bronchial tube were distributed to which diphtheritic inflammation had extended. I have observed in the lungs of dogs, subjected to the experiments of which I have elsewhere given an account, some lesions altogether similar when cantharidic pellicular inflammation had extended into the pulmonary cells.

Abdomen.—The edges of the folds of the mucous membrane of the stomach were ecchymosed. The valvulæ conniventes of the small intestine were also ecchymosed, and the chymous paste which was found in the more depending folds of the intestine had contracted a vinous colour by the mixture with the blood which had transuded. The same alteration was observed in the whole extent of the mucous membrane of the large intestine; it was much more manifest towards the termination of the rectum, where the ecchymoses of the mucous membrane were covered with pseudo-membranous exudations which could be detached by the aid of a spatula. Under this fibrinous, slender, elastic, semi-transparent layer, the villous tissue was not more easily isolated than in the normal state, and after having detached it from the cellular layer, which was very white, I was convinced that it had not acquired any thickness, and that it preserved all its normal force of cohesion.

The blood contained in the cavities of the heart was half dissolved, and there was no portion of fibrine separated from it.

I do not think that the membranous coat which covered the ecchymosed and rather rugous mucous membrane of the rectum was the product of diphtheritic inflammation; it was rather more than probable that the affection of the extremity of the digestive tube as well as that of the mouth, and the ecchymoses of the pulmonary spongy texture were consequences of the mercurial cachexia. Although exudation of blood was followed in this case by the production of a fibrinous pellicle, it is a result analogous to that which I have obtained in the experiments already quoted, and it is an additional fact, which confirms the theory of the formation of false membrane.

Case 45.—L. Dezaunay, aged one year, generally in feeble health. In the night of the 23rd to the 24th of January, 1826, he had a hoarse cough. On the first day, there was want of appetite; the child continued to suck, but refused any other food; two grains of calomel were given at intervals of two hours; the respiration was sibilant. On the second day, the respiration was stridulous and very difficult; the cough was hoarse and became very infrequent, and death followed at ten o'clock in the morning.

At the time of death, the tonsils were neither red nor swollen, and we could not discover any white spots on their surface, nor upon any point of the pharynx. The group of lymphatic glands which were found below the attachment of the sterno-mastoid muscle, were not sensibly swollen. Did the inflammation develop itself in the first instance in the air-tubes?

Autopsy.—An elastic, white, thick, false membrane lined the larynx and the trachea, and extended as far as into the large divisions of the bronchi. It was more adherent in the larynx, and afterwards became floating. The mucous membrane, which it covered, was neither reddened nor thickened in any part of its extent. If we might judge by the degree of adhesion of the false membranes, it was at the position of the ventricles of the larynx, that the diphtheritic affection commenced. The epiglottis, the laryngeal surface of which did not appear at first sight to be covered with any pseudo-membranous layer, was certainly lined with a membraniform semi-transparent pellicle, which was easily detached. The pharynx, examined with the most scrupulous attention, appeared completely exempt from pellicular inflammation; only in one of the crypts of the right tonsil did we discover a portion of concrete matter, which, perhaps, was not the product of the diphtheritic phlegmasia.

The nurse to whom this child had been entrusted, lived near Tours, where for many months, with the exception of the patients admitted to the Hospital, there had not been a single subject attacked with Diphtheritic Angina. It was not probable that there had existed any communication between the inhabitants of Chenusson, and those of the faubourg where this woman lived, and every inquiry on this point appeared to me almost absurd; but on hearing, to my great astonishment, that she was born at Chenusson and was aunt to Cormery (case 43), I confess that I was not able to avoid suspecting that Malignant Angina might have been transmitted to her nursling, either by the communication which she might have pre-

served with her dwelling-place, or by that which she might have had with the patients admitted into the Hospital, or with the relations and neighbours who had accompanied them. She declared, in fact, that the fear of the contagion had hindered her from receiving any one; but in the very terms of her denial, proof was found that she had communication with several of them.

The facts observed in the course of the epidemic of Tours were reproduced during the short duration of that of Chenusson; and in such a circumscribed locality it was still more easy to observe its details and its general character.

The diphtheritic inflammation was usually increased in the pharynx and the air-tubes in an inverse proportion; the more it has extended in the back of the mouth the less has it penetrated into the air-passages; and when at last it has extended to the latter, it was not with the same rapidity nor to the same depth. In the first of these cases which had a fatal termination, the symptoms of Malignant Angina (*pharyngeal Diphthérite*) predominated, and the croupal suffocation was announced by scarcely any precursory sign. Thus the cough, which becomes an indication of so much value, especially when it is short and hoarse, was observed in Rameau only two hours before death (see case 42), and it was nearly the same in the case of Françoise Bodier (see case 44). The symptoms of Croup or Tracheal Diphthérite, on the contrary prevailed in the case of Cormery (see case 43), whose slightly swollen tonsils were scarcely covered with exudations when the cough began to manifest itself. It was easy to recognize in such a diversity of aspects, the source of the distinction which was established between Croup and Malignant Angina.

Lastly, the disease of the little child who died so rapidly of Diphtheritic Tracheal Angina (see case 45), without the pharynx having been affected with pellicular inflammation, really presented all the symptoms of Croup described by the authors of the last century. It is the second time, and in the proportion of one to thirty that I have met, after death, with diphtheritic inflammation limited to the air-tubes.

The more easy it is to discover the relations which the inhabitants of a thinly-peopled hamlet maintain with one another and with strangers, the more do the facts relating to the contagion of an epidemic affection become certain and positive. All those which I have collected, while proving that Diphthérite had not, for fifteen months, passed over the territory of the two small communes of La

Ferrière and Chenusson, still leave us in the obscurity which has always prevailed as to the mode of transmission of this formidable malady. I have several times received on my face and lips diphtheritic concretions discharged to a great distance by the artificial opening of the trachea. I have been struck, in common with a great number of pupils, with the fetid smell exhaled by the breath of some patients. Several attendants at the Hospital had continual communication with them. How did it happen that not one of us was attacked by the disease, when the child who forms the subject of the last case, appears to have contracted it on the occasion of a much less intimate association? How was it that the girl Thérèse was alone affected in a ward where there were several other little girls? All these questions have remained as much in doubt as at the period of my first observations.

In conformity with its usual character, Malignant Angina made at La Ferrière and Chenusson, more victims among children than among adults; still, of thirty-nine individuals carried off in those two communes, there was one woman of forty-three years old, one of thirty, one of twenty-two, and several others who had passed the age of puberty.

The epidemic of Chenusson has but too well demonstrated the tendency of Diphthérite to persevere in its course. It has been seen that the pellicular exudations had arrived, in the larynx of Cormery, at the degree of putrid alteration which they generally exhibit only in the isthmus of the throat. Lastly, it has been seen in the case of Françoise Bodier, that on the thirteenth day of Malignant Angina, the diphtheritic inflammation came, and rapidly propagated itself from the trachea into one of the divisions of the bronchi. No example of spontaneous termination was remarked either at Chenusson or at La Ferrière, and of forty-six patients thirty-nine died.

The superiority of the local treatment over all other kinds of medication was never more positively manifested; and independently of the dangerous consequences of the mercurial treatment, it was but too easy to convince ourselves that it was not by its general effects that it became curative. The action of mercury on the whole constitution was carried to such a point as to liquefy the blood, to produce hæmorrhagic discharges, and to occasion gangrenous ulceration of the surfaces which had been the primitive seat of the disease, without the diphtheritic inflammation having been arrested in its

course. As in my first cases, the most beneficial effects of calomel appeared to be confined to an immediate and local action; so it is more than probable that this action cannot be exerted through the false membrane which covers the affected tissues. We cannot be surprised at this circumstance in the case of a substance so insoluble as the protochloride of mercury. After seven days of treatment and frequent injections, the nasal fossæ of Cormery were still lined throughout all their extent by thick exudations. After a general and local mercurial treatment, still more prolonged, the false membrane reached, in the case of Françoise Bodier, to near the orifice of the nostrils; and on the thirteenth day of the disease, we were unable to attempt its detachment without exciting a flow of blood.

I am induced to believe that even in the cases in which Tracheal Diphthérite has been favourably modified by mercurial treatment, it is by insinuating itself into the air-tube that the protochloride of mercury succeeds in modifying the pellicular inflammation. I suppose that it penetrates there by means of the continuity of the mucous coat of the back of the mouth and of the air-passages; by reaching one portion after another; and by obeying the impulse communicated by each movement of inspiration. We may conceive how small the quantity must be which can be introduced in this manner; and the progress of the diphtheritic inflammation is very rarely suspended in the air-passages if the treatment does not closely follow the attack of the phlegmasia.

The solution of this therapeutic question would be of great interest—for the more it were proved that we ought to depend less on the general than on the local action of calomel, the more proper would it be to prevent the danger of its influence on the constitution by limiting its use to injections into the back of the mouth and the nostrils, and these injections might be allowed to penetrate as little as possible into the digestive canal. We might even direct more of our attention to the promotion, by means of purgatives, of an exhalation which would be opposed to the absorption of the mercurial preparation.

In spite of all these precautions, the consequences of the mercurial treatment become so formidable under the influence of cold, that it would be desirable to modify the diphtheritic inflammation by an agent, the subsequent effects of which would be less dangerous than those of the protochloride. Perhaps alum, so much praised by the ancient physicians, possesses these great advantages. A practitioner,

Doctor Pommier, affirmed some years ago that this salt reduced to powder and insufflated into the back of the mouth, was a specific against Croup, and it is from motives which are far from being based on observation, that his proposition has been contemptuously rejected. Alum applied to the mucous surfaces does not exercise any escharotic action; it has been administered in substance, and in pretty strong doses, by several Danish physicians in dysentery. I have often taken boluses of twelve grains of it with relief of chronic intestinal pains. The elongation and œdematous intumescence of the uvula, which often increases the difficulty of deglutition caused by a phlegmonous tonsillitis, almost instantly give way to a strong inspersion of powdered alum. I have ascertained on myself that the inflammation of the mucous membrane was not at all exasperated by it, and that the deglutition became more easy, and less painful. The relief lasted for several hours, after which we could again resort several times to the same means without producing the least erosion.

The fear of consuming valuable time in useless attempts, has alone prevented me from trying to modify the diphtheritic inflammation of the pharynx by the application of alum. I have said that I had employed it with success in the treatment of diphtheritic stomacace. The extension of this affection being less to be feared than that of diphtheritic inflammation of the pharynx, different methods of treatment may be tried comparatively without much inconvenience, and I should have again tried to ascertain the advantages of this treatment if I had found an occasion for doing so.

I have just seen at last the Scorbutic Gangrene of the gums which I had no longer met with since 1820. A soldier recently come to join his regiment, communicated it to his bedfellow; it may be stated, in addition, that these two men had frequently made use of the same pipe. In both, the pellicular inflammation was limited to the gums of the incisor teeth and occupied only their undulating border. After two applications of alum, the first was completely cured.

The second, a short time after his admission into the Hospital, rubbed his gums three times a-day with a grain of calomel. I was obliged to have recourse to this treatment, because, during the application of a simple emollient gargle, the erosion of the gums first attacked, made too rapid progress to allow the antiphlogistic treatment to be continued without inconvenience. The disease ceased to spread, but the cure being too slow, I had recourse to the alum,

and the success of this treatment was not less rapid than in the preceding case.

When I gave an account of the experiments by which I had ascertained the poisonous action of mercury on dogs, I was induced to believe that it was much less dangerous for man than for these animals; but I can no longer doubt that the difference between the effects which have been observed, depend often upon the difference of the temperature. The damp cold which so powerfully favours the progress of scorbutic cachexia, renders that of the mercurial cachexia so rapid, that it becomes impossible to prevent its fatal consequences. In this case, an accessory condition, namely, the action of surrounding circumstances, has really more influence on the issue of the treatment than the dose, the total quantity, or the nature of the mercurial preparations administered.

I have observed on dogs, which I had compelled to take large doses of calomel, the development of dirty and gangrenous ulcerations which made their appearance sometimes on the surface of the penis, sometimes in the interior of the mouth, and which were excited by the least accidental irritation. I had seen death occur after a prolonged intestinal hæmorrhage, but from these cases I was far from drawing deductions which I could believe strictly applicable to practice. I attributed the greatest part of the effects which I had sought to obtain, to the augmentation of the doses of calomel which, in proportion, had been too strong, and to an irritability peculiar to these animals. We have just seen that a mercurial treatment, pursued with distrust and circumspection, might, on man, produce consequences quite as severe, and still more rapidly fatal. I have been compelled to reveal these sad results; they prove that under the influence of cold, mercurial cachexia may become suddenly fatal. Let me be permitted to add that they present more analogy than might be expected between clinical observations and experiments made upon living animals.

The advantages of tracheotomy were limited to prolonging, for a few days, the lives of Cormery and of Françoise Bodier; however, after these two unfortunate events, it remains still clearly proved, that the artificial opening of the trachea alone offered a chance of cure. I feel that the results obtained up to this time are very unfavourable to this operation, and I do not seek to prejudge its advantages, but the same impartiality obliges me to call the attention of practitioners to the circumstances which opposed the success I had antici-

pated in the two cases just mentioned. One of these circumstances is the more deplorable, as we are less sure of being able to avoid it. The results of the experiments which I have mentioned are reproduced in this unfortunate occurrence. In vain I had guarded against the influence of cold, the whole danger of which I was acquainted with; by a sad fatality, all my efforts to preserve my two patients from it were useless. The external temperature had fallen suddenly to seven degrees below zero, and it was impossible for me to succeed in keeping it at more than two and four degrees above it in the ward where Françoise Bodier lay; the mercurial treatment also produced upon her some effects which became rapidly aggravated.

Louis Bodier had scarcely taken twenty-eight grains of calomel, when, after having remained a long time exposed to the action of cold, he experienced the symptoms of a constitutional affection, which, notwithstanding a temporary amelioration, caused a fatal hæmoptysis. This same influence made itself felt in a manner still more striking on Thérèse, who experienced more early a mercurial salivation after the administration of a few grains of calomel, undoubtedly because, placed near a door, she had suffered more from the inclemency of the season. These fatal effects are the more remarkable, as in 1820 they had not been observed, except in one person placed in analogous circumstances, and as even still more recently, the mercurial treatment had not produced any bad consequences on any of the patients of Chenusson who were under more fortunate conditions.

The mercurial hæmorrhages which young Bodier experienced, almost resembled those which are observed in yellow fever. I had recognized, at the time of the operation, the extent of the diphtheritic affection of the nasal fossæ, and I feared that this extension of the disease would retard the convalescence, but I was secured against the fear of a fatal termination by the slowness of the pulse, and by the calmness of the respiration. It is remarkable that the diphtheritic inflammation extended to the whole of the pituitary membrane in the three patients who died in the Hospital. What would have been the manner of termination of this affection if the two last had survived the operation? This question cannot be resolved except by ulterior observations, and I shall not venture to answer it by conjectures; but what cannot be doubtful is, that the mercurial cachexia, which was so clearly manifested by numerous ecchymoses of the lung, and by intestinal hæmorrhage, was alone the cause of the death of Françoise Bodier.

It is also to the morbid state of the blood that we must refer the livid colour of the surfaces which had been affected with diphtheritic inflammation, as we must also impute to the mercurial diathesis the gangrenous ulcerations observed in the mouth and pharynx of young Cormery, and which resembled exactly those I had developed on dogs subjected to the prolonged action of calomel. We shall be little surprised that on this child the tonsils and the uvula were more seriously affected than the edges of the tongue and the interior of the mouth, if we remember that the mercurial ulcerations developed on the lips of the spaniel, the subject of my last experiment, were cicatrized, while he died from a gangrenous ulceration of the prepuce and penis, an affection caused, as we have seen, by a mechanical irritation of these surfaces.

This occasional cause generally takes such an active part in the production of mercurial chancres, that it deserves to attract the attention of practitioners. I was far from suspecting that it contributed so powerfully to their development, when I was struck by the symmetrical distribution of these ulcerations on the lips of the dogs subjected to my experiments. In fact, it was always opposite to the canine teeth that the upper lip began to be inflamed. We saw successively the appearance of new erosions in every point of the membrane which corresponded to some dental eminence, and sooner or later, according as the projections were more or less marked.

It is the same in man, and I have often assured myself of the fact. The contact of the asperities of two decayed teeth, which, two days before had been the seat of acute pains, caused in Cormery a slight erosion of the edges of the tongue, and this erosion had been rapidly converted into a chancrous ulceration, at the same time that the surfaces which had been affected with diphtheritic inflammation became the seat of much deeper lesions.

At last, at the period when Louis Bodier was affected with mercurial salivation, a superficial excoriation of the internal malleolus of the right foot was converted into a sanious and dirty ulceration.

As long as the pellicular inflammation is not modified, the mercurial treatment cannot be suspended without inconvenience; but the very formidable danger which this treatment involves when we omit the least precaution, especially when the patient is exposed to a low temperature, has made it incumbent on me to insist on the poisonous action of mercury and on its peculiar effects.

FIFTH MEMOIR.

ON THE MEANS OF PREVENTING THE DEVELOPMENT AND PROGRESS OF DIPHTHERIA.*

(*Archives Générales de Médecine, Jan. and Sep.* 1855.)

To Drs. Blache and P. Guersant.

My dear friends,—Before the misfortune which has just fallen upon you, and since Diphtheria has shown itself in a more and more endemic form in Paris, several examples have occurred of those sudden cases of toxæmia which destroy life without closure of the larynx.

Thirty years ago, Angina Maligna, imported into Tours by the military legion of La Vendée, carried off, in a few months, sixty persons of all ages, but especially children. Impressed by the increasing interest inspired by such calamities and also by the desire of arriving at a positive knowledge of truths which I had only glanced at, and led by a curiosity which never rested, I applied myself to the study of everything which had reference to the reappearances of this terrible scourge from the most remote ages; and for this purpose I examined all the periodical French and English publications, and all the old books which I bought or borrowed, or obtained at the libraries. I do not recollect having ever met with an example of such terrible visitations of toxæmia, nor have I observed any in the localities to which the epidemic of Tours has so widely extended. But it must be admitted that original works did not abound in my ample collection of old books; for investigations, inspired by the love of science, are little suited to the taste of bibliographers, to whom the probable is more pleasing than the true.

From this lengthened inquiry, it nevertheless resulted that at each period of its return, the Egyptian disease (*malum Ægyptiacum*) had

* M. Bretonneau here changes the word Diphthérite into Diphthérie.—Ed.

struck with terror the physicians and the populations among whom it raged, destroying those who were attacked by it, until the treatment proposed by Aretæus, which was always forgotten, was at last more or less successively adopted.

A picture resembling these fearful invasions may have probably been drawn by some witness of the terrible epidemics of the sixteenth century which burst from Spain and Sicily over the whole world, and subsequently came to America, where Washington died of Croup.

The work of an observer undoubtedly lies forgotten in a corner. Attention has no echo except for those who are attentive; and where are they? Certainly not among ourselves, especially at the periods when fatal maladies are devastating populous cities.

In finding you and yours, my dear Blache, exposed to the dangers of treacherous epidemics, which are generally denied or ill-understood, I feel that it is necessary to speak to you of the precautions, the efficacy of which I have ascertained. I do not wish to force my convictions upon you, but I must endeavour to make you share them. Unfortunately, in this case as in others, our presumptuous age advances in opposition to truth by repelling any belief in contagions with all the means in its power.

As I am obliged to proceed by induction, and consequently to rely upon facts which are more studied than those of the contagion of Diphtheria, I allude first to the contagion of smallpox.

Inoculation, imported from the East towards the middle of the last century, was soon practised in several states of Europe, and especially in England, where this proceeding became the forerunner of the discovery of Jenner. It was soon fashionable, and being on its pedestal, attracted attention. Different methods of transmission were then vaunted, studied, compared, adopted and rejected, and truth, which was seldom consulted, was neglected as a guide.

The important conditions of the mode of transmission were generally so ill understood that many inoculations were practised from one arm to another, at the bed of smallpox patients, by some inoculators, while others crushed the variolous crusts, and used them for powdering slices of bread and butter, to be eaten by children who were suitably prepared for the transmission of the disease.

At this period, the existence of spontaneous variola was much believed, and this belief is not yet sufficiently abolished. The development of a germ formed from birth was admitted. (This germ takes a long time for its development.) Physicians also believed in a ne-

cessary despumation which it was sufficient to bring into existence in time, and to guide to beneficial results. They accepted the ingenious opinion of the worthy precursor of MM. Carnot and Bayard, namely the Arabian physician, Rhazes, who imagined that the child, being nourished on the menstrual blood, required this purification.

Lastly, in the present day, after the learned disputes of the Val-de-Grâce, and the insane views of the Académies on contagions, the occasion being that of the plague, the transmissibility of smallpox is but little contested. It is, in fact, transmitted, and like many other epidemic diseases, it is developed only by transmission, whether it remains sporadic or becomes epidemic; and such is its power of transmission, that it attacks passers-by at pistol-shot distance. This fact, since the *provisional* adoption of vaccination has interrupted the free course of variolous epidemics, has been several times as positively ascertained as it could have been by the most rigorous experiments; for it is easy to know that on such a day, when passing at a known distance, near an isolated focus of contagion, variola has been contracted, and that it has been developed on such another day after the usual period of incubation. Everyone may ascertain this fact by paying attention.

But the contagious power of the *ens variolarum* is not thus limited. It may and does attack the fœtus in the uterus of a woman who has not smallpox, and who, during her pregnancy, has attended smallpox patients, without herself contracting the disease. How has this transmission been accomplished? The more deeply we investigate the conditions of such a contagion, the less are we able to comprehend its possibility. The contagious principle, dissolved in the air, and attenuated by this dissolution, must have traversed the different layers of several tissues, and in this passage must have undergone the powerful action of intestinal digestion and the action of hæmatosis in the respiratory apparatus. Nothing arrests it course or subdues it; but it arrives at its destination. Although the circulation of the fœtus is distinct from that of the mother, and being merely the outline of a mammal, it does not breathe, and as yet possesses only the life of a fish, yet the variolous contagion reaches it and penetrates it when bathed in the waters of the amnion.

Two cases of variola supervening in the fœtus, without the mother being attacked by the disease, have been already ascertained and carefully noted by Mead; three more have been described by the Committee on Vaccination of Paris; a sixth was observed at Tours

in 1827. A poor woman, under the above-mentioned circumstances, was confined of a child at the usual period; this child's body and face were sprinkled with variolous pustules of the fourth day of the eruption; the development continued under my inspection, and was regularly accomplished. I attentively examined these pustules, and notwithstanding the previous immersion of the skin (in the liquor amnii, Ed.), they presented all the characters of cutaneous variola, for they were prominent, rounded, and not level like those which are developed on the surface of mucous membranes. The subject of this case is now in the army.

In order to arrive at the contagion of Diphtheria, I have taken rather a circuitous course; but the facts of the old Egyptian contagion are so strange, that, to make them credible, it was, perhaps, necessary to have under our eyes some ascertained examples of the prodigies caused by another contagion.

It is unnecessary to repeat that atmospheric air is the vehicle of the variolous virus, and that this virus is volatile; but it has another more material method of transmission in the dust of dried variolous pustules, the contagious property of which is so long preserved. Tissot, in successfully inoculating smallpox, was able to make use of a sewing-thread, which he had impregnated with variolous pus, by passing it across a pustule, and which he had deposited in a book where he had carefully kept it for thirty months. The collections of variolous pus made by inoculators, have furnished innumerable examples of the tenacity of the contagious property possessed by preserved variolous matter. I insist on this point because it is to this second process of transmission of variola that we must refer the mode of transference in Diphtheria, for undoubtedly the air is not the vehicle in the latter case. Innumerable facts have proved that those who attend patients cannot contract Diphtheria, unless the diphtheritic secretion, in the liquid or pulverulent state, is placed in contact with a soft or softened mucous membrane, or with the skin, on a point denuded of epidermis, and this application must be immediate. In a word, a true inoculation is the only mode of transmission of the Egyptian disease.

Since 1818, the facts supplied by the epidemics of Diphtheria which have broken out in the department of Indre-et-Loire, or which have extended to the surrounding departments, prove, in the most evident manner, that the atmosphere cannot transmit the contagion of Diphtheria. The most unexceptionable and most clearly significant

facts have been collected by attentive observers assiduously devoted to the practice of their profession in very small localities, observing and noting carefully every peculiarity exhibited by their cases, the day and hour of the importation of the disease, its seat, its migration from one family to another, the conditions of this migration, its transmission to hamlets and different communes, together with a notice of the distances, and the periods of the year when they occurred. On these subjects I have received much valuable information from Dr. Henri Brault, of Beaumont-la-Ronce. I might admit that such precise information might cause some doubt if it had been furnished only by a single locality, or by the same observer, but for thirty-five years, in a great number of places, the same observations have been reproduced, and they are always the same, and identical with those of past ages.

Being transmitted only by inoculation, the diphtheric virus is propagated by peculiar means which it is important to understand, and if we trace these means carefully we shall find that they are still more astonishing than the modes by which smallpox is transmitted. It is true that Diphtheria possesses a method of transmission which is common to it and syphilis, and moreover, it is true that the relations of the Syriac and the Neapolitan diseases are so intimate, that in a nosological classification, these two diseases would be allied together. Although Aretæus was not able to connect the Egyptian disease with another malady which was unknown in his time, yet in the sixteenth century, the remarkable analogy of the Syriac and Neapolitan diseases did not escape Alayma, a physician of Palermo, who expresses his opinion very explicitly on this point:—"Ita dum Egyptiaca ulcera dicimus varios modos quibus hic morbus humanum genus insultat, unico verbo explicamus," preferring, he says, the name of *Egyptian ulcer*, because it is applied to all the forms of the disease, as the denomination *French disease* suffices to designate the various forms of syphilis.

A motive similar to that of Alayma has induced me to propose a denomination which may be applicable to the variable effects of the Diphtheric or Egyptian contagion, and perhaps I should have done more wisely in preserving this ancient name; but I have yielded to the desire of obtaining by a specific name the distinction of a specific phlegmasia, which it is important not to confound with other affections presenting only some general points of resemblance to it. The application of this name, made erroneously every day,

proves to me that I was in the wrong. The resemblance of Diphtheria to Syphilis has caused serious mistakes; and at the time of the epidemics of Sologne, Trousseau and Ramon collected some cases of vulvar and cutaneous Diphtheria, which became rapidly fatal by toxæmia.

I should add that great importance remained attached to the epithet *Egyptian,* which, undoubtedly, was already a very old one; it designated to the Greeks the region from which the disease was imported to them; these country names, like that of *Asiatic Cholera, Egyptian Ophthalmia, Oriental Plague, French or Neapolitan Disease,* indicate that the disease, being unknown in the region where it appeared, is an exotic production. I cannot too often repeat that it is imported by an infected person or by articles impregnated by the contagious principle. Such is emphatically the truth with regard to contagion which alone has transmitted and still transmits the Egyptian disease, for it is abundantly demonstrated that temperature, season, climate, and soil, exercise only a secondary influence and not a creative power over the mysterious effects produced by the agents of contagion.

It is vain to deny that contagion, if not the source of endemics, is the source of most epidemics; and through it we must endeavour to exterminate the scourges which strike down the human race in various degrees, in its different races, whether white, red, or black-skinned, and not only the human race, but also a multitude of animal and vegetable species united together.

It was at the time when the Greek word λοιμος signified *plague, contagion, contagious object,* that Diphtheria, imported into Greece by a numerous succession of Egyptian colonies, received there the name of *Egyptian disease,* at a time more near to that of Homer than of Hippocrates, and you will observe that at this same period arose the denomination of *Egyptian ointment,* a solution of verdigris in honey (*mel cupratum*) and this is an eminently anti-diphtheric preparation which bears the same name in the present day in our *Pharmaceutical Codex.*

You see, my dear friends, the extent to which the medical art is yet in its swaddling-clothes. You observe that from time immemorial it has been provided with a valuable remedy for a fatal disease, but in vain! for when and how has the Egyptian ointment been opposed to the progress of the Egyptian disease? The name of the medicine remains, but its use has disappeared.*

* The powerful anti-diphtheric power of the salts of copper was dis-

Ten centuries later, a richer gift was bequeathed to us by a Greek physician, the great Aretæus. At this remote period from Hippocrates, he was the most accomplished of his disciples and the contemporary of Galen; and more than the latter was he the true successor of the divine old man (Hippocrates). Aretæus's work, mutilated by time, is still a faithful exponent of our diseases. One of his magnificent pages contains an admirably finished picture of the Egyptian disease, while another page presents us with a choice of curative medicines, and of sagacious precepts on the art of using them. Until the invention of printing, the precious manuscript remained in the hands of Greek scholars, but long before the epidemics of the seventeenth century, several translations of Aretæus had been published. I here repeat, to what purpose? for when have physicians had recourse to his admirable sanitary precepts?

I now come to modern times (1809-1815). About this period, Queen Hortense was for several months affected with Gingival Diphtheria, without any curative means having been employed against the disease; and then her first-born child died of laryngeal Diphtheria. At the period of the second invasion of Paris, her mother, the Empress Josephine, who had been for a few days suffering from Pharyngeal Diphtheric Angina, died in a fit of croupal suffocation, without any attempt at an efficacious method of treatment having been made to arrest the progress of her disease.*

You have not forgotten the celebrated *Concours*, ordered by the Emperor at the death of the young prince, his nephew, nor the division of the great prize between Jurine of Geneva, and Albers of Bremen, authors of Memoirs in which they both declare that Angina Maligna is a distinct and opposite disease from Croup. No matter.

Such is the progress of scientific doctrines; but at the time when

covered, by mistake, thirty years ago at Moscow. Gingival Diphtheria was raging at the Children's Hospital, where many patients had been attacked and several had died. The progress of the disease was scarcely retarded by a timid mode of treatment, when a concentrated solution of a salt of copper was entrusted to a servant, who was to take care that it was diluted with an ample proportion of water before being distributed to the nurses in each department. From forgetfulness, the solution was employed pure, and the disease yielded so rapidly to the energetic treatment that it disappeared from the establishment.

* I have heard from one who was present at her last moments, that in the state of agitation so well described by Aretæus, not being able to remain either sitting or standing, and being unable to speak, the Empress Josephine made a sign for a pen when she was dying of croupal suffocation.

the Empress was seized with Diphtheria proceeding, I am convinced, like the Croup of her grandchild, from the Gingival Diphtheria of Queen Hortense, she was surrounded with attention. A highly endowed physician, who had attained the apogee of his scientific talent, the great Corvisart was in attendance, together with many other eminent men of our profession, the chiefs of the medical service of the armies assembled in the capital.

Proceeding according to evidence in explaining the different modes of inoculating Diphtheria, I shall show some examples:—

We sometimes meet accidentally with a case of inoculation where the mode of transmission is so evident that this kind of inoculation of diphtheria is seen to be effected in the same manner as is done with a lancet in the case of syphilis or smallpox. I shall quote for you some authentic examples of the kind, and according to the narration of M. Herpin, surgeon of the Hospital at Tours, I shall show you how he contracted nasal Diphtheria;* I give the case in his own words:—

* In Paris, the influenza, which, at its last visitation, seriously affected the nostrils, predisposed the nasal mucous membranes to the inoculation of Diphtheria. The pituitary membrane, being thickened and eroded by a serous discharge and frequent sneezing, was often prepared to retain the least atom of diphtheric dust (received in the channel of a meatus), in the antrum of Highmore. In no other part is its action better protected, and although it cannot bore an aperture, (as it can in the spongy tissue) upon the delicate and transparent membrane lining the antrum, yet it gives origin to a wide-spread diphtheric excoriation, indolent at the beginning, but becoming the abundant source of an epispastic liquid flowing down from this position, without having its activity attenuated by either drink or food, as happens in the back of the mouth; the attack may then break out suddenly. On one occasion, the curious spectacle of the diphtheric affection of this great cavity, called the antrum of Highmore, presented itself at the Hospital at Tours. A poor Jew came there every morning for a gargle which had been prescribed for him, as it was said, for a Syphilitic Angina. I was requested by the pupils to examine this poor man's throat, when the error of diagnosis became manifest, as he was suffering from Diphtheric Angina, extending beyond the reach of sight. He was soon admitted, and treated, and I desired that at the first fit of coughing, I should be apprised of it, as tracheotomy seemed to me inevitable. The next morning at the ordinary visiting hour, which was five o'clock, there was suffocating dyspnœa which had not been preceded by any attack of coughing. The period of cough was passed, and I learned from the patient that he had coughed considerably for two days. Everything was quickly prepared for the operation; I ran to the town and came back with the necessary instruments, but the occasion was passed, and life was extinct. My

"In the Spring of 1843, I was inoculated with Diphtheria from a child who had come from Epinal. In passing through Paris, he had advice for an abscess, and he had soon afterwards been sent to Tours, where he went to the house of an uncle in order to be treated there for a sore-throat from which he had been suffering on his arrival in Paris. From all the characteristic signs, I recognized Pharyngeal Diphtheric Angina, which had become croupal. It yielded to energetic cauterizations with solution of nitrate of silver, frequently repeated for six days. A nurse who took care of the child was attacked with Pharyngeal Diphtheria, which soon yielded to local treatment. The child, being intractable, coughed and violently threw out the sputa. The orifice of my left nostril once received some of this excretion, but from being obliged to continue the cauterization, I had no time either to wash or to wipe the part.

"A few days afterwards, there was snuffling on the left side, and nasal voice, then suddenly painful Pharyngeal Angina, sleeplessness at night, extreme uneasiness, weakness, coldness, and pain.

"In the morning, both tonsils and the uvula were completely enveloped in a white incrustation (twenty-six cauterizations). Three times a thimble (*dé*) of false membranes which enveloped the uvula was detached and reproduced. (Simple inhalation of alum taken like snuff, moderate diet;) deglutition difficult; sputa abundant and fetid; stools loaded with false membranes. Incomplete recovery; paleness; a fortnight later there was pain in the wrists; confusion of sight; constriction of the throat; paralysis of the palatine vault, which had become completely insensible; regurgitation of food by the nostrils. Rather later, there was a sensation of tingling in the great toes, ascending as far as the knees.

"I walked with difficulty and very slowly, and my weakness was

only satisfaction was that a useless operation had not been performed. A bronchial tree, with two large branches, boughs, and twigs, exactly moulded upon the respiratory canals, was extracted entire from the air-tubes. I found the maxillary sinuses lined with diphtheric exudations, filled with serous fluid and with an opaline liquid. Bands of false membrane floated in this fluid as in a pleuritic effusion. What waves of epispastic serosity must have flowed, at every lateral inclination of the head, into the pharyngeal funnel, and by the arytenoid channels, must have insinuated themselves into the trachea; and how extensive were the effects of its action! The width of the air-passage gave free admission to the air, and asphyxia was produced only by the obliteration of the last bronchial ramifications.

especially painful when I went up stairs, and this state continued without improvement for six weeks. The same tingling had reached my hands and fingers, and I had completely lost all tactile power. On the 10th of August, I took sea-baths, and at the second bath, I was entirely cured of all my complaints."

I shall here add some information for which I am indebted to M. Herpin. During and after the energetic treatment of the pharyngeal Diphtheria, that of the nasal Diphtheria had but little attracted his attention, and for this original affection, the medication was reduced to a few inhalations of powdered alum taken like snuff.

The lesion of motility, the alteration in the condition of the blood and the innervation, and the prolonged weakness, are the too frequent consequences of nasal Diphtheria which has passed into the chronic state. In such a case, as after Gingival Diphtheria, diphtheric tonsillar chancre, and prolonged primary syphilitic affections, the activity of expansion is followed by an almost inverse disposition, until the activity, already much diminished, terminates almost by being extinguished, when the phase of localized primitive Diphtheria has been succeeded by that of the secondary or constitutional affection.

I have had too many occasions to observe nasal Diphtheria passing into the chronic state, and to meet it by efficacious treatment, to induce me to entertain any doubt as to the truth of these clinical observations.

The following case of nasal Diphtheria with fetor of the breath, observed in a young girl, fourteen years old, deserves to be studied.

The nasal Diphtheria having become pharyngeal, arrested in its course by nasal injections of solution of nitrate of silver, and by pharyngeal cauterizations, was prevented from penetrating into the larynx, but the dread of every kind of solid or liquid food, paleness, coldness, and prostration of strength, were making the most fearful progress. By great persuasion, I succeeded in causing a little sugared wine to be swallowed at ten o'clock at night, and at midnight an egg and some more teaspoonfuls of sugared wine were taken. The next day, everything that could be imagined was offered to tempt her appetite, and small and scarce articles of food were accepted; but, from the second day, the food did not excite the same repugnance, and the nasal source of the infection being quickly dried up by nasal injections, this last phase of the disease yielded to restorative diet and suitable medicine.

To seize upon the opportunity of introducing food at the period when loathing is about to become insuperable, is to cast the anchor of safety and to resort to the most efficient of all treatment.

You understand that there is no longer any question of contagion or inoculation, but of imminent danger of sinking. You know that *efficacious* treatment alone will ward off the danger, and in order to allow us to have recourse to it, life must not be too much depressed, nor all the doors left open, by inanition, to a fatal toxæmia. Give in small injections, everything which, being nutritive, is yet refused with great repugnance, but do not cease to offer and to insist on the acceptance of everything nutritious, such as white of eggs lightly boiled, yolks of eggs mixed with Spanish wine, or milk, wine with or without sugar, coffee;—in fact, everything that can be imagined or suggested either by the fancy of the patient, or by the sagacity of the attendants.

A short time after the inoculation of the nasal Diphtheria under which Dr. Herpin nearly sunk, my friend Dr. Gendron, of Château-du-Loir, being obliged to perform tracheotomy, received on his lips, at the moment of opening the air-tube, a shower of tracheal exudations thrown out by the efforts of a convulsive fit of coughing. Pharyngeal Diphtheria was the immediate consequence of this accident. Originating in one tonsil, the special phlegmasia so rapidly reached the larynx that I was obliged to have recourse to energetic treatment. The cure was rapid and complete, and none of the symptoms of constitutional Diphtheria were developed.

In 1826, being summoned to the *Ecole Militaire* by an invitation from the Minister of War, on the occasion of an epidemic of Malignant Angina, I there collected some cases of great interest, and especially an instance of contagion of such a marked character, as to leave indelible traces on my memory. It was a striking example of the inoculation of the Egyptian disease in the moist way. From the establishment of the school, which dates from the commencement of this century, the physician and surgeon attached to the institution had neither of them observed a single case of Malignant Angina, but the death of four pupils and of the sister of charity who had nursed them, all five being carried off by Malignant Angina, had excited alarm and powerfully attracted attention.

My *Treatise on Diphthérite* had just appeared, and the treatment of Aretæus was explained in it with the additions rendered necessary by the progress of chemistry. At this period, as well as at the most distant times, it was attended with the best results. The throats of

the inmates were examined every day. Sixty pupils were found to be attacked, at a more or less advanced stage of Malignant Angina; but all were immediately treated and cured.

At the period when those whose cases had been mistaken, were dying of the disease, one of their comrades, who was kept in the Infirmary for excoriated chilblains, wetted one of his feet in a little pool of sputa which moistened the brick flooring at the bedside of one of the patients. An excessively painful ulceration was the consequence of the contact; it was established between the toes and was covered with a false membrane, and the Egyptian disease, thus inoculated, yielded only to the employment of a solution of nitrate of silver, and afterwards to the soothing and cicatrizing action of calomel.

A similar transmission of Diphtheria was observed at the same period by MM. Trousseau, Ramon, and Leblanc.

During the course of their mission in Sologne, which was prolonged in that unfortunate district, they saw a woman who, in suckling her child affected with buccal Diphtheria, had contracted Diphtheria of the nipple. The disease had extended to the breast, with a production of false membrane and excessively painful swelling.

The cases collected in the departments of Vienne, Deux-Sèvres, and Loiret, abound in instances of the transmission of Diphtheria observed in all its forms. On this point, my dear Blache, I ought to abstain from reminding you of the conditions of the sad event which has befallen you. The principal features of the publications emanating from the medical societies of these departments will find a place in a forthcoming edition of my *Treatise on Diphtheria*.

In restricting myself to the exigencies of the present work, I must insist on some facts which are little known or generally ill-interpreted. In order to understand properly the mode of action of the Egyptian and the syphilitic virus, we must examine them both; the only method by which we shall discover the resemblances connecting them together is to establish the distinctions by which they are separated.

In the first part of this Memoir, I have stated that the Egyptian disease is not communicated by volatile invisible emanations, susceptible of being dissolved in the air, and of acting at a great distance from their point of origin. It no more possesses this property than the syphilitic disease. If the liquid which issues from an Egyptian chancre as visibly as that which proceeds from a venereal chancre has seemed, in some circumstances, to act like some volatile forms

of virus, the mistake has arisen from its not having been studied with sufficient attention; the appearance has been taken for the reality.

It must not be forgotten that smallpox, besides its volatile virus, possesses also one which is inherent in the visible variolous crusts of every pustule of variola, and in the pus which the inoculator allows to dry on the point of a needle or of a lancet, or preserves in a sewing-thread which he keeps impregnated. There preserved and incorporated, it may be transmitted by inoculation to-day, to-morrow, or in several years; it may be sent to China, and if well wrapped up, may go round the globe without losing its reproductive power and without becoming inefficient.

The same is the case with the Egyptian virus, which, for many ages has been reproduced at so many periods and at such long intervals, and has always been the same. We follow the progress and the phases of its operations. We see the Egyptian sanies act like an oily solution of cantharidine; it raises the epithelium and the epidermis, extends the area of its attacks and covers it with a false membrane which is seen to thicken in proportion as it is produced; with this difference, that it acts less powerfully and expeditiously than the oil of cantharides. But the diphtheritic virus is an epispastic agent which, acting through the epithelial coats of our inner or outer integuments, takes much less time to produce the same effect.

At the period when the Egyptian disease attacks the point of insertion of an incisor tooth, some time is required for the epithelium to be raised and detached by the epispastic sanies, which, from the chancrous point, runs off and moistens the corresponding part of the lip, raising and detaching its epithelium, which is soon replaced by a false membrane; while in spreading with the pulp of the finger (which is unaffected), a little drop of oil of cantharides on a dog's tongue, previously wiped, over an extent corresponding to the size of a two-franc piece, we find the epithelium detached in less than five minutes. Then to the papillary appearance succeeds the smooth aspect of a surface which secretes only serosity instead of mucus, and also becomes less soft to the touch. In a moment the rosy tint of the denuded space is covered over with a white, opaque false membrane, which is seen to thicken in a short time.

I cannot resist the opportunity of quoting an instance of this kind, which I have seen over and over again with the same degree of astonishment.

A ball of the ethereal extract of the powder of cantharides, having scarcely the volume of a hemp-seed, dissolved in a small spoonful of olive oil, was administered to a goat. There was fatal poisoning and the body was examined. There was no traces of the coriaceous epithelium which covers the tongue, the œsophagus, and the first stomach; but the enormous concrete exudation which occupied its place exhibited the most exact model of the surfaces from which the exudation was being detached in prodigious quantity.

After having pointed out this similarity of epispastic action existing between two agents of such different origin, why should not something be said of the similarity exhibited by death from Egyptian poisoning and that from the poison of cantharides?

In both cases, there was the same coldness, yielding to no process of warming, even in the midst of summer; the same absolute adynamia, which cannot be compared to any other adynamia, or rather it is a complete extinction of muscular power; no other movements remain except those of the heart or of the respiration, and even these movements are so slow that the pulse falls to 50, 30, 20, 5 pulsations in the minute, then to only 1 in two minutes; there is a corresponding decrease in the expiratory movements, and at last extinction of life, with this remarkable difference that the death caused by the Egyptian poison is *real*. There is a circumstance which can only be observed in man, namely, that while in children and adults there is a constant exaltation of the affective sentiments and of the intellectual faculties, the same exaltation of the powers is observed even in very young subjects. But here the similarity ceases. There is another difference peculiar to death caused by the poison of cantharides, and experiments often repeated on young dogs, made with the same or with different objects have given very strange results in this respect.

After the poison of cantharides, death is only apparent before becoming real. We have twice and even thrice seen this fictitious death repeated; on those occasions this apparent death so closely resembled real death, that the instinct of the great blue-fly was deceived by it. A swarm of these flies which deposit their larvæ on meat when it is beginning to turn, covered the commissures of the eyelids, the lips, and the apertures of the nostrils, with a thick and rounded layer of these heaped-up larvæ.

Each of these successive fits of lethargy was generally prolonged more than twenty minutes, without our being able to perceive any indication of life, or to excite even a dubious movement of the heart

during the continuance of this apparent death, when to our great astonishment we saw a kind of resurrection, at first slow, then rapid, so that the animals became able to stand and walk; subsequently there was a more prolonged relapse, and finally, complete extinction of life.

One of the young dogs, whose toxæmia in the morning had been less deep and prolonged, began to eat in the evening and appeared to be advancing towards a complete revival; but although drinking milk and being kept warm during the night, he had ceased to live by the next day. This circumstance occurred in the presence of a dozen pupils in the year 1825.

This is a digression which has slipped out of its place, but the speciality of contagious diseases and that of their treatment belong to the great medical truths revealed by clinical observations, against which no prejudice can avail anything. Still the medical journals resounded with strange and deplorable objections offered by physicians. Truth, even if it is not listened to, ought at least to endeavour to make itself heard. I therefore repeat that a special germ peculiar to each contagion, gives origin to every contagious disease. Epidemic visitations are engendered and disseminated only by their reproductive germs, as all languages have declared from the remotest time.

At the most distant periods, the transmission of epidemic diseases attracted the attention of the precursors and the successors of Hippocrates; the word *contagion* indicates that the transference of epidemic diseases is effected and accomplished directly by the contact of the patient, and indirectly by the contact of contaminated articles; then the *prevailing* disease is imported, exported, and transferred by a person who is attacked by it. Although in a populous city the importation is not even suspected and we may seek in vain for the source and traces of contagion, yet, without examining, we find in a small village, whether we wish it or not, the person who imports it, as well as him who receives it and him who exports it. Although this is sometimes insufficient evidence, even in a village, after fallacious explanations, yet by dint of seeing the prevailing disease extended from one subject to another during the course of different seasons, and its transmission accomplished, physicians and rustics are compelled to agree that the disease is gaining ground.

The fact is too transparent and too palpable not to attract the

attention of those who are obliged to contend against contagious diseases; thus it has been repeatedly observed and published; but fatal errors have always crept in to obscure and eclipse it, or what is worse, to misrepresent it. In the interest of the medical art, it is better that a prominent fact should be forgotten than perverted. When contagion becomes too evident to be denied, it is admitted; the self-sufficient theoretical infallibility then comes to terms and offers to make the most fatal concessions. It then says:—"A disease which was not contagious, may become so under such and such conditions," and a thousand dangerous fallacies are substituted for the protecting truth which arrests epidemic scourges and prevents their extension.

The blind multitude, who are ignorant of everything and who doubt nothing, when meeting with the mysteries of life, of which they do not understand the secrets, hasten to impute every epidemic to innumerable chimerical possible or impossible causes.

Impossibility is the dream and the predilection of the profane vulgar; thus at several periods the people exterminated the Jews, who invented the plague, and in our own days, they have attacked or murdered those who took upon themselves the duty of throwing into the rivers and wells the poison which propagates cholera. Can the inclination of the vulgar of the nineteenth century for the incredible, be possibly denied in the presence of homœopathy, magnetism, and table-turning?

It is painful to observe medical men travelling and meeting together on this road, some of them being in high situations, and engaged in teaching the healing art, outbidding one another upon the perverse decisions of the common people, so difficult is it to understand a special cause of disease and the speciality of its action! And yet this speciality is not limited to the effects of invisible, imponderable causes, which are only revealed by varied symptoms peculiar to each. There is no caustic, or poisonous puncture, or local irritant which does not leave its traces after the accomplishment of its object.

Without passing beyond the category of these powerful caustics, these anhydrous acids, observe the constant diversity of their action; that of sulphuric acid is limited to a narrow and almost indolent perforation; that of nitric acid produces an extensive, burning, erysipelatous inflammation; and hydrofluoric acid, dreadful and very painful corrosion. Each of the well-known agents operates in its own peculiar manner, without much regard for individual conditions.

In the great number of species of the genera melöe, mylabris, cerocoma, &c., which compose the numerous family of the cantharidiæ, we have seen that a physiological blistering secretion transudes from the articulations of these insects as soon as they are touched, and that a contagious disease gives to several of our tissues the power of generating a morbid blistering secretion. What an astonishing resemblance in effect between two products so dissimilar in origin! Both of these secretions are blistering, both cause death in the same manner, in the manner as you know most opposite to all the known methods of dying.

If arguments were drawn against the speciality of the Egyptian disease, from the similitude of the blistering and poisonous action of the oil of cantharides and of the Egyptian sanies, a great error would be committed, for, notwithstanding their apparent identity, there is a marked difference in the operation of these two agents.

Cantharidic Croup, developed by the injection of a small quantity of oil of cantharides into the trachea of a dog or a goat, produces the symptoms of Egyptian Croup; but this cantharidic Croup is far from extending or becoming aggravated. As soon as the expulsion of the false membranes is effected, the animal begins to recover, and after this expulsion, I have tried in vain to prolong and aggravate the disease by repeated cantharidic injections, for the mucous membrane resisted more and more the vesicant action of the epispastic oil, and was seen exposed on the surface of the dog's tongue when wiped, as I have before stated. In the same manner the effects of croton oil when reapplied several times to the same region of the skin, have been seen to cease to be reproduced.

Thus we have learned from Rasori that large doses of tartarized antimony gradually increased, no longer excite vomiting, and we have admired the wonderful consequences of this temerity. It has just been ascertained that from the most formidable of poisons, namely, arsenic, taken in poisonous doses, poison-eaters derive beauty, health, and strength; and moreover that a courier and his horse kept upon the same regimen, acquire the useful faculty of running quickly* and for a long time on steep roads without losing breath.

Opium, in a dose which would destroy a person unaccustomed to its use, becomes in Turkey an inexhaustible source of gaiety, comfort, and warlike valour. The charm of poisoning produced by opium

* M. Bretonneau is here in error, as all the stories about the beneficial effects of arsenic-eating have been proved to be fabulous.—(EDITOR.)

when smoked should not be forgotten; has it not lately worked an immense revolution in China?

As to our tobacco-smokers, we meet them so often enraptured in their ineffable intoxication, that we are no longer astonished at seeing them swallow down at full breath the vapours of nicotine, and thus braving a poisoning worse than that of Circe. Besides, in order to obtain the pleasure of a poisoning which does not kill, there is not a small community on the surface of the globe which has not recourse to accustomed habits; so that a few years have been sufficient to allow alcoholic intoxication, assisted by variola (which is also only subdued by habit), to extinguish almost completely indigenous races of the two Americas.

Then what is this undeniable fact of habit converted into tolerance? This immeasurable faculty belongs to man, it is born and developed with him, and does not confine itself to withdrawing him from the effects of poisons; it is in man the progressive means of arriving at everything, which, if presented all at once, could be neither supported nor obtained. The prerogative of habit confers a high authority on man; habit has endowed him with the means and the power of conquering himself, and of subjecting a multitude of living beings to his control, from the wild beast which he renders docile, affectionate, and grateful, to the spider of the prisoner.

Ah! if habit were not abused, what immense benefits it might confer on man! Let us turn away our eyes from mad, infamous, and strange habits, and look only at the blessings which habit has lavishly bestowed on the lord of the creation; first it makes him the workman of every art, the possessor of vegetables and domestic animals, then it brings to perfection, from age to age, the innumerable races which God permits man to create. At his command, custom and habit prepare for him birds, and dogs for hunting, and a race of animals for every kind of game; they harness for him packs of animals for his sledges, prepare for him learned dogs, speaking birds, dancing and ploughing horses; they give to the blind man a dog to lead him, and from a dog they make for man a friend, who dies of sorrow and despair at the tomb of his master.

The beneficent effects of this magic power are not limited to these results. It is upon habit and custom that the most laborious, elevated, honourable, and most justly rewarded of human faculties rests, namely, attention. The fine arts are due to this power; the medical art is its work, as Corvisart acknowledges in a beautiful page of his

preface to the translation of Avenbrugger. He there shows us that to acquire the medical acumen, the physician requires the medical education of each of his senses, which ought to be put upon their trial, and their report ought to be waited for and listened to with calmness.

What power is given to the will by the persistent habit of *willing*, and what power is given to the attention by the sustained tension of this noble faculty! To attention the hippocratic art owes the good which it has already accomplished, and will owe what still remains for it to accomplish. Attention is the most powerful of all healing measures, and that which chiefly brings about unexpected cures.

I should repent having allowed myself to enter into this long digression, if I was not certain that habit, which subdues the wild animals, also mitigates the various kinds of morbid poisons. By penetrating into our economy, the morbid poisons multiply there, which circumstance, however, does not prevent the amount of each dose of the virus successively absorbed from exercising a weakening influence over its operation, so that at the period of an epidemic, the physicians who have a large practice, running from one patient to another, and absorbing only fractional portions of virus, succeed in attaining an immunity which is often observed and generally ill-understood.

As an example, our friend, the courageous Lachèze, remained shut up for five months in a large hospital of plague-patients at Cairo. In the course of a single meal, he saw the death of two servants attached to his service. The vertiginous intoxicated appearance of these two servants revealed to him the suddenness of their attack, and they fell, one after the other, as if thunderstruck ;* and still, though operating every day, dressing the sick, studying and comparing the diversity of the organic lesions peculiar to all the stages of the plague, the brave doctor remained invulnerable. It was in 1838, on his return from Egypt, that Lachèze, passing through Tours, related to me very modestly the account of his long struggle with the plague. On returning to Paris, Lachèze was not able to raise sufficient money to print a small memoir, which was an excellent collection of useful clinical observations. Among other things I had remarked the method of arresting the fatal progress of cutaneous carbuncles by a circular cauterization. This memoir was neither read nor considered, and the Académie determined that the little book was one of those

* In these cases of sudden poisoning there were no posthumous traces of disease.

unseasonable superfetations with which, at this period, it was overwhelmed.

Of local applications employed to modify the Egyptian ulcerations there is none so painful as that of alum and hydrochloric acid, while a solution of nitrate of silver is the least painful and the most efficacious. It is to Dr. Mackenzie, of Glasgow, that we owe the successful substitution of a non-poisonons salt of silver for the salts of copper, which probably we might not be able, without danger, to carry up to the elevated doses of the silver salt.

Being accused in a London Medical Journal, of having derived from the *Treatise on Diphthérite* the knowledge of the medicinal power of caustic applications, the doctor invokes the testimony of his fellow-practitioners, who, like him, have recognized the necessity of having recourse to this treatment during the course of a fatal epidemic of Croupal Angina, no other treatment having been found efficacious, and then he congratulates himself upon our agreement on a method of treatment which is essentially the same, this coincidence confirming the confidence felt in both kinds of treatment, whether at Tours or in Glasgow.

Tonsillar Diphtheria, by its vicinity, threatening the air-passages with imminent danger of extension, requires the most expeditious and complete local treatment.

You will remark that at the first day of the appearance of the Egyptian chancre, a radical cure may be obtained in forty-eight hours; remark also, that every hour and every day the necessity of a more active, complicated, and prolonged treatment goes on increasing in a melancholy proportion.

At the first stage, in order to obtain this favourable result, it is sufficient to employ, on the first day, two local applications, one in the morning and one in the evening, and to repeat the same proceeding the next day. This superficial cauterization is conveniently performed only by means of a spatula holding a piece of caustic. The thin layer of sponge covering the right surface of the spatula, ought to be only slightly moistened with the solution of nitrate of silver and not soaked. That the action of the caustic may not spread beyond the point which it is intended lightly to cauterize, it is expedient that a slight pressure should keep up the contact with the caustic without allowing it to slip over the white spot formed by the false membrane.

From this first stage I pass to the last, or the most serious case of Pharyngeal Angina which has become croupal. Between these two extreme conditions, it will be easy to establish the degrees of treatment which it will be necessary to oppose to the different intermediate stages.

When the sponge has been charged with the caustic solution, it is pressed at the edge of a saucer, and wiped so as to make it certain that it will not allow a drop of caustic liquid to flow into the bronchial tubes, an accident which might cause fatal tubular pneumonia. I have ascertained by numerous experiments on animals, that the most inert substance, such as wetted chalk, injected into the trachea and deposited in small quantity in the bronchial tubes, has caused a fatal attack of pneumonia, even this pneumonia was not very extensive. It is therefore better that the solution should be active than diffluent.

The explanation of what remains for me to say of the subsequent proceeding will show you the necessity of these precautions.

The caustic-holder having been introduced obliquely on the left, between the left tonsil and the uvula, slip under the epiglottis the spatula with which this valvular flap is to be raised and kept supported on the base of tongue, for it is thus that the epiglottis should remain pitilessly held (for pity would be negligence) until, when the instinct which suspends all respiratory movement yields to another still more imperious necessity, you see a deep and prolonged convulsive inspiration drawn, and a second inspiration succeed to the first. At this moment the pharyngeal mucous matters previously whitened by the accessory cauterizations, then afterwards whitened and re-whitened at the entrance of the glottis, are swallowed up together, swept down by the alternating movements of convulsive respiration, while the viscidity and the consistence which they have just acquired do not allow this kind of cataplasm to be drawn down into the bronchial ramifications. The thick varnish remains where it is most useful, for it stops in the ventricles of the larynx, passing and repassing over the false membranes which are to be impregnated by it.

I wish to hasten to a termination by relating another instance of cruelty. After some minutes' respite, the same proceeding must be repeated a second time in all its details; the caustic-holder must be withdrawn, its sponge must be washed, wiped, and dried by the pressure of a very dry piece of linen, that it may again be moistened

at the proper part, and the caustic-holder may be re-introduced as at first.

You may be frightened with this barbarity, but it must also be said that it is justified by an amelioration in the patient's condition from a state of semi-asphyxia, for he has been re-animated by his deep inspirations. Add to this that the local soaking of the false membranes subdues the pain instead of increasing it. Thus modified, they protect the tissues which they cover. The proceeding may, indeed, be a severe one; but the preparations for tracheotomy which might otherwise be performed under the most fatal circumstances, may, by such means, be deferred until a pupil, appointed to watch the patient, comes to tell us that the operation can no longer be delayed.

During the first day, there are strips of expectorated false membranes, which, being well washed, float suspended in water, and being exposed to the light, do not yet assume a violet tint; but from the second to the third day this coloration takes place, and the cough, less shortened, inclines on the fourth day to a catarrhal tone. We then see that tracheotomy need not be performed, and a cure results on the fifth to the sixth day, without any other treatment than an imperative or coaxing administration of food, offered or forced under all possible forms.

I have under my notice four persons restored to life by this rude practice, without any unfortunate occurrence. Dr. Leclerc records the cases of two who were quite restored to health.

The details of a story recalling the scenes of a most horrible period of the disease would here be out of place. I leave it for the next edition on *Diphtheria;* but I must give you a rapid summary of the principal facts.

Being summoned in consultation, in 1837, to the house of an innkeeper named Viel, by M. Haime, we saw a child, seven years old, sink under an attack of croupal suffocation. We warned the parents that a child three years old, who remained to them, might be attacked by the same disease. They were urgently recommended to call on M. Haime at the least sign of illness in this child. Some few days afterwards we were summoned again. We endeavoured to examine the back of the mouth, and at the time when we ascertained the pharynx was completely occupied by the disease, we saw this unfortunate patient expectorate, during the resistance made to our examination, a tube five or six centimeters in length. (Twenty to

twenty-four lines, Ed.) Its expanded extremity, which bore the shape of the larynx, was thick; and what was still more alarming, its broken bronchial extremity, the termination of which we could not see, had also the most alarming thickness. The principal divisions of the bronchi were undoubtedly already affected, and tracheotomy, under such circumstances, could not be performed without hastening the loss of life. A fictitious local treatment, devoid of all efficacy, did not suit us. The barbarous proceeding, the efficacy of which I had already several times ascertained, was proposed, accepted, and executed. Four applications were ordered, each one repeated (namely, eight every day), the first at four o'clock in the morning, and the last between ten and eleven in the evening.

From the fourth day all anxiety had ceased. On the fifth, in the evening, we saw the child through a glass-door at supper with its father and mother, and we refrained from entering, as our presence always excited fear. On the sixth day, the inspection of the throat left nothing to be discovered which in any way deviated from the healthy condition. On withdrawing, M. Haime and I remarked to one another: "If this throat had been ill-treated with a sponge dipped in white of egg, or mucilage of linseed, as it has been with our ounce of nitrate of silver, should we not have been convinced that the pharynx would have resented it more?"

An enormous proportion of the solution was drawn into the digestive tube by the inevitable movements of deglutition, and this happened eight times a-day, without any other effect than a slight purging. The large black spots exhibited by the linen when washed and dried in the sun attested the unusual quantity of the salt swallowed. No slaty tint of the skin was manifested, the laxative effect being, no doubt, opposed to absorption. This case may afford encouragement to the most timid.

I hear lamentable stories of the ingestion of nitrate of silver by the lower animals and man, and I listen to them as patiently as I can. I affirm that, without any error in calculation, a solution of thirty-two grammes (about one ounce, Ed.) of the crystallized nitrate of silver was completely employed in this horrible treatment. Although the washing of the sponge, and the spitting which followed each cauterization may have wasted two-thirds at the most, yet the rest was in great measure mingled with the mucous matters drawn in at the time of the cauterization.

Your letters, my dear Blache, become more and more alarming,

and I can understand that you and Trousseau are terrified at witnessing the cases of sudden loss of life after forty-eight hours' illness. Mothers, you tell me, are attacked with the disease which has just carried off their children, and in other houses the servants do not escape from the scourge. You ask my opinion, and appeal to my long experience. I have hastened to transmit to you the facts which are most applicable to the present condition of the epidemic of Paris; they have been collected since 1827, during the continual succession of a multitude of epidemics.

Believe me, this sudden loss of life which so naturally alarms you is not real, for when the disease appears and, as it were, explodes, it existed before, and was silently, though abundantly developed in the nostrils. Do not object to me that I have said it, and explained and repeated it in every possible manner. After having clearly pointed out the insidious occurrence of nasal Diphtheria in large or small localities where the sudden extinction of life struck so much terror into medical practitioners and populations, and having said to my colleagues, "You cannot sufficiently suspect the secret seizure of the disease upon the nostrils," I was still far from knowing my lesson, for it is only recently that I have completely acquired the conviction that the Egyptian disease is developed in the nostrils, and extends there without any warning and without any apparent symptom. It must be confessed that such is the case.

Under these circumstances, a minute and attentive vigilance is imposed upon us. When the Egyptian disease prevails and is propagated with the intermittent march which characterizes its irregular outbreaks, and when, from one year to another, it has raged so extensively as it has been seen to do in Paris within the last six years, it is incumbent on us not to wait for visible symptoms; but at the least sign of snuffling, at the slightest indication of coryza, to *feel* and not to *look* beyond the angle of the lower jaw, below the lobe of the ear, and thence down the sides of the neck. If in this region we should find any swollen lymphatic glands, our attention should be redoubled, for if we feel a glandular swelling, it is more than probable to be a consequence of the absorption of the Egyptian virus.

Do not be satisfied with this examination, for it is necessary that the diagnosis should leave no doubt; examine, therefore, the upper lip below the nostrils; in the most simple coryza the skin is reddened *equally* under each nostril, while in the case of the Egyptian

disease, it is *only* on the side of the glandular swelling. If the swelling exists on both sides it is unequal; on the side where the swelling is least, the redness of the lip of the same side is least. From the period of this discovery, we are certain that there is a special affection, in fact, the Egyptian disease.

We see what value the information obtained by this inquiry possesses, for we may discover the day on which the reproductive germ has begun to develop itself in the nostril first attacked, and the day of transmission to the nostril secondarily affected, as exactly as we follow, from the fourth to the fourteenth day, the age of a variolus pustule. This knowledge will besides accurately guide the treatment which ought to be pursued according to the age and the stage of the disease.

Then let me advise you to act instead of talking, and with a glass syringe, the padded extremity of which ought to be yielding and incapable of causing pain, inject into the nostrils alternately a solution of nitrate of silver, and although the injection may flow back through the nostril which has not been injected, it will be well that the latter should also receive an injection of suitable strength, if, on the corresponding side, there is the least swelling of the cervical glands.

In descending along the course of the pharynx, the caustic solution will accompany the epispastic secretion as far as the arytenoid cartilages, and up the sloping channels formed by these cartilages it will penetrate into the larynx, and in the air-passages it will follow the blistering secretion, thus preventing or arresting its action.

At the commencement of the affection of the larynx, two fatal results may be prevented by two different proceedings, one for children and the other for adults. First, in children we must prevent the formation of a valve, the insidious mechanism of which becomes rapidly fatal, and in adults we must oppose the production of a long tracheal tube taking the form of a bronchial tree and throwing out branches as far as the final divisions of the air-passages, thus tending slowly, but inevitably, to the destruction of life. Remember the poor Jew bearing for a week, without much uneasiness, his slow and fatal asphyxia. Let us leave this rare case like all the rare cases presented by the strangulatory Egyptian lesion, which, in the present day, makes so many victims; this lesion abounds in therapeutical and prognostic indications, and we will study it.

The fibrinous production, appearing like a membrane, has scarely fixed itself and attached its roots to the ventricles of the larynx,

when it moulds itself as it advances towards the trachea, upon the expanded walls of this organ, and at the same time becomes thinner.

Attached by its base, and having its tracheal point free and floating, this cone becomes a valve, the horrible mechanism of which is perfectly completed. At the period of inspiration, the valve elongates and extends itself, unfolding and allowing the air to pass when deeply and strongly inspired, while at the moment of expiration, the free extremity of the valve being pushed back, opposes an insurmountable obstacle to the passage of the air outwards. Being thus retained, the air is imprisoned without giving place to the fresh air. Hence arises a sudden asphyxia, the fatal importance of which is so well described and so admirably depicted by Aretæus when he says, "Pallida his...livida facies. Inspiratio magna est, expiratio verò parva...hæc signa in pejus ruunt cum subitò in terram collapsis anima deficit."

Let us accord to this great master the tribute of a grateful admiration! Although deprived of the information which we moderns have gained from necroscopical researches, what a picture does he leave us of the last scene of the Egyptian disease!

My dear Trousseau, we have many times made the observation together, that it is one of the blessings of the art of medicine that it inspires an affectionate esteem for an able practitioner of the time past and for one of the time to come; it is besides a consolation for the bad conduct of some of our brothers. My heart swells with tenderness when I hear Morton saying of old Sydenham, "If it were permitted me to praise such a man!" A hundred years later, Stoll, speaking of Sydenham being blamed, says, "Quem virum, et quantum!" Think also of our Laennec, so forbearing as to himself, but so ready to resent offence, when physiologism dares to touch Bayle, his much regretted rival and friend.

Thanks to heaven, the catalogue is long, and it will be prolonged still more. You will continue to regard me when I am no more.

By the prognostic signs which I have just pointed out, Aretæus knew, and by these signs it will always be known, that death is approaching, but the time has come to add to the therapeutical measures which are necessary, some proceedings which carry the treatment beyond the limits in which this learned disciple of empiricism had left it. In the present day, the cause of the livid paleness which announces the approaching asphyxia, is well known. An obstacle is opposed to the entrance of the air, and this obstacle is removable and

must be taken away. It may be reproduced, and we must immediately, and on the spot, have recourse to proceedings which may put an end to this reproduction. These indisputable conclusions rendered tracheotomy imperative; the natural horror of even the least operation yielded to the despair of anxious friends. I had performed it five times and had obtained from it only a cruel half success, but I had learned why my success was not complete.

You have not forgotten that the rapid progress of lividity remarked by Aretæus indicates the threatening progress of asphyxia. By this terrible sign, I was able to foresee that Elizabeth Puységur, the daughter of my best friend, was about to sink under the rapid effects of Croupal Angina. Three other children of this family had been previously carried off by the same disease. My friend knew my obstinate perseverance, and he knew of my ill-success, and he said to me, "Do as if this was your own child!" Twelve days later, the little girl's cure was completed.

You see that the prognostic symptoms of Aretæus announce the time when it is proper to perform tracheotomy; and they also announce that it will then be performed under the most favourable conditions; that the air will enter below the valve, which permits long inspirations and suspends the expirations, and it does this when the disease has had only a short duration, when it is still local, and when the toxæmia, more formidable and irremediable than strangulation, may be prevented.

It is unnecessary to add, that with the precaution of keeping everything prepared for the operation, tracheal cauterization through the larynx may be attempted. In such conditions, it is proper to wait and see what may happen; perhaps the valve, hardened by the imbibition of the caustic, may become insusceptible of being pushed back, and even if the operation should eventually become necessary, there will be a gain of time before the performance of tracheotomy.

These minute details are not addressed to you, my dear sir; but we must share an apprenticeship in our practice which cannot be extemporized. With your senior, Velpeau, I commenced it, with you I have continued it, and if the art is not taught, it cannot be learned, except at the expense of our patients.

At the Hospital of Tours, since the importation of the Egyptian disease by the legion of La Vendée, we have been compelled to recognize the necessity of opposing all the artifices of treatment to the insidious variations of a proteiform disease.

The occurrence of croupal strangulation has attracted too much notice, and has diverted attention from other still more dangerous results of the Egyptian disease. It is difficult to believe that it could be otherwise.

At its insidious commencement, Egyptian Croup is the least terrible of all diseases; it is especially less so than stridulous Angina, the nocturnal attacks of which excite the greatest alarm, and often cause physicians to be summoned to the patients. In fact, it is only after a tranquil onset that the Egyptian Laryngeal Croup begins to be aggravated. A child, whose illness for some days had scarcely attracted notice, apparently dies and revives at short intervals; these painful alternations, these rapid changes from hope to terror, which have been so often mentioned, lead at last to a fatal asphyxia, and leave a deep impression of terror in the parents of the sick children and on medical practitioners.

This picture of Egyptian *Laryngeal* Croup is found everywhere, and I intentionally revert to the word *laryngeal*, because it is the laryngeal croup which is most commonly met with, and because I have yet to write of Croup which have not passed beyond the larynx and trachea, and not of that which descends almost into the bronchial ramifications.

This portrait has, indeed, some resemblance, but it is a deceptive one, inasmuch as it represents exactly the death-struggle, the apparent extinction of life; but life which appears extinct is not really so, and the prolonged duration of asphyxia is not the certain sign of its complete extinction.

In the first part of this Memoir, several cases of nasal poisoning by Diphtheria have been mentioned. Under this disguise, in Paris, the Egyptian disease had just attacked several children, and also old persons, and had led to so many sudden deaths, that the attention of the medical profession was especially called to the calamity. On this occasion I must recall my reminiscences from 1817 up to the present day, and collect together the facts which may explain the pathogenesis of this mode of attack; these facts resemble those which have just been mentioned.

A sad period of security generally intervenes, and in a great number of cases lasts until the period of death; and this security is not only the illusion of a patient who can only judge by his feelings, but it deceives the relations, and even physicians.

The more I have examined this serious question, the more I have been convinced that it will be difficult for a long time to distinguish, from a cold in the head, or from a simple coryza, the surreptitious affection of the nostrils in the Egyptian disease, since it is upon one part of the pituitary membrane, namely, the mucous lining, that the development of this affection occurs without any salutary suspicion having been excited by the complication of any collateral and more manifest attack.

Since such is the case, I wish to describe once more the deceptive appearances which must be distrusted, and to call attention to the treacherous want of meaning presented by illusory symptoms, which, instead of attracting attention, actually divert it!

I fear that I have not sufficiently insisted either upon the danger of the disease or upon the difficulty of avoiding it. Several of the symptoms of a simple and slight coryza are common both to this indisposition and to the fatal disease; it is, therefore, of the greatest importance to distinguish those which may excite a salutary apprehension and put physicians on the track of the disease lurking in the nasal anfractuosities.

Several of these signs have already been mentioned. The following is a summary of the fearful but faithful recital which recalls what is necessary to be known upon the danger and the treatment of this insidious disease. It is the extract from a notice written in my leisure for our friend Trousseau, while expecting one of his kind visits, and while I had under my notice the most formidable attack of nasal toxæmia I had ever seen.

My friend, residing at six leagues from Tours, in the little town of Amboise, lives with the family Saint B.—, with whom you are acquainted. George St. B.—, a large robust boy about twelve years old, came from Paris with his mother, both of them being alarmed at the danger of Malignant Angina. Since his return, George made some long excursions on horseback. On Saturday, May 29th, 1854, and on Sunday, the 21st, there was pain in the ears, especially the right, but so slight that it scarcely attracted attention. These symptoms became aggravated, and on the 28th of May, his rides were interrupted in consequence of a sore-throat of which he complained the night before. The pharynx was attentively examined, but it was ascertained that there did not exist the slightest white spot upon the mucous membrane. On Monday, the 29th of May, at five o'clock in the afternoon, I was sent for by the boy's uncle, and

I was told by the messenger that I should probably not find him alive.

Half an hour afterwards we were with the patient. Every measure which the case required had already been adopted by our friend Miguel. I saw and listened, and learned from three of my colleagues and from the family, all that was passing, and all that had passed for the last week. The pulse was irregular and thready; the hands were cold, and exhaustion was continuing to make rapid progress. What the boy's uncle had told me was now repeated to me. I again heard that after the exploration of the pharynx, while having a glyster administered, the patient was unable to stand; he had sunk down in a fainting condition, and being thrown on his bed he remained there in a state of icy coldness since his uncle's departure. In the morning, white exudations enveloped the tonsils, and the snuffling in the right nostril, of which the patient complained on the previous days, had scarcely at all increased. Cauterizations with nitrate of silver had been immediately performed. At the period of my visit, the pharynx and the tonsils were coated with false membranes, rendered opaque by two successive cauterizations. The sub-mastoid and cervical glands were enormously swollen; they presented the dimensions, the nodulations, and almost the hardness of middling-sized potatoes; the lateral swelling of the neck, particularly on the right side, passed far beyond the border of the lower jaw. I do not recollect having seen anything of a similar kind. The extreme loathing for food evinced by the patient, as well as his continual somnolence, added to my consternation.

The *treatment* consisted of a nasal injection of a strong solution of nitrate of silver, the proportion of the salt being gradually increased, and employed every six hours, and three times a-day the pharynx was cauterized. A grain of calomel to be given in the morning. Dr. Lagarde, at intervals of two hours, had given alternately two grains of alum and then two grains of calomel. We insisted continually upon the patient taking some nourishment, no matter of what kind and however difficult it might be for him to take it, such as clear broth prepared with milk and wheaten flour, white of egg, boiled eggs, wine and water, &c., &c.

The family were in the deepest distress. "How long will these cruel sufferings last, and how will the poor mother bear the miseries of seeing her son's dying moments?" said the brother-in-law of the poor widow to me. "It is desirable that this state should

last four days at least," I replied, "and we shall hope for the possibility of a slow and painful convalescence." For three days, the volume and the hardness of the sub-mastoid glands continued; but the power of taking food, acquired with some difficulty, was progressively increased, and without a distinct reaction coldness gave way to perspiration. The patient was even able to change his position in bed without assistance. On the fourth day, a positive improvement was at length manifested and acknowledged by the family and by my three colleagues. The appetite was good, and the food, which was varied, was asked for and allowed, and then the medicines, which had already been diminished in quantity, were rapidly discontinued. The excavation in the right tonsil to be carefully watched, and, if necessary, to be cauterized by a lateral application of the caustic.

A subsequent communication announced to me that the patient was beginning to return to the habits of common life, and with a playful gaiety he said to the doctors that he was better in health than themselves, and that for a long time he had suffered no other inconveniences than those which they had made him undergo. Three months later, young St. B. followed his mother to Paris. On his departure he had been brought to me, walking by himself, but looking at his feet to know if, after three months, they touched the ground. They still remained so destitute of all tactile power, that he appeared to himself to be walking in the air. Warm salt water baths, as salt as sea water, appeared to be beneficial.

It is evident that the consequences of this nasal toxæmia were much more severe than those experienced by M. Herpin, and I firmly believe that without the domestic attentions of a whole family and the assiduous superintendence of three zealous physicians, the patient would, without doubt, have sunk. This is a new proof that we ought to give the utmost attention in checking the treacherous progress of such a disease, and use all our efforts to avert an extreme danger. The following are some commemorative pieces of information which offer us instruction of great importance.

The mother of George St. B.—, learning that a lady of her acquaintance, whom she saw every day in Paris, was treated by Dr. Blache, the usual medical attendant of the two ladies, for an Egytian affection of the gums, a contagious disease, had hastened to take refuge in Amboise with her family. There the progress of her son's illness, and especially the great tumefaction of the sub-mastoid lymphatic glands, as well as the swelling and redness of the nose, whenever the

young horseman returned from his excursions, had attracted the attention of a lady who frequently visited the family of St. B.—. She several times exclaimed, "You do not pay sufficient attention to George's health; the boy, who is habitually good-looking, changes visibly in appearance; he is hardly to be recognized, and is quite frightful, with his neck larger than his head; he is certainly ill." It was three and even four days before the catastrophe that this prudent warning was given; what a difference would it have made if the warning had been taken!

At the period when Dr. Lagarde saw the patient he understood that there had been a long duration of the disease before any attention was paid to it. Preconceived views and the expectation of a Croupal Angina, which did not manifest itself, had dissipated all anxiety. The disease became aggravated; but the symptoms, as they appeared, were different from those of Croup, which was the only danger apprehended.

The attention of the relations was so much diverted, that the enormous swelling of the lymphatic glands was attributed to the mumps, an epidemic contagious affection which was prevalent in the district. The same mistake, as you know, was committed quite recently in the case of a schoolboy in the Faubourg St. Germain. The physician of the establishment, being very much astonished, attributed the loss of two patients to mumps, complicated with Angina and cold in the head, this epidemic affection having a malignity which he had never seen it possess.

In the spring of 1852, George had had a slight attack of mumps.

GUERSANT.

GUERSANT ON CROUP.

TRACHEAL DIPHTHERITE OF BRETONNEAU.

(*Dictionnairè de Médecine*, 1835.

ON CROUP.

This Scotch name, employed at first by Home to designate an acute inflammation of the larynx and trachea, characterized by the rapid formation of a false membrane, has become a popular term, which is now generally adopted by physicians of all countries, and is common to all languages. It is the same disease as the *garotillo* of the Spaniards, and the *male in canná* of the Italians. Authors have assigned to it a number of different scientific names, which may be considered as synonymes; the principal of which are, *strangulatorius affectus*, Carnevale; *cynanche stridula*, Wahlbom; *morbus strangulatorius*, Starr; *suffocatio stridula*, F. Home; *angina stridula*, Crawford; *angina suffocativa*, S. Bard; *angina polyposa sive membranacea*, Michaelis; *cynanche trachealis*, Cullen; *tracheitis infantum*, Albers; *angina laryngea exsudatoria*, Hufeland; *diphthérite tracheale*, Bretonneau.

Croup is certainly not a new disease, but the passages in the most ancient authors which appear to refer to it are the more obscure to the greater part of our modern writers, inasmuch as the early observers described the symptoms of gangrenous Angina and Croup, such as they were met with most frequently in nature; namely, united together, or succeeding one another like different degrees of the same disease, as may be very well observed in the excellent description of the *Syriac Ulcer* by Aretæus. He presents a faithful

picture of the alterations which may be perceived in the pharynx, and he describes with admirable truth the phenomena of the painful asphyxia which most commonly terminates this dreadful disease; but as it was impossible for him, and for many of those who succeeded him, to make *post-mortem* examinations, he could not have ascertained the true causes of the death by suffocation; and yet it is evident, even by the description of Aretæus, that the patients died in his day as they do now, and in the same manner. Still it is only in 1576 that Baillou, in the seventh note which is found in the end of the Constitution of that year, page 148, vol. I., first alludes to a case in which a kind of false membrane was found in the trachea of a child who had died of a rapidly suffocating disease, unknown up to that time; it is evident that no one had thought of referring it to gangrenous Angina. This disease, however, prevailed almost at the same period in an epidemic manner in Spain and Italy, where it cut off many patients. All the descriptions of contemporary authors agree completely, such as Carnevale, Nola, Heredia, Mercatus, Marcus Aurelius Severinus, &c., and they all appear to be copied from the description of the Syriac Ulcer of Aretæus. All the patients died as if they were suffocated, *instar laqueo suffocati*. In no case, however, except in that related by Baillou, had the *post-mortem* appearances been ascertained, and Morgagni is justly indignant at this neglect.

Marcus Aurelius Severinus alone, among all the physicians who had had occasion to observe this fatal disease, had opened a body, and in speaking of the result of his researches, he says, "Larynge investigatâ contecta erat pituitâ quâdam crustaceâ, citra ulceris speciem." Still this anatomical observation remained unnoticed, like that recorded by Baillou, when Ghisi, during the epidemic of gangrenous Angina which prevailed at Cremona in 1747, having ascertained the presence of a false membrane in the larynx of a child who died of the epidemic, first conceived the idea of distinguishing this mode of termination as a peculiar disease, which he designated under the name of *perfidious or mortal Angina*, in order to separate it from ordinary gangrenous Angina, which does not terminate by suffocation.

Up to that period, all the observers had seen only one kind of gangrenous Angina. The error of Ghisi involved the greater part of his successors in the same mistake. The alterations of the pharynx were, as it were, forgotten, in the gangrenous Angina, and

only the larynx was regarded as the seat of the disease. The Memoir of Dr. Home, by attaching considerable importance to the distinction of Ghisi, and by assigning the common name of Croup to this disease, diverted the minds of physicians more and more from the true path. Nevertheless, the work of Home was very useful, as M. Deslandes has well remarked; for he first gave a good description of this disease. The monograph of Michaelis confirmed the minds of physicians more and more in the ideas of Ghisi and Home.

Several more or less remarkable works were published on the same subjects principally at the commencement of the present century, on the occasion of the *Concours* proposed by the French Government on Croup, and the works of Vieusseux, Jurine, Schwilgné, Albers of Bremen, Double, Royer Collard, &c., undoubtedly contributed very materially to the better knowledge of Croup, considered as an isolated disease. Nevertheless, the true starting point had been missed, and the tradition of the ancient writers had been forgotten; Johnston had indeed said that Malignant Angina and Croup were diseases of the same nature; Starr and M. Double had proved that they were often united together; but the greater number of physicians rejected Johnston's views.

M. Bretonneau, by the publication of some excellent observations, collected together from the most authentic historical documents, has at last dissipated all doubts upon the subject. He has demonstrated that epidemic Malignant Angina is not at all of a gangrenous nature, as was heretofore supposed, but that it is a true pellicular inflammation similar to that of Croup; he has proved that these two morbid alterations, erroneously considered as very different, are identical in their pathological relations, and differ only in the spot which they occupy. He has also proved in an incontestable manner than Gangrenous Angina and Croup have almost always presented themselves in combination in all the epidemics of Malignant Angina described by ancient and modern authors, as they have done in the epidemics of Tours and of the neighbouring district under his observation. The works of M. Bretonneau have therefore thrown a great light on the pathology of Gangrenous Angina and Croup. The observations which I have been enabled to make for myself for more than fifteen years, and which have been published either as extracts from my Clinical Lectures, or in the first edition of this Dictionary, are entirely in conformity with those of my friend.

Still, I admit that there yet remains considerable uncertainty, and

even obscurity, in the distinction between Croup and certain diseases which most resemble it. Almost at the same time when Home published his dissertation on Stridulous Suffocation, Millar endeavoured to distinguish from Croup a very similar disease which may be very easily confounded with it. The loose definitions, however, which he assigned to his Acute Asthma of children, served only to obscure the matter still further. The efforts made by Wichmann, Dreysig, and M. Double, to give a more distinct character to the asthma of Millar, have not thrown much light upon the subject.

Although the existence of stridulous laryngitis is at present admitted by many practitioners, it is still rejected by many others who persist in confounding Croup with Acute Asthma, and who make no difficulty in recognizing Croups, with or without false membranes, as simple varieties of the same affection. I do not think that in the present state of our knowledge, it is possible to admit the absolute identity of diseases which present different symptoms and such dissimilar anatomical characters. The presence of a false membrane in Croup is a character which belongs to it as essentially as the purulent and pseudo-membranous exudation does to inflammation of serous membranes. These facts are indisputable; but not being able to deny the *facts*, some persons have made war against *words*. To these disputes I attach very little importance. The name of *false Croup* (which I had introduced in the first edition of the Dictionnaire de Médecine to supply the place of that of the *acute asthma* of Millar, which I thought ought to be abolished because it has given rise to confusion and error), is certainly, as the critics have remarked, not very scientific; but my intention, in proposing it, was merely to associate a word, which might be easily popularized, with that of Croup, which was already popular; and thus I wished to introduce into common language a distinction which I believe to be absolutely necessary. For the use of physicians I shall more willingly adopt the expression of stridulous laryngitis, admitted by M. Bretonneau. Whatever may be the value of words, let us rather examine that of the things which they designate.

The only objection which is raised to the distinction between the pseudo-membranous and non-membranous Croup is drawn from a simple theoretical induction; it results, say the critics, from experiments made upon the lower animals, that an acid applied to the glottis, or to the internal part of the larynx, in the same degree of concentration, produces sometimes a membranous exudation, and

sometimes a simple inflammation without exudation; therefore Croup and pseudo-Croup are only different degrees of the same disease. The reply to this objection is easy. Although the action of a chemical agent and that of a spontaneous organic cause are but slightly comparable, these experiments prove only what daily observation confirms, namely, that the same cause may give rise to very different effects, according to the peculiar state of the individuals on whom it acts. Thus the same iced drink taken by several persons when perspiring freely, will cause in one a simple aphonia, in another an attack of cold, in a third one of severe laryngitis, &c.; but these diseases are not, therefore, the same, and no person would maintain that they were so. We are, therefore, fully convinced that membranous and non-membranous Croup are produced by the same causes, for we find them both in the same circumstances and in the same epidemics, but the identity of their causes cannot suffice for the establishment of a perfect similarity between the morbid symptoms and the organic alterations which are connected with them, or consequently between the therapeutic measures which are suitable to each case, and this latter is the most important part of the question.

The identity which some authors attempt to establish between diseases which are unquestionably different, under the pretext that they originate from the same causes, is an error which involves the most serious consequences, inasmuch as the treatment of the cases is very different, as will be hereafter shown; and, therefore, mistakes in this respect may be attended with the most serious results. In order to prove the truth of this remark, it is sufficient to recollect that in several cases, of recent occurrence, some very distinguished physicians have performed tracheotomy on persons affected with suffocation and with croupal voice, who were considered as suffering from Croup; but the consequences of the operation, and the *post-mortem* examinations, demonstrated that there was no false membrane, and consequently there was no Croup. The mistake which has already taken place several times, ought to make us sensible of the necessity of insisting more than ever upon the diagnosis of the diseases which are frequently confounded with Croup, in order that we may the better appreciate their distinctions and their relations to each other.

Nosography of the Diseases commonly designated under the name of Croup.—When we take a general view of the diseases

generally designated under the name of Croup, we find that they 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 by 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 discovered. I shall give to the first class of diseases the name of membranous or pseudo-membranous pharyngo-laryngitis, or the true Croups; and the second class will have the name of stridulous laryngitis, or false Croup.*

Of Membranous or Pseudo-Membranous Pharyngo-Laryngitis, or true Croup.—In general or partial epidemics, and even in the greater part of the cases of Sporadic Croup, the disease almost always presents itself under the same forms, and follows pretty nearly the same course. Three very distinct periods may be recognized in its progress. At the time of the invasion of the disease, nineteen-twentieths of those who are attacked by it are generally seized with slight shivering, followed by more or less fever, and a sore-throat, which is seldom very intense at first, but is rather frequently accompanied by a little pain in the anterior parts of the neck, and a greater or less swelling of the sub-maxillary glands. The pharynx which ought always to be examined early in every kind of Angina, and more particularly in that now under notice, generally presents a manifest degree of redness, with more or less swelling of the tonsils, and generally more marked on one side than on the other; but the appearances which ought especially to attract attention are the little white patches which are observed on the tonsils, the velum palati, the uvula, and sometimes on all these parts at once. There is often also a slight serous oozing, of a fetid smell and a yellowish colour from the nostrils, and there are pseudo-membranous eschars on different parts of the body. The first period of Croup is, in fact, exactly like that of gangrenous or membranous Angina. It most frequently lasts from four to five days, and sometimes seven; but in some cases in which the disease advances with great violence

* The remarks on false Croup are omitted in the translation, as being unconnected with the subject of Diphtheria.—(Ed.)

and rapidly attacks the larynx, it may scarcely comprise more than twenty-four hours, and the first two periods seem then to be confounded together.

The second period is at first distinguished by a small, dry cough, which returns by very short paroxysms at more or less brief intervals, and which is accompanied, from the commencement, with aphonia and symptoms of suffocation. These symptoms afterwards assume considerable intensity in a more or less rapid manner. The cough and the voice then present those peculiar characters which it is so important to recognize thoroughly, and which are easily distinguished when they have been once observed, but which it is very difficult clearly to describe. The rough comparisons which have been drawn by authors with the crowing of a cock, the barking of a dog, &c., give an idea of it which is the more false, inasmuch as by these comparisons the writers have combined together the two kinds of cough and of voice which are observed in the cases of membranous and stridulous laryngitis, which are very different from each other. The cough, in membranous laryngitis, is not loud and sonorous, as in stridulous laryngitis; on the contrary, it is hoarse, stifled, dry, and appears as if going back into the larynx. It appears to be almost smothered by a rapid and more or less deep inspiration; each shock of cough is followed by a short, dry, and sibilant inspiration, as if the air was passing into a dry and metallic tube: and independently of this short and well-marked sibilous breathing, which is remarked at the end of every fit of coughing, there is always observed, in the interval of the paroxysms, a laryngo-tracheal sibilant sound at each inspiration, which is heard very well at a distance, and which is perceived still better by applying the stethoscope or the naked ear on the course of the trachea, or at the posterior part of the chest. It is generally so strong that it completely masks the sound of the vesicular expansion, which it is consequently impossible to recognize. The paroxysm of cough most frequently induces pain in the larynx, in the trachea, and in the anterior part of the sternum; it is most usually accompanied, from the commencement, with a feeling of great anxiety. The patient starts from his seat, and appears to be seized with a feeling of suffocation which is out of proportion with the short duration of the paroxysm. The voice presents in Croup a character which is no less remarkable than that of the cough; it is not simply hoarse, as in Stridulous Angina, but it is suppressed; the patient is almost completely voiceless, and the tone of his voice has something of a

metallic character like the cough. Every word is followed by a small and very short hissing sound, so that the articulation of the words appears to be formed during the inspiration, which gives to the voice somewhat of the character of that observed in ventriloquists, although it is much lower and weaker. To the characteristic signs of the cough and the voice are added a greater or less frequency of the respiration and the pulse, a violet tint of the lips, puffiness, paleness, and very remarkable lividity of the face, except during the time of the febrile exacerbations. The patient is inclined to somnolence and sadness, but delirium and convulsive movements are never observed, even in children. The fits of coughing are sometimes followed by vomiting of mucous matters and of membranous shreds. After these kinds of vomiting, which are either spontaneous or produced by artificial means, the difficulty of respiration temporarily diminishes, the dejection ceases, and the patient returns for a longer or shorter time to his natural cheerfulness; but he remains silent and is afraid of speaking, from the embarrassment which he feels. When the disease is about to terminate favourably, the intervals between the paroxysms are more numerous, the cough is less dry, the pharynx is filled with transparent mucous matters, and the patient regurgitates or expectorates viscid, transparent, or opaque sputa, mixed with small membranous shreds. Sometimes, however, long intervals of tranquillity are observed after the expectoration of membranous tubes, but they are followed by fresh and rapidly fatal fits of suffocation.

The third period of Croup supervenes more or less rapidly, sometimes barely at the end of twenty-four hours, reckoning from the period of the development of the first symptoms; at other times, only after the disease has lasted several days. But in the cases where its progress is most slow, this last period always supervenes shortly after the first week. It is characterized by the increase of all the symptoms. The aphonia is almost complete, the fits of coughing are rare and absolutely dry; and the laryngo-tracheal hissing sound very dry, metallic, and sonorous, is heard at a very great distance. The inspirations are very much accelerated and almost as noisy as in asthmatic patients. All the muscles concerned in respiration are in a state of convulsive contraction. The pulse, very frequent and sometimes irregular, is in proportion to the respiration; the face is pale, the lips violet-coloured, and the head is thrown backwards. In this last stage of the disease, drowsiness is almost constant, and the patient arouses from it only when he is tor-

mented by the fits of suffocation, which are almost always excited by the cough. Then he makes a forcible effort to breathe as he rises to the sitting posture, with his body thrown backwards and covered with perspiration; sometimes the unfortunate patient places his hand in front of the neck as if to pull away something which is strangling him; at other times he starts out of his bed, runs a few steps as if in search of air, and falls back to expire in a fit of suffocation. The efforts made by the patient to breathe are so violent, that in a case of Croup in an adult, quoted by M. Bretonneau, there was a laceration of the pulmonary vesicles, and the air passed into the large blood-vessels. If the patients have been much weakened by previous diseases, or by a very lowering treatment, the period of death is not marked by these signs of agitation and violent strangulation, and they sink by degrees into a kind of tranquil asphyxia.

When the patient recovers spontaneously, which is a very rare circumstance, or by the combined efforts of nature and art, the cure usually takes place during the second period of the disease. There is hardly any example of patients having escaped, at least without operation, after the disease has reached its last stage; nevertheless, Jurine gives a remarkable case of the kind. If the disease proceeds favourably towards recovery, the cough gradually becomes more moist, and the laryngo-tracheal hissing ceases to be so dry; a more or less abundant mucous rhonchus is recognized in the bronchi; the vesicular expansion is well perceived; the fits of suffocation disappear, and the patient becomes convalescent a few days after these symptoms of improvement have presented themselves, unless pneumonia or any other consecutive diseases should supervene. During convalescence, the pulse always remains more or less frequent, and aphonia lasts sometimes more than two months after the disease. Recovery does not appear to ensue in Croup or in Membranous Angina, except when the false membranes have been cast off and expectorated; or in consequence of a kind of solution of the plastic exudation in the mucus of the bronchi, the specific croupal inflammation ceasing to act. But I am induced to believe that there may be, besides, a third mode of favourable termination, by absorption of the false membrane when it adheres firmly on all points to the mucous membrane, and that this absorption may take place layer by layer on the internal surface of the larynx, as we have observed it to do on the velum palati, in Membranous Angina. Several facts in pathological anatomy, which will be

described hereafter, give a certain degree of probability to this opinion.

Croup does not always present such a regular progress, and does not always extend by descending from the pharynx towards the larynx; sometimes the development of the plastic inflammation takes place simultaneously on the pharyngeal and laryngeal surfaces; the first two periods are mingled together, and the disease advances very rapidly towards a fatal termination. At other times, in some cases of sporadic Croup, the disease, instead of beginning in the pharynx, commences at once in the larynx and trachea, and then the first period is altogether wanting. The number of cases in which Croup is not preceded by Membranous Angina and presents itself in its most simple state, is, moreover, much more restricted than was formerly supposed, and than I myself believed some years ago. Perhaps the number of such cases may amount to a twentieth, for since a more minute attention has been paid in exploring the pharynx in these diseases, some traces of false membranes are almost constantly found there at the commencement. M. Bretonneau saw only a single patient who did not present plastic exudations in the pharynx. It may also happen in certain cases still more rare, that the disease, commencing in the bronchi and the trachea, advances in the reverse direction towards the larynx. I have seen at least one very remarkable case of this kind. A little girl, attacked with lobular pneumonia, having been seized with a dry and croupal cough, attracted my attention. The examination of the pharynx, made with the greatest care and at several intervals, exhibited to me no kind of alteration; but the isthmus of the pharynx being very wide in this child, I was able, by lowering the tongue, to observe easily the glottis and the surface of the epiglottis, and for three or four days while the patient struggled against the disease, I fully convinced myself that the false membrane was progressively extending from the edges of the glottis to the superior surface of the epiglottis. At the opening of the body, we found that the pellicular membranes occupied the principal bronchi, the trachea and the larynx, as far as the convex surface of the epiglottis, where they ceased.

Whatever may be the progress of Croup, whether it begins at first only in the pharynx, or the larynx, or the trachea, or whether it attacks all these organs simultaneously or successively, the physiological characters presented by the disease, when it is confirmed, are the same, while its anatomical characters are still more positive and

constant. At the commencement of the disease, when it begins in the pharynx, which is usually the case, we find membranous patches on the tonsils, the velum palati or the uvula, &c. In the second or third period, when the patient dies, we no longer observe at the autopsy, any plastic formations in the pharynx even when the disease has commenced in this region, because they have been destroyed by local applications, or even by the efforts of nature, especially when the pseudo-membranous patches have been of small extent; but they are always more or less considerable in the larynx. The plastic formation is sometimes limited to the orifice of the glottis and to the epiglottis, it is always very adherent to these parts and appears covered with epithelium, especially if the patient has died rapidly. But if death does not ensue until several days after the disease is fully confirmed the epithelium is often softened and destroyed, and the false membrane is then laid bare. In the larynx, the membranous patches are also always more or less adherent, but never covered with epithelium and only coated with a frothy, sometimes puriform mucus. Sometimes the whole of the internal surface of the larynx is uniformly lined with a false membrane penetrating into the ventricles, where it adheres more firmly than elsewhere; sometimes only some membranous strips are found on the posterior surface of the thyroid cartilage or only on the arytenoid cartilages. Most frequently the false membrane penetrates into the trachea in the form of a more or less extensive lamina, applied to the anterior or posterior surface of this organ, or, more rarely, under the form of a complete cylinder. In some cases, it is prolonged into a part of the large bronchi, and sometimes even into their final ramifications, either in a tubulated form or in that of more or less narrow and almost linear strips. The false membrane is almost always rather adherent in the trachea towards the upper part near the larynx, and free in the rest of its course, between two layers of mucous and puriform or flocculent matters. Still I have sometimes found it intimately adherent to the anterior surface of the trachea; the dry mucous membrane then presents longitudinal striæ and red points which are not found so constantly when the pellicular formation is floating, and the surface of the membrane is moistened by mucous matters. The red points sometimes penetrate even into the tissue of the plastic formation, and are not the product of simple bloody spots, for they still exist after maceration in water. These little points are undoubtedly the commencement of the vascular lines which have been described by some

observers, which I have noticed myself, and which are shown in the specimens of pathological anatomy preserved in Soemmering's cabinet. We do not find reddish striæ nor red points in the bronchi as in the trachea; the mucous membrane is merely of a rose-colour or sometimes even pale, principally in subjects weakened by former diseases or by blood-letting. The bronchi also contain more or less mucus of a greenish-white colour or of a puriform character. It is important to know the relative proportion of the plastic formations in the larynx, the trachea, and the bronchi, especially in relation to the chances which may be prevented by the operation of tracheotomy. We find, on this point of the pathological anatomy of Croup, some curious results in the thesis of M. Hussenot, on Croup and Tracheotomy. He has made an abstract of a hundred and seventeen *post-mortem* examinations recorded in different authors. In all the subjects in whom symptoms of Croup had existed, and death had occurred from suffocation, false membranes were found in the larynx only, or descending a few lines down the trachea, in fifteen; not passing beyond the trachea, in thirty; in the large division of the bronchi, in ten; in the small bronchi, in patches and mixed with mucus, in five; in the small bronchi in the form of ramifications, in four; in the larynx or trachea, without mention being made of the bronchi, in thirty; nothing in the air-passages, or rather some alterations without false membranes, in twenty-one. In fifty-four *post-mortem* examinations, M. Bretonneau found false membranes, terminating at different points in the trachea, in thirty-one; penetrating into the large bronchi, in sixteen; in the terminal bronchi, in seven.

Out of one hundred and seventy-one cases of *post-mortem* examinations in Croup, one hundred and fifty exhibited false membranes in the air-passages, and there were seventy-eight in which these false membranes were confined to the trachea, and only forty in which they penetrated to the bronchi. This result is very favourable, as will be perceived, to the success of tracheotomy.

The characters of the false membranes vary considerably. They are sometimes as delicate as the external membrane of an egg. Those of the second or third formation are generally more delicate than those which are developed at the commencement of the disease; still I have found them in several cases very thin in patients who had died in the space of forty-eight hours from sporadic Croup; but most frequently they are, at the period of the invasion of the disease, thick, white or yellowish, and opaque. They are often a line in thickness,

and sometimes much less. The surface which corresponds to the mucous membrane is sometimes dotted with little red points; sometimes reddish lines are observed. The false membranes do not always present a homogeneous tissue in their structure; they are often composed of small rounded agglomerated, opaque flocculi, disseminated through a more transparent tissue. Their consistence is very variable; in most cases, it is firm and almost coriaceous; in others, on the contrary, it is soft and diffluent, being especially so in proportion to its distance from the larynx.

Whatever may be the varieties presented in other respects by the pseudo-membranous formations of Croup in their texture and consistence, the results of chemical analysis are identical. They are all insoluble in cold and even hot water. The dilute sulphuric, nitric, and hydrochloric acids shrivel and harden these plastic productions. Concentrated acetic acid, liquid ammonia, and alkaline solutions dissolve them, and convert them, according to M. Bretonneau, into a diffluent and transparent mucus, exactly in the same time, in the same vessels, and at the same temperature. This excellent observer has ascertained that they are also softened and dissolved in a strong solution of nitrate of potash. The croupal exudations afford, on incineration, sulphate of lime and carbonate of soda.

In Croup, as in most diseases, a pretty large number of varieties have been observed, to which, however, we shall abstain from giving as many different names, after the manner of certain authors. The most important of these varieties are those which relate to the different forms under which the disease presents itself, and to its different complications. Some authors, and particularly Jurine, have admitted intermittent Croups. In the three cases on which he has founded this distinction, the patients had a kind of croupal voice, but in the individual whose body was opened, he discovered only some thick mucous matters in the bronchi. Thus the observations of Jurine must refer to catarrhs attended with remissions in the fits of cough and the febrile exacerbations. I do not know of a single well-authenticated case of really intermittent Croup; for we must not consider in this light the cases which present a true intermission between the first and second period, when the Croup is not yet confirmed. The examples of this kind of intermission are not very rare. I have seen a well-marked case of this variety. A child, after having coughed a little and suffered from a fit of croupal voice during the night, had completely resumed its habits and cheerfulness, and

had gone to walk and play all day in the garden of the Luxembourg: but on the following night all the characters of Croup were developed, and in spite of the most active treatment, adopted during the night by M. Magendie, the child was on the point of death when I was called to see it at ten o'clock in the morning. All the usual measures having been adopted and the death of the child being imminent, we proposed tracheotomy, which was performed immediately, in my presence, by M. Magendie. We were able to extract, by means of a feather introduced into the trachea, several very delicate membranous strips which readily diffused themselves in water. But the amelioration was only temporary, and the child died in twenty-four hours. The intermission had here been very evident, but it was between the first and second period. When Croup is confirmed, we sometimes also observe, more or less lengthened remissions between the fits of cough and suffocation; but then the patient always retains some aphonia and a laryngo-tracheal hissing during these intervals; the intermission is not really complete, and is only a kind of remission due undoubtedly to the fact, that the membranes, not being yet free in the trachea, are only partially detached by the fits of cough. It would, in fact, be difficult to conceive an absolute suspension of all the symptoms, when the false membrane has once been formed.

Complications of Croup.

Independently of the varieties presented during the progress of Croup, it is essential to describe the different diseases with which it may be complicated, because they may require important modifications in the treatment. The most frequent complication of Croup is that of Membranous Pharyngeal Angina, since in almost all cases it commences in the pharynx, and it is evidently the same disease, being distinguished from it in this treatise only in conformity with the system pursued in most nosological works. Membranous coryza, which is also only a simple extension of laryngo-tracheal Diphthérite, coincides with it rather frequently and adds considerably to its danger, but it is much less common than Pseudo-Membranous Angina. Diphtheritic œsophagitis must be rare, for I have never met with it, and I do not know that any author has mentioned it; diphtheritic inflammation generally ceases at the limits of the pharynx, but I have found it several times in the stomach, the internal surface of which was partly covered with a false membrane exactly similar

to that observed in the larynx. When Dr. Albers of Bremen, came, in 1823, to visit the Hôpital des Enfans, I showed him the autopsy of a little girl who had died of Croup, and of this last-mentioned form of pseudo-membranous gastritis, which he had never before seen. Enteritis and entero-colitis, which are so frequent in children, sometimes appear as complications of Croup, but I have never remarked that they then assumed the pseudo-membranous character which I have just described in gastritis. Bronchitis, more or less extensive, is met with pretty frequently with Croup, and this complication is not so serious as I at first imagined. It has even appeared to me to be rather favourable, because it facilitates the separation and a kind of solution of the plastic exudations. It may even happen, sometimes, that the abundance of mucous matters in the bronchi and the larynx entirely masks the croupal cough. I saw, at the Hôpital des Enfans, a phthisical young girl die of a very intense attack of Croup, which lasted only four days. The false membrane extended into the pharynx and larynx, and descended in the form of a band into the trachea; but still the cough had never once been croupal, from the great quantity of mucus and pus which was thrown up at each time by the fits of coughing. In this remarable case, aphonia and laryngo-tracheal sibilation united with Membranous Angina were the only symptoms which could give rise to the suspicion of Croup, for the cough was as moist as in a simple catarrh. Besides this case, I have sometimes met with Croup in the advanced stage of pulmonary phthisis, and it has then always been very speedily fatal. Authors have not sufficiently insisted upon the complication of Croup with pleuro-pneumonia. These complications are, however, very frequent, and add considerably to the danger of the disease. Croup may supervene during the course of pleuro-pneumonia, an instance of which has been related by M. Blache. At other times pneumonia may be developed at the end of the disease, or even after it, and cause death after the patient has apparently escaped from danger. Hooping-cough sometimes complicates pseudo-membranous laryngitis. Joseph Frank quotes several cases of this kind, and Dr. Finaz has described in the *Revue Médècale*, a curious case of this complication, in which the patient, aged ten years, recovered. He observes, with some reason, that the repeated shocks of the hooping-cough, by promoting the excretion of the false membranes, may have contributed to the favourable termination of the disease. The complication became, in fact, a favourable circumstance.

Croup may be complicated with all the erruptive diseases, and develop itself during their progress or towards their termination. It has even been supposed that the acute cutaneous eruptions might be placed among the occasional causes of Croup, but this is evidently an error, for the examples of Croup with measles, smallpox, and scarlatina, are rather rare, although some cases of the kind are to be found in books. I have seen Croup only once during scarlatina, and in one of these cases I had the operation of tracheotomy performed which favoured the expulsion of some membranous shreds, but the improvement was only transient. In three cases of variola which I once observed, the disease was complicated with Croup and terminated fatally. Croup must not be confounded with a kind of laryngo-tracheitis which is not rare during the course of smallpox. In this kind of laryngitis, the cough is dry, harsh, painful, and even tearing; but it is not accompanied with the peculiar sibilation and the fits of suffocation which are observed in Croup. No trace of false membrane is observed in the pharynx, nor any swelling of the cervical glands. The voice is simply hoarse and feeble, and presents nothing of the tone resembling that of ventriloquists.

Diagnosis of Croup.

Croup may be confounded with several other diseases. Ordinary laryngitis, of a merely mucous character, is considered by many physicians, Croup in a less acute degree; but it differs essentially from it in several characters, for the cough is not sibilant as in Croup; it is more sonorous, more sharp, less dry, and very painful. Difficulty of breathing, and suffocation are constant but are not renewed by paroxysms as in membranous laryngitis. The voice is low, in consequence of the pain experienced by the patient in speaking, but it has not the tone peculiar to Croup, and, lastly, it differs in all its antecedents.

Acute laryngitis and œdema of the glottis, although presenting symptoms rather analogous to those of Croup, differ from it in the absence of the false membrane; while other diseases in the vicinity, although very distinct, resemble it, on the contrary, by the very presence of the plastic exudations. The spitting up of a false membrane formed in the trachea or the bronchi, is not, in fact, sufficient alone to characterize Croup; for several inflammations of these parts may terminate by a membranous exudation, and yet may not present the symptoms

of the diphtheritic affection of the larynx. The principal anatomical character is the same as that of Croup; but the physiological phenomena which are observed in these different cases are essentially distinct. Non-diphtheritic pseudo-membranous tracheitis is not very rare, and I have seen several examples of the kind without any complication with other diseases, or complicated with measles. This disease does not present any of the signs of the first ordinary period of Croup; it commences by a more or less intense fever and a dry, sharp cough, which causes a more or less tearing pain in the trachea; the patient speaks in a low voice, in consequence of the acute pain which he experiences in speaking, but there is neither loss of the voice as in Croup, nor laryngo-tracheal sibilation between the fits of coughing and the articulation of the words; it is evident that the larynx is free. In the second period of membranous tracheitis, the cough becomes more moist, and the respiration, although difficult and wheezing after the fits of coughing, and between the fits, presents nothing comparable to the dry and metallic rhonchus of Croup and the fits of croupal suffocation. In the third period of this disease, the wheezing and the difficulty of breathing increase, and the patients generally throw up, after violent fits of coughing, membranous ribbon-shaped shreds of greater or less extent. If the inflammation is confined to the trachea, the spitting up of this false membrane generally puts a stop to all the symptoms, and the patient becomes almost immediately convalescent, because in this case the reappearance of the false membrane is not to be dreaded as in Croup. But if the tracheitis is complicated with bronchitis and measles, as I have seen in an epidemic which some years ago attacked some orphan children, then the patients often sink with all the signs of most serious and extensive bronchitis, and on opening the bodies there is found a puriform mucus which is sometimes propagated from the trachea to the extremity of the bronchi, and in the midst of which float several thickened flocculi or small shreds of false membrane.

Treatment of Croup.—When Croup commences in the pharynx, as is usually the case, the treatment indicated is that of Membranous Angina. We must immediately have recourse to the cauterization of the affected parts, either with weakened hydrochloric acid, or almost pure citric acid, or, better still, a solution of nitrate of silver, applied to the parts by means of a sponge fixed upon a flexible piece of whalebone. When we have reason to fear the supervention of

Croup, the solution of nitrate of silver must not be employed too strong, because the concentrated solutions of nitrate of silver produce by themselves a kind of false membrane, a sort of fictitious Croup; they coagulate the mucus as they do albumen, as may be shown by shaking mucus with a very strong solution of this salt. It will be sufficient, in order to modify the plastic inflammation on the walls of the pharynx and at the orifice of the glottis, to employ a solution of four grains of nitrate of silver to half an ounce of distilled water.

If Croup, instead of commencing in the pharynx, begins in the larynx, which is rare, or even in the trachea, which is much more rarer, the first period is altogether wanting. The local treatment, which is very useful when the disease begins in the pharynx, is useless at this period. It is only in a few persons, who have the isthmus of the throat very wide, and in whom the surface of the epiglottis may easily be perceived by lowering the tongue, that it might perhaps be possible, by raising the epiglottis, to apply the sponge, moistened with the caustic solution, to the larynx, or to insufflate into it some powdered alum; but whenever the pharynx is very narrow, it would be very difficult to penetrate into the larynx, and the patient would be very much fatigued without any good result. We must, therefore, in such a case, renounce topical applications for the time, and have recourse to general therapeutical measures, as in the cases where the disease has regularly passed from the pharynx into the larynx.

The general thereapeutical measures which may be employed to subdue pseudo-membranous laryngitis have undoubtedly a very limited action; but to reject them entirely, and thus to allow ourselves no hope of curing the patient, except by having recourse to tracheotomy, would be as dangerous and blameable an error as that of the physicians who repudiate the use of all local remedies in the treatment of Croup. Experience proves that children and adults, evidently affected with membranous laryngo-tracheitis, have recovered under the influence of general measures only, and without any local treatment. The exclusive partisans of local treatment will undoubtedly say, that the patients in such cases have recovered spontaneously and in spite of the general measures. Still it is at least evident that these measures have not been injurious, and to every impartial observer it is probable that they may have assisted the efforts of nature, which has never, perhaps, in this disease, effected a spontaneous cure. There are two principal indications to be fulfilled in the second stage of Croup, namely, to limit, if possible, the progress of the phleg-

masia, and to facilitate the excretion of the false membranes, if the disease does not terminate by the adhesion of the membrane itself, which is the rarest possible method of cure. It must be admitted that we possess scarcely any means of limiting the phlegmasia when it has penetrated into the air-passages, because it is impossible to apply caustics without running the risk of great danger, as will be seen hereafter; and although the contrary has been asserted, and is still maintained, it must be allowed that blood-letting has certainly not succeeded in arresting this specific phlegmasia as it has unquestionably done in most ordinary inflammations. As long as the disease is confined to the pharynx, the false membranes are seen to extend and to be renewed in spite of blood-letting, and when it has penetrated into the larynx, this therapeutical measure possesses no efficacy in limiting its extension. In order to be convinced of this truth, it is sufficient to read over the greater part of the cases of true Croup, published up to the present time, and we shall find that the disease advances with more or less rapidity under the influence of general and local blood-letting, and almost always terminates fatally, although the depletion has been often carried to the utmost possible extent. Still I do not think that we ought in all cases to banish this powerful therapeutical agent from the treatment of Croup. It even appears to me useful to have recourse to general and local bleedings in adults and in strong, vigorous children, when symptoms of imminent suffocation are manifested at the beginning of the disease, in order to retard, at least for a time, the supervention of asphyxia, and, by re-establishing the freedom of the circulation, to give time for the action of other remedies. I have seen a nun attached to the Hôpital des Enfans recover from Croup, under the influence of a bleeding alone, for she constantly refused to adopt any other remedial measure. After some violent efforts she expectorated several strips of membraniform exudation, and remained almost entirely speechless for a month after her cure. Bleeding is especially indicated when Croup is complicated, from its commencement, with pleurisy or pneumonia, or other inflammatory diseases; but the more useful this measure is in all these cases, the more injurious will it be in feeble persons and those who do not present the indications of a strong reaction; for we must not lose sight of the circumstance that by weakening these patients, we evidently accelerate their death, and that the only chance left for them to escape from danger is by preserving their strength.

The employment of mercurials is a very valuable therapeutical measure which ought never to be neglected in confirmed Croup when we are summoned at the beginning of the disease, and when the symptoms are not too urgent, or the patient too weak. These medicines undoubtedly fail in many cases, but still their use is attended with considerable success. I have seen three cases of Croup recover under the influence of mercurial frictions, and in one of these cases the symptoms ceased as if by magic as soon as salivation commenced. M. Bretonneau has collected seven cases of cure by mercurials. Frictions on the sides of the neck, the armpits, the inside of the arms and the edges of the gums ought to be employed almost simultaneously with the internal use of calomel. But this latter medicine ought to be administered only as an alterative, and never with the intention of producing a purgative effect; for if it purges abundantly, it weakens, and this is a result which must, if possible, be avoided. In order to obviate this inconvenience, it is a good plan to give the calomel at first in divided doses of a quarter of a grain to half a grain every half-hour or every hour, and to mix it in mallow paste, powdered gum, or sweetmeats, recommending the patient to let them melt in the mouth. If these small doses do not produce any laxative effect, the mineral is then administered in larger proportions, but always in the same manner. But it cannot be denied that mercurials, especially when they produce salivation, often throw the patients into a very distressing state of debility which may become fatal, and M. Bretonneau has mentioned several instances of the kind. It is therefore prudent never to try this method of cure in subjects of a feeble constitution, or who have been weakened by former diseases, and even to suspend the action of the mercurials as soon as their injurious effects are observed, and to have recourse to the use of tonics. For this reason, it is better to adopt this kind of treatment in summer than in winter, and perhaps even to abstain from it altogether during moist seasons.

In endeavouring to modify the diphtheritic phlegmasia by mercurials, we must attempt, on the other hand, to promote the separation and the excretion of the false membranes by all possible means. Expectorants and emetics should especially be employed. The sulphuret of antimony and the tartrate of antimony and potash are especially preferable to all other medicines in producing these effects. We may add still more to the efficacy of the emetic by administering

it in a strong decotion of polygala (senega) with syrup of ipecacuanha. The oxymel of squills may also be advantageously combined with emetic and expectorant draughts. The action of these therapeutical resources is sometimes promoted by tickling the pharynx with the feathers of a pen. None of the measures which tend to excite vomiting, should ever be neglected. As to the sulphuret of potassium, so much extolled for sometime as a pretended specific, and now almost universally and justly abandoned, it acts only by exciting nausea and the regurgitation of liquids secreted in the pharynx; if it were taken in the stomach in certain proportions it might cause, as I have observed, a more or less intense attack of gastritis.

Sternutatories, in powder or in vapour, and irritating purgatives with vinegar, have certainly been sometimes beneficial, but the shocks caused by such means as well as by emetics can only be followed by successful results, when abundant mucous deposits are secreted in the bronchi, raising the false membranes and thus facilitating their expulsion by spitting. All these therapeutic agents fail when the cough is constantly dry.

Energetic purgatives, and especially purgative injections, so much praised by some practitioners, may, perhaps, momentarily diminish the difficulty of respiration; but for my own part I am convinced that we cannot attribute to them the cure of a single case of true Croup, and that on the contrary, by weakening several patients, they have accelerated their death.

Cold effusions, employed in the last stage of Croup by Dr. Harders of St. Petersburg, and practised by some other physicians in Germany and France, have manifestly excited a vivid reaction in certain cases, and produced fits of coughing which have facilitated the expulsion of several membranous strips; still there is no well-ascertained example of a cure obtained by this measure alone, which, besides, appears to me to be attended with serious inconveniences in a disease which is so often complicated with inflammation of the lungs.

Tracheotomy.

When the most energetic general therapeutical measures, which we have just passed in review, have been employed in a suitable manner, according to the particular indications presented by different cases,

and when, nevertheless, Croup is making rapid progress and is arriving at its last stage, we must then renounce all medicinal agents which only fatigue and weaken the patients and have recourse to the only measure which still offers any chance of success, namely, tracheotomy. M. Dupuytren, in the last stage of Croup in a child of Bonaparte's Mameluke, employed a very simple method; for he attempted to detach the false membranes of the larynx and to extract them by rapidly sweeping out the interior of this organ with a sponge fixed upon a piece of whalebone. He in fact succeeded, although with great difficulty, in extracting some membranous shreds, and this painful and delicate operation was followed by a momentary calm; but still the child died, and on the autopsy it was discovered that the pellicular exudation extended into the bronchi. This operation, which is a very difficult one and requires great dexterity, cannot, besides, be attempted with any probability of success, except when the membranous exudations are confined to the glottis, which is rarely the case, as we have seen above when treating of the pathological anatomy of Croup. But as in most cases the false membranes are prolonged more or less into the trachea and it is impossible to ascertain their extent, we should run the risk, by thus introducing the sponge into the larynx, of pushing back the false membranes into the bronchi, and of introducing asphyxia which might become speedily fatal. It is therefore more prudent to renounce this operation, and to adhere to tracheotomy, which causes the immediate cessation of all the symptoms of asphyxia, and indisputably prolongs the life of the patients, even when it does not rescue them from certain death. Every time that I have seen this operation performed, even without success, I have observed a sensible improvement, at least for several hours, and sometimes for several days.

The necessity for the operation appears to me evident whenever Croup has arrived at its last period, and when the cough is very infrequent and dry, the voice suppressed, the laryngo-tracheal rhonchus dry and metallic, the inspirations deep and frequent, with violent contraction of the muscles of the neck, and of the alæ nasi, and swelling of the abdomen. We must not wait until asphyxia is imminent and the weakness too great; the favourable chances of the operation depend principally, as we have stated, upon the strength of the patient. Although the signs we have just described indicate the most pressing danger and the necessity of the operation, we

must, nevertheless, renounce it if the patient is evidently phthisical or is affected with a very extensive double pneumonia; death being certain in these two cases, we should not induce the patient to submit to the sufferings attendant upon a useless operation. If pneumonia existed only on one side, I should still advise the operation in such a case, although it presents very few chances of success; but I am certain that it does not add to the danger of the disease. My son has four times performed the operation of tracheotomy in Croup, and twice in cases of complication with pneumonia. In one of the cases the patient lived to the eighth day and in another to the fourteenth day, the wound being almost cicatrized. The younger the children are, the more the operation should be accelerated, because the disease advances much more rapidly in them than in those who are approaching puberty, and in adults. The danger is less pressing in young children if Croup is complicated with Hooping-cough or Catarrh.

Tracheotomy has been proposed from the most remote antiquity in serious cases of Angina, and was more particularly advised in the fifteenth century by René Moreau, in answer to Bertholin, who had asked his advice during the epidemic of Gangrenous Angina which prevailed in Italy. The operation has been attempted in Croup a great number of times for many centuries back. Several distinguished practitioners have performed it in the last forty years in England, France, Geneva and Germany, and yet it was not until 1825, when M. Bretonneau met with his first successful case, that a single instance of success had been recorded, and this was one by Dr. André of London, first related in Borsieri. After six unsuccessful operations, M. Bretonneau had the courage to perform it for the seventh time, and this seventh operation was crowned with success. He has performed altogether seventeen operations, and has succeeded five times. The service rendered by M. Bretonneau to the treatment of Croup is immense, and has never been so much appreciated as it deserves. Tracheotomy did not usually succeed in Croup, because no precautions were afterwards taken to ensure its advantages, The mere performance of the operation does not alone constitute the cure. Success depends essentially on all the means which are employed to facilitate the free access of air by means of a wide canula well adapted to favour the elimination of the membranous strips, while at the same time the renewal o he false membrane is opposed

by the employment of local applications. Still I must observe that great caution must be exercised in the use of caustic solutions, even in a weak form, in the interior of the larynx and trachea: for these measures are seldom necessary, and if they were employed without great precaution, and a few drops of a very caustic liquid, or even some portions of calomel or alum should penetrate into the extreme bronchial tubes, these substances would infallibly give rise to fatal pneumonia. The experiments made upon animals by M. Bretonneau, and since repeatcd by M. Miguel of Amboise, have demonstrated this truth in the most evident manner. Since the success of M. Bretonneau, one of his most distinguished pupils, M. Trousseau, has had occasion to perform tracheotomy a great number of times in Croup, and in following the proceedings of his master, he has succeeded nine times in thirty-four cases. M. Scoutteten at Metz, M. Gerdy at Paris, also reckon one case of success each, and according to Samuel Cooper, Mr. Chevalier, an English surgeon, and Messrs. Lawrence, Blicke and himself, have had equal success. We may, therefore, reckon more than twenty examples of the success of tracheotomy in Croup.

Prophylactic measures against the diseases designated as Croup.

The means of preventing the attack of diseases consist entirely in hygienic precautions. All that has been said of the utility of exutories is unsupported by any positive experience; on the contrary, examples of fatal Croup are recorded in individuals who bore the marks of cauterization or blisters. Nor do spontaneous suppurations act as preservatives, for I have seen children die of Croup who had eruptions on their head and skin; others who had scrofulous ulcers, and even several who were phthisical at the last stage. The frequently repeated use of emetics and purgatives which has been advised as prophylactic, is quite as useless as exutories, and may produce the further inconvenience of determining inflammatory affections of the intestinal canal to which children are naturally very liable. No greater confidence is to be placed in the other methods of treatment which have been proposed; some have recommended the employment of depressing agents, and in particular, frequently renewed applications of leeches to the neck, tepid baths, &c.; others, on the contrary,

have recommended stimulants and diaphoretics. All these measures may be, undoubtedly, useful if the child is ill, and if, moreover, they are employed in suitable cases; but they will always be more or less dangerous and hurtful if the child is in good condition, because they alter the health, and we have seen that diseases do not secure the patient from Croup any more than the most robust state of health. We must, therefore, reject from the prophylaxis of Croup, all the therapeutical measures which have been proposed only in accordance with isolated and unmeaning observations, and are invested with the charm derived from illusory views, from which it is so difficult to guard ourselves when we desire to make ourselves useful.

We can protect children from the influence of croupal affections only by removing them from moist or cold parts of the country, where these catarrhal diseases are frequent, and prevail in an endemic or even epidemic manner. M. Valentin quotes the case of a merchant who quitted Geneva because his children had frequently had Croup there (most probably stridulous laryngitis), to come and live at Marseilles, where they enjoyed perfect health for four years. The case quoted proves that these diseases are in fact unknown, or at least very rare, in certain parts of the country. But since it is impossible to resort to this prophylactic measure which, to say the truth, is the only one known, what precautions ought to be taken, in moist and cold districts, in order at least to diminish the influence of the causes which give rise to croupal diseases? These precautions are the same as those which are adapted to guard persons from all catarrhal affections in general. It is, however, necessary here to remember the distinction which we have established as to the frequency of these diseases in the different classes of society. Membranous laryngitis is perhaps more common, as we have stated, in the indigent classes than in those in better circumstances, because all the causes which may produce severe catarrhal affections are found united in this class of society rather than in the others, and because, when this disease prevails epidemically and sometimes becomes contagious, it is much more difficult for the poor person to remove from it than for the rich; yet there is in the manner by which this disease manifests and propagates itself, something specific as in the disease itself, and which appears to be independent of the causes which usually produce the other catarrhal affections. Croup, in fact, strikes into all classes of society, and upon persons who have very different man-

ners and habits of life; and the principal cause of these unforeseen and insidious attacks is entirely concealed. How, then, would it be possible to protect ourselves from the attacks of a disease the cause of which is not known? We must adhere to general precautions which tend to ward off catarrhal affections; but it must be admitted that these precautions are not always sufficient when the disease prevails in an epidemic manner; it may then in certain cases become contagious. It is, therefore, always prudent to isolate the patients; and for those who can do it, the safest of all prophylactic measures is to remove from the places where the disease prevails.

TROUSSEAU.

TROUSSEAU ON DIPHTHERITE.

(*Dictionnaire de Médecine*, 1835.)

M. Bretonneau has given the name of Diphthérite to a special disease which may develop itself upon the mucous membranes and the skin, but which shows a marked preference for the pharynx and the air-passages, where it constitutes the diseases commonly known under the denominations of Membranous, Malignant and Gangrenous Angina, and also under that of Suffocating Angina, and more particularly of Membranous Croup.

Before M. Bretonneau, some physicians, and Starr in particular, had remarked that, in certain cases of malignant Angina, the skin was covered with white, putrid, false membranes, terminating in the production of gangrene; these authors had partially seen the analogy which might exist between the lesions of the pharynx, and those of which the skin was the seat. But M. Bretonneau determined the facts in an explicit manner, and he demonstrated that Diphthérite had everywhere the same characters, whether it was observed on the skin or on the gums, the tongue, the pharynx, the œsophagus, the external auditory canal, the nasal fossæ, the air-passages, &c.; and he gave a complete description of the disease. Having been a pupil of this learned physician, and being acquainted with all his ideas upon this important pathological subject, I have been enabled, in the midst of extensive epidemics of Diphthérite, to see the disease in all its forms in the course of a very short time. I shall describe it successively upon the skin and upon the mucous membranes.

Cutaneous Diphthérite.—I have never seen Diphthérite develop itself on the skin unless it was previously deprived of its epidermis, or ulcerated, that is to say, unless it approached more or less to the organization of the mucous tissue. Thus, in the course of an epidemic, I have seen leech-bites, slight cuts, *herpes* supervening upon

an attack of fever, blisters, cracks of the breast, excoriations of the scrotum, of the ears, of the hairy scalp, of the nose, of the anus, and different wounds; all these have become the causes of the development of cutaneous Diphthérite; and this has not occurred in a small number of isolated persons, but among some of the members of almost all the families in the same village; so that it is quite astonishing that so common and so severe a disease could have remained unnoticed.

As soon as Diphthérite attacks a wound, the spot becomes painful, allows the escape of a great quantity of colourless and fetid serosity, and is soon covered with a greyish, flabby, and more or less thick membrane. The edges of the wound are swollen, assume a violet-red tint, and are considerably elevated above the base of the ulcer; still the disease does not usually extend, but it remains stationary for whole months. Sometimes, however, even when the epidermis alone has been removed, it has been seen to be covered again immediately with a white membrane analogous to that which is observed on blisters. A kind of erysipelas is soon developed round the excoriated part. On the surface of this inflammation the epidermis is elevated, in a multitude of points, by small masses of lactescent serosity, so that the skin is covered with confluent vesicles in the vicinity of the wound, but less and less numerous in proportion as they approach the integuments which are still healthy. Among these vesicles there are some which seem to have been formed by the union of several others which, whether simple or united, burst asunder, and then, in their place, the dermis is seen covered with a white membrane; these excoriations are united to others which are smaller and unite with the principal one, and thus the disease gradually gains ground.

Thus, Diphthérite commencing with a slight excoriation of the hairy scalp or of the back of the ear, may attack the skin as far as the loins, as I have elsewhere proved. (*De la Diphthérite cutanée*, Archives Gén. de Med., t. xxi. p. 541.) The pellicular concretions, which are at first thin, gradually become thicker, those which are forming on the surface of the dermis incessantly elevating those which have been first secreted, so as to form a kind of foliated membrane, the thickness of which may amount to four, five, or six lines. The layers of exudation in contact with the skin always preserve a certain degree of density; but the most exterior, bathed in the serous secretions, become softened and putrefied, change colour, assume a grey and sometimes blackish tint, and exhale a dreadfully fetid odour,

rendering it almost impossible to believe otherwise than that the whole skin is sphacelated. Here the same error is committed as in the case of pharyngeal Diphthérite, which is still, in the present day, in spite of the labours of M. Bretonneau, often regarded as a gangrene of the back of the mouth.

I do not assert that the gangrene may not in certain rare cases attack the parts affected with Diphthérite. I have observed this occurrence only twice; and besides, the sphacelus was confined to a small portion of the velum palati in one case, and of the skin of the arm in the other. Still when the disease extends rapidly or occupies several points at once, the fever may be very acute; but most generally it is almost insensible, and approximates to the form of the hectic fever accompanying suppuration.

I have mentioned just now that, although Diphthérite remains most frequently limited to the portion of the skin originally attacked, cases also happen where the phlegmasia gradually gains in extent, and finishes by attacking large surfaces. The mode of invasion has this peculiarity, that it generally takes place from the superposed parts towards the depending portions; thus Diphthérite is never seen ascending from the arm to the shoulder, and from the nape of the neck to the hairy scalp; but, on the contrary, descending from the shoulder to the arm, from the nape of the neck to the back, from the abdomen to the loins, and from the nipple to the rest of the breast. The diphtheritic inflammation is very probably propagated by the irritation excited by the prolonged contact of the serous secretion, whether this secretion bathes the depending parts as it flows, or is retained by the dressings.

But this extension of the disease differs very much from its repetition, if I may so express myself. Thus it is sufficient for one point of the skin or for one mucous surface to be the seat of Diphthérite, in order that the malady should repeat itself in several different points, under the influence of the least occasional irritation. Thus it happens that a simple coryza or a slight otitis, or a mild sore-throat, or a slight bronchial catarrh may become the immediate occasion for the repetition of the Diphthérite, which then constitutes a formidable complication.

Buccal Diphthérite.—This disease has been very well described by Van Swieten under the name of *Scorbutic Gangrene of the Gums* and of *Watery Cankers:* it is one of the forms of the *stomacace* of the ancients, and of the *fégarite* of the Spaniards. The distinguished

commentator of Boerhaave, who believed it to be of a scorbutic nature, nevertheless, recognized its identity with Malignant Angina; but M. Bretonneau has removed all doubts upon this point.

Buccal Diphthérite is far from having always the extreme severity which would seem to be indicated in the description given by this pathologist. The disease often remains limited for a long time to the commissure of the lips, to one of the gums surrounding a carious tooth, or to a portion of the tongue corresponding to a broken one; but in cases unfortunately too common, it is also propagated from the mouth to the pharynx, and thence, with fearful rapidity, into the larynx, where it destroys the patients from croupal suffocation. It is remarkable that Diphthérite has such a manifest tendency to propagate itself from one point to another on the skin, in the pharynx, in the nasal fossæ, &c.; and that it remains sometimes several months in the mouth, and that there it gradually wears itself out, without attacking the throat or the lips. Such an anomaly could not certainly be anticipated *à priori*.

I have just stated that Diphthérite, when it occupies the mouth, has very little tendency to propagate itself; but, on the other hand, it has a considerable tendency to repeat itself on other points. Thus, Malignant Angina, Croup, and membranous ulcerations of all kinds will frequently affect those whose buccal mucous membrane is the seat of Diphthérite.

Pharyngeal and Tracheal Diphthérite.—It is a sad reflection that the most frequent seat of Diphthérite is the mucous membrane of the pharynx, and that of the air-passages, without our being able to assign the causes of this fatal predilection. This greater frequency, which is evident at ordinary times, and when the disease is sporadic, is no longer observed when the affection prevails epidemically: at such periods, we may see, in a village, the greater part of the inhabitants presenting diphtheritic ulcerations in their skin, and Croup numbering but few victims. I must here refer to the articles Angina and Croup in the *Dictionnaire de Médecine*, and also to the work of M. Bretonneau, for the demonstration of the identity of Croup, Malignant Angina, and buccal Diphthérite; and I should rely on the same arguments as he has adduced, in order to prove the identity of cutaneous Diphthérite and the diseases of which I have just spoken, under whatever denomination they may have been known in science.

Of the causes of Diphthérite.—When I saw Diphthérite prevailing

as an epidemic at Tours, I thought that the position of this city, which is situated in the midst of a valley watered by two rivers, had some influence upon the development of the disease, and I attributed, like almost every one else, the cause of this formidable affection to cold, and especially to humidity. But in glancing over historical documents I soon became convinced that these supposed local causes could be considered at most only as accessories; and after I had myself made some statistical and comparative observations in four departments where the disease had presented itself in an epidemic form, and was dreadfully destructive, I became certain that Diphthérite did not depend either on seasons or localities. Thus, in the towns and hamlets of the Department of Loiret, which are remarkable for their salubrity and for their excellent geographical position, I saw Diphthérite raging with excessive violence, while some villages of Sologne situated in the midst of marshes, remained exempt from the scourge; and on the other hand, some hamlets and towns situated on the banks of ponds were depopulated by the epidemic, while others enjoyed a perfect immunity, which was thought to be attributable to the ordinary salubrity of the place.

If we examine into the habits of the population in order to find the causes of the disease, we find the same difficulty; for while some communes covered with vines and rich harvests, in the Blaisons, the Orléanais, and in Berry, lost more than a tenth of their inhabitants, very few losses were experienced in some poorer cantons, where the peasants procure only a scanty subsistence from the soil; but the contrary was equally observed.

Hygrometrical, thermometrical, and barometrical influences gave no better explanation of the appearance, the increase, or the disappearance of the epidemic; for while in 1825, a year remarkable for its extreme dryness, some communes situated to the north of Orleans were ravaged by Diphthérite, it was ascertained that the commencement and the maximum intensity of the epidemic in one commune, did not occur at the same time as in the neighbouring commune placed under the same appreciable conditions. On the other hand, in the year 1828, which was not very hot and rather rainy, Diphthérite was found to number, in the south of Orleans, as many victims as it had made in the north, in 1825; and when I consulted the tables of mortality of the different villages which had been attacked by the scourge, I found that the first deaths coincided in one case, with the commencement of the winter, in another with

the rainy days of spring, and in a third with the middle of summer. It is therefore necessary to exclude from the causes of the disease all the conditions which were not uniform.

It must be admitted that misery, if not an exclusive condition, was at least rather an ordinary one, of the development of Diphthérite; for it was evident that the epidemic seized upon the poor inhabitants in preference to those who were in easy circumstances. But inasmuch as the richest families also experienced several losses from the disease, it is necessary to seek for some more general cause than poverty for its development.

It is evident to me that contagion performs the principal part in the propagation of Diphthérite, as I have, I think amply demonstrated in the work which I have published in the *Archives*. Thus, it was sufficient for a patient attacked with Diphthérite to come into a family in order that the disease should develop itself in all its forms. But of all the modes of transmission, the most common is unquestionably the cutaneous Diphthérite, and for the following reasons. The disease lasts so long, that mediate and immediate contact is the more easy and the more frequently repeated. Among poor families, the same bed, the same clothes, and the same utensils, often serve for almost everybody, and it must happen that the virus, accumulated in greater force in proportion to the want of cleanliness, quickly attacks all the members of the same family. Thus I have seen, in 1828, thirteen persons out of seventeen die in the same farm-house.

Still, I wished to perform upon myself a direct experiment, with the view of ascertaining the communicative action of the serous secretion which flows in such abundance from the cutaneous surfaces attacked with Diphthérite. I accordingly steeped a lancet in a false membrane which I had just extracted from a diphtheritic wound, and I made one puncture in my left arm, and five or six on the tonsils and the velum palati. I found, on my arm, at the seat of the puncture, that a vesicle was developed very similar to that of vaccination; but there was no result upon the mucous membrane. Experiments of a similar character would require to be repeated; but even if they should not be followed by the development of Diphthérite, it must not be concluded that the disease is not transmissible, but only that inoculation is not the method of transmission. The same remark applies to rubeola and scarlatina, the contagious properties of which are denied by none, so far as I am aware.

Of the danger of Diphthérite.—Diphthérite may be dangerous

by the mere fact of the intensity of the phlegmasia since it may, although rarely, induce gangrene of the parts. But what renders it especially dangerous is the rapidity with which it may attack large surfaces, as well as the mechanical obstacle which it may offer to one of the most important functions of life, and the obstinacy with which it resists therapeutical resources which generally modify other inflammations. Thus, although it is generally not very dangerous on the skin, it becomes so when it attacks the mouth, the nasal fossæ, the vulva, or the vagina; but it is most frequently fatal when it attacks the pharynx, and unless it is immediately combated by energetic treatment, it scarcely ever spares the patient when it has once reached the larynx and the bronchial tubes.

Treatment of Diphthérite.—If Diphthérite did not differ from simple inflammations in its form, its progress, its danger, and in a word, in numerous characters which make it an altogether special disease, it might be supposed that antiphlogistic treatment would be serviceable, but we may conceive *à priori*, that blood-letting and emollients would have no favourable influence in this disease, and experience has confirmed what analogy had led us to surmise. It is in vain to attempt the cure of Diphthérite by means of the antiphlogistic regimen. The inflammatory complication may indeed be subdued, but the disease remains without losing any of its malignity. It is thus, that by means of emollients, we may diminish the inflammatory swelling which surrounds a vaccine eruption; but vaccinia, nevertheless, preserves its indelible characters. The revulsives which are often recommended, either to subdue the diphtheritic diathesis, or to draw away the disease which is fixing itself upon important organs, are attended in general with no other result than to occasion the development of Diphthérite on the spots where the revulsives have been applied, and in this manner the disease is augmented rather than diminished. The same remark applies to all constitutional methods of treatment, which can only be employed, in this disease, to remedy the general, and never the local conditions. It is in the use of topical remedies, which are so powerful in most external diseases, that the practitioner must confide, in order to effect the cure of Diphthérite. In the first rank must be placed caustics, nitrate of silver, the acid nitrate of mercury, sulphate of copper, hydrochloric acid; after these come alum, mercurial sublimate, and the chlorides of potassium, sodium, and calcium.

But the mercurial preparations, wherever they can be applied locally,

modify most powerfully the diphtheritic inflammation. Those to which I have particularly had recourse are calomel and red precipitate. The affected parts are dusted with calomel, or a fine powder composed of a mixture of powdered sugar and red precipitate, in which the mercurial oxide has only the proportion of a twelfth, is sprinkled upon them. When Diphthérite occupies the nasal fossæ the patients inhale calomel, or the powder which has just been described. The same powders may be insufflated into the auditory canal, the vagina, &c.

As to the treatment of the Diphthérite which occupies the mouth, the pharynx, or the air-passages, it differs in reality but little from that of which I have just spoken.

Still, when Diphthérite is repeated upon a great number of parts, the patients at length fall into a deplorable state of cachexia and feebleness, and a general mode of treatment is then indicated. Bitter drinks, such as the infusion of calumba, bark, or quassia; the simultaneous administration of iron and quinine; the use of succulent aliments and fermented drinks, will then become the groundwork of the treatment.

On Tracheotomy in Croup.

(*Dictionnaire de Médecine*, 1835.)

Croup is so obscure at its commencement, and its progress is so rapid, that death is often already inevitable when we are called upon to attend patients attacked with this disease. Even when the case appears desperate, we nevertheless adopt an active mode of treatment which has no other effect than to torment children in their dying hours, while it augments very slightly their chances of recovery. Still there remains an important resource, namely, tracheotomy: "Si omnibus his non, serò, vel frustrà tentatis, morbus sit maximé recens et strangulans...statum post acerbam prognosin instituenda erit bronchotome." (Stoll *Aphorism.* p. 32, Vindob. 1786.) Thus recommended by Stoll, who appears never to have seen it performed, this operation was practised, for the first time and with success by John André, in London, in the year 1782. Caron afterwards extolled it with an ardour which appeared almost absurd; and it was strongly forbidden by the Académie de Médecine, if we may judge by the Report of M. Royer-Collard on the celebrated *Concours* of 1807.

M. Bretonneau, however, ventured to perform the operation in 1818 and 1824, and both his patients died; he performed it a third time in 1825, with success; and since that period he has performed it fourteen times, and has saved four patients. Since 1826, I have myself performed this operation thirty-six times in cases of Croup, and nine children survived, who up to the present time enjoy good health. M. Scoutteten, Senn of Geneva, and Gerdy have followed the example of M. Bretonneau, and three children more have been rescued by them from certain death. Lastly, MM. Velpeau, Guersant, junior, Sanson the elder, and Blandin have also practised tracheotomy in children attacked with Croup, and if they have not saved the patients, they have at least prolonged their life for a sufficiently long time to render the utility of the operation incontestable. Thus, reckoning the operation of André, which, however, is rather apocryphal, there are in the present day (1835) eighteen authenticated cases of cure out of about sixty operations.

Such a result no longer permits us to neglect in future a therapeutical agent which will probably obtain more extensive success when the method of treatment is better understood. I shall, therefore, study the question under three divisions:—1. Is the operation necessary? 2. The operation being deemed necessary, at what period ought it to be performed? 3. The operation having been performed what are the methods of ulterior treatment?

Is the operation necessary?—If we suppose Croup to be arrived at such a stage that death is imminent, the event may be retarded by tracheotomy; this is an indisputable and uncontested fact. If the operation were nothing more than a simple measure of delay, it ought still to be attempted, for it is the duty of the physician to prolong the life of the patient, especially in acute affections, since a few additional hours are often sufficient to enable the organism to triumph over a morbific cause, the action and the effects of which are essentially temporary. Besides, the necessity of operating should be judged by the results of the operation itself. Sixty children otherwise doomed to inevitable death have been subjected to tracheotomy; eighteen have recovered, and therefore the operation ought to be performed.

The only objection which can be offered is the following:—Nothing proves that the children who survived would have died if they had not been operated upon. To this argument I reply, that almost all were operated upon in a state so near death that it is impossible to be-

lieve that they could have lived, and that the symptoms were those which always announce a fatal termination; and this objection has no more value against tracheotomy in the case of Croup, than against this same operation in the case where a foreign body is lodged in the larynx, or against the ligature or compression of a large vessel which is allowing the escape of large quantities of blood; for if the patient recovers, it may always be said that he might have done so without the operation.

The operation, therefore, ought always to be attempted whenever the symptoms lead us to believe that in all probability there remains no other resource.

Let us now consider what may be its inconveniences. Tracheotomy in itself is an operation which is more delicate than difficult; it requires only care and presence of mind. The details of this operation are given in the article on Bronchotomy in the *Dictionnaire de Médecine*. I shall merely remark, that in that article and in almost all those which have been published on the subject, the necessity of tying the veins is very properly insisted upon; but this precept, which is useful in cases where tracheotomy is performed for a chronic disease of the larynx, should no longer be followed when the operation is performed for Croup, or for the removal of a body lodged in the air-passages. At present, 15th of January, 1835, I have performed tracheotomy thirty-eight times; thirty-six times on children or adults attacked with Croup, and twice on adults who were sinking from slow asphyxia, caused by a chronic inflammation with swelling of the glottis. I had only a single and very slight hæmorrhage in one of my patients who was attacked with Croup, and in both the others, on the contrary, there was a terrible hæmorrhage.

Thus, when I perform tracheotomy in an acute affection, I always neglect to tie the blood-vessels. MM. Bretonneau and Velpeau adopt a similar practice, and we have never had occasion to regret it. I have therefore only occasion at present to describe the accidents which may follow the operation, independently of the disease for which it is performed. This question could evidently be determined only by way of experiment, and I instituted, together with M. Hamard, a series of experiments on dogs, with a view of ascertaining the influence of tracheotomy and of the presence of a canula in the trachea. The result of these experiments is, that the animal experienced different bad symptoms, oppression and fever, for several days; and some, who were ill at the period of the experiment, were cut

off by pneumonia. It is then natural to suppose, that children with fever, and those whose lungs are already engorged, will more easily suffer from dangerous symptoms which may threaten their existence. Thus I have several times seen children sink after tracheotomy, without my being able to attribute death and the inflammatory lesions of the lungs to the extension of the false membranes. I must state, however, that none of the healthy dogs on which I tried these experiments, experienced any dangerous symptoms, and that the immediate consequences of tracheotomy appeared also to be less dangerous in children who had not been depressed by a lowering method of treatment, and who had not reached the last stage of the disease.

I may add, that having had occasion quite recently to place a canula for some time in the trachea of a lady thirty years of age, who was on the point of suffocation from a chronic engorgement of the larynx, I did not observe any pulmonary embarrassment to ensue.

The operation being considered necessary, when ought it to be performed?—As long as tracheotomy was in my hands a measure of almost uniform danger, I said, "It must be performed as late as possible," but now when I have had numerous successful cases, I say, "It must be performed as soon as possible." Now the period ought to be that in which, judging from known indications, there no longer remains any hope of recovery. I shall not repeat the reasons for operation, which have been urged by M. Guersant, in the article on Croup in the *Dictionnaire de Médecine;* but cases of well ascertained tracheal Diphthérite, cured without operation, are so rare that, in my opinion, the operation should be performed as soon as the disease is well-marked; for if the Diphtheritic phlegmasia has been rapidly propagated to the larynx, and if the examination of the bodies after death proves that it penetrates from the larynx into the bronchi with still more rapidity, we should be more likely to find false membranes in the bronchi, in proportion to the advanced period when the operation is performed; and experience has proved to me that not more than one patient in ten was lost, in cases where the operation was performed while the false membrane was still only in the larynx; but scarcely one in ten was saved in operations on children whose bronchi were already invested with pellicular concretions.

I may say in the case of Croup what experienced surgeons say in the case of strangulated hernia, namely, that it is rare to lose patients

when we operate soon, and it is rare to save any when we wait till the last moment.

In practising tracheotomy when children are about to expire, we run the risk:—1st, of finding the false membranes occupying a very great extent: 2nd, of not being able to remedy congestion, engorgement, inflammation, and pulmonary emphysema, which are rather frequent occurrences in the last stage of asphyxia: 3rd, the operation is rendered much more difficult, in consequence of the enormous swelling of the cervical vessels, the swelling being greater in proportion to the embarrassment of the respiration.

Of the treatment which ought to follow the operation.—As soon as the incision in the trachea is made, at that very instant blood is sucked down into the bronchial tubes, and as the respiration becomes still more difficult, the venous hæmorrhage, far from stopping, flows with more violence. It is necessary, at the very moment, to be provided with the *dilator*. This instrument is nothing more than a kind of dressing forceps, the two blades of which form at their extremity a little spur projecting externally, intended to hook into the lips of the wound in the trachea, so as not to be continually displaced during the movements of respiration. It is introduced closed between the lips of the wound, and when it is lodged there, it is gently opened by bringing together the rings of the handle. This proceeding, however easy it may appear, requires considerable practice. It has very often happened to myself, that I have placed the extremity of the instrument between the muscles, or that I have introduced only one of the blades in the trachea. *It is necessary to proceed slowly and pass in the instrument as deeply as possible.* When the dilator is well placed, the air easily penetrates; the blood, the false membranes and the mucous matters are expectorated, and the respiration generally becomes easy. The dilator is left in the trachea during the continuance of the syncope which usually follows the operation and until the canula is introduced. The canula should never be placed in the trachea until ten or twenty minutes after the operation. The trachea and the bronchi should be previously cleaned, and the mucous membrane which lines them should be cauterized.

1. *Cleaning the trachea and bronchi.*—When, during the efforts of coughing, a false membrane presents itself between the blades of the dilator, it is seized with a pair of forceps, and it is drawn away gently in order to avoid tearing it; but most frequently, the pellicular concretions and the semi-plastic mucus adhere firmly

to the mucous membrane, and then they must be removed by means of a kind of brush called *écouvillon*. This little instrument, devised by M. Bretonneau, is of two kinds. One is nothing else than a small piece of fine sponge at the extremity of a rod of flexible whalebone, rounded, and about six or eight inches long. The other is a small brush similar to that which is used to clean bottles, and is constructed in the following manner. Some pieces of flexible horse-hair, laid between the branches made by an iron or brass wire doubled upon itself, are arranged equally and in a parallel direction in a space of seven or eight lines; they ought to touch and even to cover one another. The two wires, seized with a pair of nippers immediately beyond the horse-hair, are twisted into a spiral. Being drawn in by the twisted wire the hairs lose their parallelism to converge round the axis on which they are fixed. As soon as they are thus seized and firmly held between the revolutions of the double helix, nothing remains to be done except to cut them in order to give the little brush the form of a ball borne on a stem formed by the two wires turned round upon one another. It is advisable to fit this brush on a little handle made with a pen or a small piece of wood.

The brushing (*écouvillonnement*) is such an indispensable proceeding, and so important in the treatment following the operation, that I shall carefully describe the manner of performing it. In ordinary circumstances I prefer the sponge brush; it is introduced rapidly to the depth of three, four, five, or even six inches, while it is made to execute a rotatory movement; then it is passed several times from above downwards, and is finally withdrawn while the operator impresses upon it the rotatory movement which I have described. Each brushing does not last longer than two or three seconds; when the sponge is withdrawn, an assistant squeezes it with a piece of linen, and removes the mucus which covers it. The instrument is immediately re-introduced, and the re-introduction is continued until the removal of the mucous matters, or false membranes which are heard rustling in the trachea. Before commencing the brushing, it is generally necessary to inject half-a-teaspoonful of tepid or cold water into the bronchi: this water, together with the brush, and the air which enters and goes out, shake up, mash together, and draw outwards everything that is found in the air-passages. The brushing most frequently excites an extremely distressing cough; but when the children have not been exhausted by the loss of blood, when the pellicular inflammation is already modified, and nothing except mucus

is secreted, then it is sufficient to pass the brush once or twice, and the proceeding is so simple, that most frequently children who are asleep are not aroused by it.

The first brushing ought to be performed immediately after the operation; by this means the mucus, the blood, and the greater part of the croupal concretions are drawn away. *Thus the mucous membrane is laid bare, a necessary condition for the modifications which may be effected in it by the topical remedies;* and here the precept ought to be laid down, *to brush thoroughly whenever it is desirable, in order to act directly upon the mucous membrane.* The horse-hair brush is serviceable when a false membrane is too adherent and the sponge cannot draw it away; and it is always preferable to the other brush in clearing the canula.

2. *Cauterization.*—When the trachea and bronchi are well cleaned, we may proceed to cauterization. This is performed in two modes; 1st, *by touching,* 2nd, *by instillation.*

Cauterization by touching.—The sponge-brush is moistened with the caustic liquid, and it is introduced at several intervals upon all the points of the mucous membrane which it can reach. In this manner the caustic solution is not diffused in the bronchi. This cauterization ought to be repeated at least three times the first day, and twice on the two following days.

Cauterization by instillation.— Cauterization by instillation is performed in the following manner:—A writing-quill is filled with the caustic liquid, which is poured into the trachea, while the operator takes advantage, as much as possible, of a movement of inspiration. Immediately afterwards, water is dropped in, and the brush vigorously employed until the air-tubes are well cleaned. This kind of cauterization ought to be repeated two or three times during three days. If after the operation we are able to ascertain that there are no exudations beyond the larynx, it is sufficient to employ the cauterization by touching.

On the first two or three days after each cauterization, a very abundant serous exudation takes place on the surface of the mucous membrane. This hypersecretion usually continues for twenty or thirty minutes, and in general it lasts the longer in proportion as the patients have been reduced by powerful depletion. It is then essential to brush the mucous surface lightly and often with the sponge well pressed out, so as to remove all these watery secretions.

The caustic solution for cauterization by touching and that which is

employed in instillation are not prepared of the same strength; the first is composed of eighteen grains of nitrate of silver to a drachm of distilled water; the second, of only four grains to the same quantity of liquid; and it is the more important to observe this proportion because if we made use of the first solution for instillation we should run the risk of coagulating the mucus contained in the second or third divisions of the bronchi and thus of causing immediate asphyxia, while the solution, No. 2, cannot produce such a serious result; it only whitens, but does not coagulate the albumen. I do not dare to affirm that cauterizations by instillation are often useful; the success obtained by M. Bretonneau, who employs only the cauterization by touching, ought to make us cautious in the use of instillations which I have often recommended and which I have, perhaps, too often employed.

Of instillations of water.—I have already explained the importance of instillations of water into the bronchi when it is desirable to detach and draw away the false membranes. They have besides another advantage, which is, that they dilute the mucus and render its expectoration more easy. The rapid contact of the air with the trachea often dries the mucous matters which cover it, exactly as in the nasal fossæ; the instillations of water obviate also this serious inconvenience. When the object is to detach and to draw outwards any tenacious membranes, it is necessary to inject a large quantity of water, a teaspoonful at a time, and to brush out the trachea immediately afterwards; but in order to dilute or soften the mucous matters it is sufficient to pour in two or three drops every quarter of an hour. The larger instillations are especially suitable during the first two or three days, and they ought not to be repeated more than four or five times a-day; the small instillations may be performed more frequently, but they are especially adapted for the subsequent days.

Of canulæ and their introduction.—When, after the operation, the wound, the trachea, and the bronchi have been properly cleaned and cauterized, it is proper to introduce a well-fitting canula which is to be firmly secured. I generally make use of the canula described by M. Bretonneau, and of those which I have figured in the *Journal des Connaissances Medico-chirurgicales.* Sept. 1834.

All these canulæ have a much more considerable diameter than that which was formerly recommended. The precept laid down by M. Bretonneau who invented them is, that *the artificial conduit*

should always have at least the normal diameter of the glottis of the subject; an excellent precept which should never be forgotten.

Before introducing the canula we pass into the rings which are made at its anterior aperture two portions of string, thread, or ribbon, intended to keep the instrument firmly fixed. With one hand the operator holds the dilator with its ends separated in the trachea, while with the other hand he holds the canula, which he slips into the trachea between the blades of the dilator. When the canula is introduced, he withdraws the dilator, and firmly ties the threads round the neck. The introduction of the instrument is often very difficult; sometimes the opening of the trachea is missed and the instrument is plunged, in front of this tube, into the cellular tissue. When the canula is properly lodged, the fact may be known by the free passage of air and mucous matters, and by the facility of respiration. It is important and even indispensable that the canula should be long and should enter into the trachea for several lines beyond the inferior angle of the wound in the trachea. If the canula is too short it is disarranged in the efforts of coughing, and becomes lodged in front of the trachea in a *cul-de-sac* which is always formed there, and the patient dies asphyxiated in a few minutes. I have met with this fearful accident on three occasions, although I had left some pupils of considerable experience in attendance upon the patients. The error, in this case, is the more easily committed, as the canula is displaced only in its posterior portion, and inexperienced persons are ignorant of the cause of the sudden embarrassment of respiration. Added to this, children are seized at the same moment with violent movements which render the measures necessary to replace the instrument much more difficult. The practitioner, therefore, should remember, on the one hand, that the canula should be plunged about five or six lines into the trachea, and on the other hand, that he should fix it sufficiently to prevent its expulsion during the efforts of coughing.

When the finger is placed in the front of the neck, in a child or an adult, in order to explore the trachea, before the integuments are divided, or even when the operation of bronchotomy is performed on a dead subject, a just idea is not formed of the depth at which the trachea is found in the living body after the operation; the depth is at least double of that which it is supposed to be. Therefore there should never be any fear of having the canula too long; and this is the more important, because, on the day after the operation, the

wound is swelled to such an extent that the canula which is suitable in the evening, ceases to be so on the following morning. It is in order to remedy this inconvenience that I have devised some canulæ with a lengthening tube, like an opera-glass. The advantage of these canulæ is that they may be used as well on the first day as on the three following days; but on the fourth day, the swelling of the lips of the wound begins to subside, and this subsidence is so great that the trachea is found even less deep than it was before the operation; and at this period it is necessary to use shorter canulæ. These canulæ, which scarcely enter at all into the trachea, do not prevent the air and the mucous matters from striking against the larynx in the efforts of coughing, and from detaching the croupal membranes which remain still adherent to the vocal cords. But these short canulæ may sometimes be disarranged; and although the opening in the trachea is then gaping, and does not close again until after the expiration of some hours, still I have thought that I ought to provide for the cases where the medical practitioner can visit his patient only once in twenty-four hours. I have therefore had canulæ constructed with dorsal openings; each opening is placed quite near to the posterior extremity of the instrument. If it had been placed more in front it would be in contact with the superior wall of the wound, and then the fleshy matters which would have been introduced into it might have caused a hernia into the canula, and might thus have completely obliterated its cavity. This accident happened to me upon one occasion, and it would have been attended with the death of the child, had not its father had the presence of mind to remove the instrument. *The best precept therefore, is, that the dorsal opening should be entirely in the trachea.* Besides, this aperture has the advantage of permitting a direct communication between the trachea and the larynx; and when it may be supposed that the larynx is beginning to be free from obstruction, the canula is loosely closed with a cork, and then the air and the mucous matters pass without difficulty from the bronchi to the back of the mouth.

The canulæ which I have described are usually made of solid metal, and are consequently inflexible. I have often had reason to complain of this inflexibility, and in order to remedy it I have had some canulæ constructed of silver-wire flattened and turned in a spiral form. It is easy to adapt to them an elongation in the form of an opera-glass, but it is not so easy to make the dorsal aperture in them. I

sometimes make use of these canulæ in the first days which follow the operation.

Several physicians, and among others MM. Bretonneau, Gendron, and Coqueret, have proposed to substitute for the canulæ, which I have above described, instruments which might be applied at all periods of the disease, and which might be firmly kept in their place. I have elsewhere described the greater number of these instruments.

Whichever canula may be selected, it is not only necessary to introduce and retain it, but it is also essential to remove it, clean it, and replace it as often as may be required, and I shall point out the results of my own experience upon this subject. When the canula is wide, it is barely possible to remove it more than once a-day; but it is expedient, as soon as it is practicable, to take it out three times in the twenty-four hours during the three days which follow the operation, twice on the two following days, and then only once up to the time of closing the wound. It is not removed merely for the purpose of cleaning it, for most frequently it is not at all stopped up; but experience has proved that the thorough brushing out of the trachea can only be accomplished by removing the canula, whether the mucus and the false membranes were attached to the internal extremity of the instrument, or that the posterior and membranous wall of the trachea was applied to the opening of the canula and partially closed it. When the brushing (*écouvillonnement*) is performed with the canula in the wound, this operation can be performed neither with the same facility nor the same safety; for frequently the brush, in returning, becomes caught at the edge of the canula, and would carry it away if it were not cautiously retained in its place.

I may sum up my observations on this subject by stating, that in ordinary brushings of the trachea, the canula may be left, but that it is convenient to remove it in order to brush it out thoroughly.

During the first two or three days, the wound of the trachea begins to close, however little the canula may be removed, and it is, therefore, advisable to introduce the dilator as soon as the tube is taken out. The dilator remains in the wound as long as the brushing of the trachea is going on, and until the canula is replaced.

If, on the fifth or sixth day, the air is not heard passing in small quantity by the natural passages in great efforts of coughing, it is proper to apply the caustic solution once or twice to the larynx, by means of a strong curved piece of whalebone, armed with a little sponge; this very simple treatment is sufficient to facilitate the passage of the air

and the mucous secretions, and then the canula may be closed altogether or partially, according as the larynx is more or less free. On the first occasion, the canula should remain closed only a quarter of an hour, or an hour at most; then it is closed again, some hours afterwards, for two or three hours, and then for ten or twelve hours. If, then, the respiration remains easy, the canula is removed, the wound is cleaned, and the edges of the wound are exactly brought together by strips of adhesive plaister. The dressing is covered over with carded cotton and a loose cravat, the broad part of which is applied behind the nape of the neck, and the ends are brought across the neck and passed under the armpits to be tied behind the back. The bandage is changed twice a-day, and generally, after four, six, or eight days, the aperture in the trachea is entirely cicatrized; there remains then only a simple wound which is soon healed. If the external wound is covered by exudations, which happens rather frequently, it is to be dusted with calomel, which in a short time modifies the morbific disposition.

From the result of my observations, I have found that when children have been weakened by blood-letting, a sanguinolent serosity oozes incessantly from the lips of the wound. This fluid enters into the bronchi at each inspiratory movement, and rapidly engorges the lung; but the most serious inconvenience which results from this depletion is, that the little patients have not power to expectorate the plastic mucus which fills the small bronchial tubes, or the false membranes which line the trachea and the first divisions of the bronchi, or even the medicinal substances which are instilled into the air-tubes. They never recover from the deep stupor in which they were plunged before the operation, and they die at the end of ten or fifteen hours, without having expectorated anything except a little white froth. The same thing happens, though to a less degree, when mercurials have been administered before the operation in doses capable of producing salivation.

Although the operation of tracheotomy may have been performed, the practitioner should not neglect the treatment of the Diphthérite in the pharynx, where it is almost constantly present, and in the mouth, where it is also often met with. To fulfil this indication, it will be sufficient to apply twice or thrice a-day, on the diseased parts, a mixture of two drachms of hydrochloric acid to two ounces of honey of roses, or else a strong solution of alum in syrup or honey. It is the more important to pay attention to the Diphthérite of the

pharynx and the mouth, inasmuch as this special phlegmasia is often the only cause of the dyspepsia of children, and nothing is more essential than to support these patients with nourishment.

When once the operation is performed, it is essential, almost as a necessary condition of success, to feed the patients well; milk, broth, and light soups must be given as long as the traumatic fever continues; and more nourishing substances must be resorted to, as soon as the febrile orgasm has entirely ceased. If the appetite fails and the strength is not restored, quinine wine will be useful.

On Cutaneous Diphtherite.

(*Archives Générales de Médecine*, 1830.)

M. Bretonneau, in his Treatise on Diphthérite, has clearly proved that the most common seat of this affection is the back of the mouth and the larynx. He has demonstrated the manner in which it often attacks the nasal fossæ, and he has shown that the disease known to the ancients under the name of Scorbutic Gangrene was no more a gangrene than the Angina which was said to be gangrenous; and that both these affections were nothing more than pellicular inflammation, modified either by the position which it occupied or by its duration. Still, some rather numerous facts had convinced him that the special inflammation which he had called Diphthérite, might occupy not only the pharynx, the air-passages, the nasal fossæ, and the mouth, but also the integuments themselves, and all the mucous membranes of the organs of generation. This truth, which had already been partly perceived by some modern writers, but which was demonstrated by M. Bretonneau, will derive additional weight from the numerous facts which have been collected by Dr. Ramon and myself in Sologne, during the summer of the year 1828.

We were informed, in the early part of September, 1828, that Malignant Angina had just appeared in the Department of the Loire et Cher, at Nouan le Fuselier, a village situated on the road from Orleans to Bourges, and that many persons there had fallen victims to it. We went there, and M. Leménager, a physician residing in the locality, was so kind as to accompany us in our visits to the patients. We began with the house of a woman, named Josephine Pressoir. It was situated at the northern extremity of Nouan, and

up to the time of our visit there had been no patients, except in the southern part, in a hamlet a little separated from the village and named *les Rois*. The daughter of Josephine Pressoir, aged eight years, had had some communication, as we were informed by the mother, with an infected family of the hamlet of les Rois, and a short time afterwards she was attacked with pharyngeal Diphthérite. When we saw her, on the 13th of September, she was at the eighth day of the disease; M. Leménager had applied leeches to the neck, had touched the back of the mouth three times with a solution of nitrate of silver, and had employed several insufflations of alum. Besides these measures, this gentleman had been induced by the fear of a gangrenous affection, to order for the throat some injections with a decoction of bark and camphor, and to prescribe gargles with alum and bark. On the fifth day of the disease a blister was applied to the nape of the neck, and was followed by an abundant suppuration, the excoriated surface being covered with false membranes, as was also an ulceration on the foot, under which this girl had for a long time suffered. I shall now describe the state in which we found the back of the child on the 13th of September, being the ninth day of the disease.

The blistered surface, which at the beginning was only three inches wide, was now more than six; it was excessively painful and poured out an abundant suppuration; it extended upon the back, making irregular offshoots similar to ivory card-markers (*fiches de trictrac*) and it was surrounded with a broad erysipelatous areola, much more marked below than above and on the sides. The part actually denuded of epidermis appeared depressed, and was really so in comparison with the surrounding tumefaction. It was covered with fibrinous superposed layers, of a yellowish-white colour, which being thicker in the centre became thinner towards the circumference. In the middle, their thickness amounted to two, three, or even four lines, and they exactly resembled dry pleuritic exudations, which are found in the cavity of the chest, when resolution has already begun, and the serous part which had been effused has been almost entirely reabsorbed. We raised some of these exudations with a very delicate metallic plate and we saw that they adhered rather strongly to the tissue of the skin, and that they could not be removed without some difficulty.

The surrounding inflammation presented a singular appearance. The redness was the more vivid in proportion as it approached nearer to the excoriated parts. The epidermis, in a multitude of points, was

elevated by small effusions of lactescent serosity, so that the skin was covered with vesicles, confluent in the vicinity of the wound, and less and less numerous as they approached the integuments, which were still healthy. Among the vesicles there were some which appeared to have been formed by the union of several; others which, whether simple or united together, appeared to have burst; and in their place the derma was seen covered with a white membrane (*couënne*); these ulcerations were united to other small ones, these came to join the principal one, and thus the disease crept on by degrees. Let me add as a remarkable peculiarity, that near the head and shoulders, the erysipelatous inflammation hardly extended at all, and that in these parts we also found very few vesicles.

However, the mother of this child, Josephine Pressoir, being in the fields on the 30th of August, 1828, that is to say, five days before her child fell ill, had been seized, at the end of what was called a cold, with a severe pain in one of her breasts. An inflammation of the cellular tissue of the nipple soon followed, and an abscess was formed. The pus began to point, and at the apex of the swelling, the skin was attacked with mortification in an extent of about three lines, and on the 12th of September, the abscess opened spontaneously. We saw the patient the next day, and the wound was already surrounded with an erysipelatous circle, and the edges of the incision were covered with a false membrane, extending upon the integuments for the space of two or three lines. The child Pressoir was then at the eighth day of Diphthérite, and she had not ceased to sleep with her mother during the whole time of her disease.

At la Blettière, a farm situated in the commune of Marcilly en Villette, in the Department of Loiret, five persons died of pharyngo-tracheal Diphthérite; Huré, aged ten years, lay in the same room and the same bed with those who had died, and a slight inflammation which he had behind his ears, soon became exasperated, the skin was covered with false membranes, the pellicular inflammation extended to the whole of the back, and he died in a few days, exhausted by dreadful pain and an excessively abundant suppuration. M. Régnaud, physician at la Ferté-Saint-Aubin, saw another patient at Marcilly sink exactly in the same manner, after an attack of cutaneous Diphthérite, which at first had taken possession of some favous ulcerations of the hairy scalp, and then it had extended to the neck and back as far as the loins. He also communicated to us

the case of a man at Marcilly, in whom the Diphthérite had attacked the skin of the scrotum, which was previously excoriated.

At le Grand Pied-Blain, situated in the commune of Tremblevif, and about a quarter of a league south-east from La Ferté-Beauharnois, twelve persons were attacked with Malignant Angina, and ten died; the mother of three of the children who had just died, applied to the nape of her neck, a *precautionary blister*, thinking thus to escape the disease; but in a few days, the surface of the blister and the surrounding parts were dreadfully inflamed, and this unfortunate woman soon sunk. We were told that the skin of the neck had been attacked with gangrene.

The same thing was observed in a family named Bouzy, in the hamlet of Les Rois, near Nouan-le-Fuselier. There had already been some patients in most of the houses of the hamlet, and a little girl had died in a room immediately near that of Bouzy. A young man, named Cauqui, aged nineteen, slept in the same part of the house which was occupied by Bouzy and his wife and child; he contracted Malignant Angina, and immediately Bouzy, being alarmed, applied a blister to both arms of his child, in order (as he said) *to draw away the humour;* and almost immediately the blisters were covered with false membranes, the surrounding skin being inflamed; and on the fourth day, when we saw the child, the nose was obstructed with pellicular exudations; and extremely fetid serosity flowed from it, and the pharynx was already beginning to be attacked with Diphthérite.

At Saint-Loup, in the Department of Loir-et-Cher, twenty-one persons had been attacked with Diphthérite, and nineteen had died; a man named Blaise and his wife had just witnessed the death of their two children; and they themselves had Malignant Angina at the time when we went to visit them. The husband was going on favourably, under the influence of local treatment, and the state of his wife, whose larynx had been invaded by the false membrane, began to excite less apprehension; but a blister had been placed on her left arm, which was now in a truly alarming condition. The surface of the blister was singularly enlarged, it appeared deeply sunk, and was covered with a pellicular exudation of a blackish-grey colour; a limpid and very fetid serosity trickled from it, and the whole arm, the forearm and hand were swollen and of a shining rose colour. It was impossible not to believe that the surface of the blister was seized with mortification; still, by pricking it with a

pin, we found that below the false membrane the sensibility was very acute.

We dusted the wound with calomel, and on the next day the pain and the tumefaction were almost entirely removed; the same plan was persisted in, and three days after the commencement of the treatment the wound was entirely cleaned; there was a healthy suppuration, the false membranes had wholly disappeared, and nothing remained except a small gangrenous eschar which was detached at the end of twelve or fifteen days.

A child had just died of tracheal Diphthérite in a farm in the department of the Indre; a medical gentleman, called in too late, was unable to afford efficient assistance, but he caused some leeches to be applied to the abdomen of the mother, who complained of pain in that region; the bites were soon inflamed, the skin became erysipelatous, and as soon as the epidermis was detached, it was covered with false membranes of such a fetid smell that they resembled gangrenous eschars.

François Minière, aged forty-five, a labourer of the commune of Chaumont-sur-Tharonne, in the Department of Loir-et-Cher, had two children affected with epidemic sore-throat. One died, but the other was cured by local treatment. In the meantime, the father himself, who had a slight excoriation at the internal part of the tarso-phalangeal articulation of one of the great toes, soon felt an acute pain in this part. The skin became erysipelatous and was deprived of its epidermis, and some days afterwards, there existed a foul ulcer with unequal and thickened edges, surrounded by a considerable tumefaction; the surface of the wound was covered with a greyish false membrane which could easily be removed; the glands of the groin and those of the internal part of the leg were considerably tumefied. We dusted the wound with about six grains of calomel, and thirty-six hours afterwards, the surface of the ulcer was diminished by one-fourth, the pain was less acute, the tumefaction had disappeared, and there was no more false membrane. We repeated the treatment and left the calomel with the patient, but he lost it, and the wound, which in a short time had been reduced to very small dimensions, afterwards remained for a long time stationary.

A young boy of Marcilly, named Maitre, had had, for some time, together with his mother, gingival Diphthérite (*scorbutic gangrene of the gums* of the old writers); and at last he died on the 19th of January, 1828, of Diphthérite, which attacked at once the throat

and the hairy scalp. This boy had tinea of the scalp. His brother, aged thirteen, a cowherd at Colombier, came to Marcilly at the time when his brother and sister were ill, and a short time after his return to Colombier, the ulcerations which were on his head became dreadfully painful, and allowed a large quantity of fetid serosity to trickle out. We received these details from the boy himself, and from the medical gentleman who attended and cured him.

As young Maitre was, in my opinion, the cause of an epidemic the more interesting as it was more circumscribed, I shall insist with some earnestness upon details of great importance.

The château of Louan, which belongs to M. Briolet du Cyran, is situated on a hill which looks over a valley, embellished with magnificent plantations by M. du Cyran; the château is surrounded by streams of spring water. At a short distance on the south-west, are situated two of the farms built upon the downs, named Colombier and La Grange. Five or six hundred paces from the château, on the south-east is another farm named Bouchebrant, situated in a little valley, running from south to north. The château of Louan, Bouchebrant, Colombier, and La Grange, are at some distance from the towns of Ménestreau, Saint-Cyr, and Marcilly, and are very distant from the surrounding farms; by their position, therefore, they are entirely isolated.

M. du Cyran, his wife, two children, and two servants, lived at Louan; Colombier was occupied by a person named Boulinette, his wife, two children, and a little cow-boy, namely, young Maitre, who was just mentioned. A person named Derland, his wife, and two children occupied La Grange. At Bouchebrant there was the farmer, the uncle of Boulinette of Colombier, his wife, five children, a shepherd, and a carter.

We have just seen that young Maitre went to Marcilly, a town situated a league from Louan, where Malignant Angina had prevailed for more than a year; he remained there while his mother and brother were ill, and on returning to Colombier, we found the favous ulcerations on his head assume, on a sudden, a character of unusual severity, and soon afterwards Pauline and Laurent Boulinette, who slept in the same bed with him, became ill. Little Laurent, aged four years, died first with the symptoms of Croup; his sister, aged seven years, died of suffocation the next day, February 20, 1828. For some days previously, this little girl had the back of her ears, the hairy scalp, and a part of the nape of the neck inflamed and

allowing of the oozing of a very large quantity of extremely fetid serosity. Subsequently the mother had her body interspersed with scabby ulcerations, and we still saw these ulcerations in the month of August. They began by pustules rather analogous to those of vaccination, except that they were pointed and not flattened. The epidermis was broken, and the broken part left a small ulcer which rapidly increased in size, allowed a considerable quantity of pus to escape, and cicatrized only with great difficulty.

Still the family of Derland, who lived at La Grange, which was separated from Colombier only by a court-yard, came continually to visit their neighbours; the woman Derland to offer assistance and consolation, and her children came also as much in order not to leave their mother, as by the habit which they had of playing with the children of Boulinette. Pierre and Laurent Derland, aged respectively four years and eighteen months, died of suffocation in their turn, a few days after their playmates. What struck the parents most was the closure of the nasal fossæ, the tumefaction of the face, and the inflammation of the scalp.

The closure of the nasal fossæ is rather common, especially in children, who continually apply to their nose their hands impregnated by the virus which flows from the diphtheritic ulcerations of the skin. I have observed it several times, and particularly at Nouan-le-Fuselier, a hamlet of Les Rois, as I have mentioned above, in the case of a little child on whom two *precautionary* blisters had been applied, which were suddenly covered with diphtheritic membranes. We now return to the family of Boulinette.

I have stated, that Pauline Boulinette had had for a few days some diphtheritic ulcers on the head, before being attacked with Membranous Angina. She was already very ill when she was taken by her mother to the farmer of Bouchebrant, her great uncle; she there passed some time with her relatives, playing with the children, as much as her sufferings permitted her. Returning in the evening to Colombier, she soon died. A few days afterwards, some of the children at Bouchebrant took cold in their heads, and among others a little girl, who had the back of her ears inflamed, soon experienced acute pain in those parts, and, the affection spreading rapidly, the skin was excoriated as far as the larynx. In the space of two months the mother and five children died of Malignant Angina. The farmer himself and his shepherdess were attacked at the same time with sore-throat; but this man told us that he had not felt any uneasiness

on the subject, *because having looked at himself by means of a looking-glass, and having examined the throat of his shepherdess, he had not found there any white skins as in his wife and children.* After this time, the shepherdess and a young carter had, on several parts of their body, ulcerations which were healed with great difficulty, and were incessantly renewed; and we were able to observe, in the case of the carter, one of these ulcers still in the recent state. It was hollowed in a conical form, and filled with a false membrane, white at its circumference and greyish in the centre; this exudation was easily detached at the edges. The skin around the ulcer was red and painful.

All the facts relating to this epidemic of Louan are wanting in details sufficient to indicate the anatomical characters of the diseases of the skin observed at the same time with Malignant Angina; but as no physician was called in, we are obliged to rest satisfied with the imperfect descriptions given by the relations and by Madame Briolet du Cyran who attended most of the patients.

At Paulmery, near Selles, a little girl contracted Diphthérite; she came back to Les Barres (Indre), a farm situated at the distance of a league from Paulmery, to see her relations; she soon died, as well as her two brothers, and the mother who nursed them was seized with Diphthérite, occupying the side of the neck and all the right side of the face. This woman did not die; but she was a long time recovering, and suffered very much pain. When we saw her in the month of August, she was not yet well.

At Graçay (Indre), a little child, who was still sucking, contracted Diphtheritic Angina which was prevailing epidemically. The mother continued to nurse the child until its death, and the breast was soon afterwards attacked with the specific inflammation, and became covered with false membranes, the extension of which was prevented by suitable treatment.

At Montévrant, a farm situated at the distance of a league and a half from the town of Chaumont-sur-Tharonne (Loir-et-Cher) several persons died of Malignant Angina. Julie Thomas, the daughter of the warder of Chaumont, and servant at Montévrant, began to feel the first approaches of Diphtheritic Angina, and being alarmed she went to her father who lived in the town of Chaumont, and she died a few days after her arrival. She slept with her mother, aged forty, and with her little sister Marguerite. Three days after her death, the mother experienced severe pain in the vulva and in the lower

part of the abdomen. The husband examined the affected parts, and I shall quote his exact words, "I looked," said he, "and I saw her nature" (meaning the sexual organs) "which resembled my children's throats, and had also a very bad smell; internally it was grey and black, and all around it was red." Five days after complaining of illness, the woman Thomas died. Scarcely a week had elapsed, when Marguerite, the second daughter, died also of pharyngo-tracheal Diphthérite.

A similar case was observed at Mézières (Loiret). Malignant Angina broke out in the family of the warder of the château, where a child of six years of age died. A short time afterwards, the four daughters of a person named Adam, who lived in the court-yard of the château, contracted Diphthérite and died; one of them aged seven years, had at the same time the hand, the foot, and the vulva attacked with pellicular inflammation; she did not die of suffocation, but fell into a deep state of adynamia which rapidly ended in death. This case was communicated to us by M. Carrère, physician at Cléry, who also related the following case. A man named Montigny, who saw six children in his family sink in succession in the space of a month, out of seven who had been attacked with Malignant Angina, experienced himself the first symptoms of Diphtheritic Angina, and at the same time the prepuce was covered with false membranes.

Dr. Epine, physician of the Royal Military School of La Flèche, observed an analogous case during the epidemic which prevailed in that establishment. "The sister Marie," says he in his Memoir, "nurse at the school of La Flèche, exhibited at first the most serious symptoms of Malignant Angina: the disease after having made great progress on the tonsils, developed itself at the external part of the rectum. The anus, excessively swollen, painful, and of a livid-red colour, was covered with diphtheritic pellicles which were detached only in parts and very slowly. After exhibiting for several days a rather well-marked degree of amendment, she fell into a state of extreme adynamia, constantly suffering from long fainting-fits, and she died on the seventeenth day.

Everyone knows the case of Dr. Bourgeoise, who himself suffered from symptoms of an exactly analogous character, and who was cured only with great difficulty.

The family of a person named Gabereau, of La Ferté-Saint-Aubin (Department of the Loiret), was composed of seven persons; namely, the wife, an elder girl, aged nine years; a boy, aged seven; a girl,

aged five; and a little boy, aged two years and a half. A female servant, twenty years old, had a natural child aged fourteen months.

The little girl of seven years, died of pharyngo-tracheal Diphthérite at the commencement of the epidemic of Saint-Aubin, on the 18th of December, 1827. The mother and the two elder of her children had since this time, diseases, according to their own expressions, which got well on one part of the skin only to reappear upon another. The boy of two years and a half had obstinate ulcers around his lips; his sister of nine years had some between the toes and on the chin; and those on the chin, we were told, were covered with white skins.

The eldest boy used to amuse himself by drawing his little brother Pierre in a wheelbarrow. The part of the thigh of this child which rested on the edge of the wheelbarrow, was slightly excoriated, and in a few days there was a broad and painful wound, the severity of which was out of all proportion to the slight cause which had produced it. In the meantime, Louis Sylvain, aged seven years, died of Croup on the 4th of August, 1828, and seven days afterwards Pierre died also.

A little child named Agathe, daughter of the female servant, was confided, in the absence of the mother who was going on a journey, to the care of the woman Gabereau and her eldest daughter, Sylvine; and she constantly played with the children of Gabereau, for she remained with them in the same room. On the 4th of August, the day of the death of Louis Sylvain, it was perceived that the child's sexual organs were affected; and they were immediately shown to M. Régnaud, physician of La Férte-Saint-Aubin. "I saw," he told us, "some white membranes on the mucous surface of the vulva, and on the skin of the fold of the thighs, which was excoriated, and I admit that at first I believed in the existence of syphilis; and knowing that the child was not born in legitimate wedlock, I was the more confirmed in this view. This opinion made me persuade Agathe, the mother, to go to Orleans with her child, and to enter into the Hôtel-Dieu of that city."

We then obtained, in connexion with M. Régnaud, the most accurate particulars in our power as to the condition of the mother, Agathe, and we were convinced that she had not syphilis. Besides, for fourteen months after the child was born, she and her mother had enjoyed perfect health; and since the first fault which she had committed, and in the hope of contracting an advantageous marriage, Agathe's conduct had been most irreproachable.

The mother and the child, then, came to the Hôtel-Dieu at Orleans. M. Duverney, the surgeon of this establishment, examined the infant, and being struck with the singular appearance of the external parts of generation, and, moreover, not knowing the antecedents, he declared that he found no syphilitic affection, and he pronounced this opinion in opposition to that of the hospital pupils around him who examined the patient with him. Still the case seemed to him embarrassing, and he deferred pronouncing a definitive opinion until the next day; and on the second examination, he could not yet recognize the characters of syphilis, and declared that if it was a species of that disease, he had never seen it under such a form.

I write in some detail of the uncertainty felt by so experienced a surgeon, in order to show that this inflammation of the vulva and of the skin of the fold of the thighs presented an unusual appearance. M. Duverney, who himself related the circumstance to us, remembered very well that it was the existence of the false membranes which prevented him from believing that the case was one of syphilis; and now that his attention was directed to the point, he remembered that the state of this little child's vulva was similar to that of the mucous membrane of the pharynx in children attacked with Diphtheritic Angina.

However, Agathe remained two days in the Hospital and then returned to Saint-Aubin; and her child died from the continuance of the disease, fourteen days after the attack.

Corollaries.

These facts being established, it is necessary to endeavour to show that the affections of the skin and of the mucous tissue of which I have been writing, are of a nature identical with those which had their seat on the mucous membrane of the larynx and of the back of the mouth. Let us examine at first the most simple facts.

A little girl is attacked with pharyngeal Diphthérite; a blister is applied, and on the next day the excoriated surface is covered with false membranes, the thickness of which soon becomes very considerable, and which rapidly extend, being accompanied by dreadful pain and a very abundant suppuration. Is this the ordinary course of a blister? Certainly not. If the surface of a wound caused by cantharides is covered with false membranes, it is where the action

of the irritating cause has been long and energetically continued; but even in this case, we do not see the phlegmasia extending from point to point, and rapidly attacking the parts which have not been at all in contact with the cantharides. If, however, this were an isolated case, we should hesitate to draw any conclusions from it; but it is repeated in all localities and in all epidemics which we have seen; at Chaumont-sur-Tharonne, at Saint-Loup, at Tremblevif, at Graçay; and, besides, all the physicians have made the same observation at Rebrechein, Loury, Marigny, Orleans, Saint-Cyr, and Cléry. M. Bretonneau had already expressly pointed it out in several manuscript Memoirs which he has allowed me to inspect. We, therefore, arrive at this experimental result; that when Malignant Angina exists in any person, the application of blisters is often followed by the most disastrous consequences, that the skin becomes inflamed, covered with pellicular exudations, and gangrenous. Besides, in the same communes and in the same houses, where the irritation produced on the skin by cantharides is at present so dangerous, blisters had previously been employed without the slightest inconvenience, and we could always easily calculate the local effects of this treatment.

What is the cause, then, of the difference now observed? Is it the difference of treatment? Certainly no one will believe it to be so. Is it the difference of the atmospheric constitution? If this were the true cause, why do two adjoining villages and two contiguous houses present such different phenomena? For while in the house of Josephine Pressoir, which is situated at the northern extremity of Nouan-le-Fuselier, the application of a blister was followed by symptoms similar to those observed at Les Rois, situated at the southern extremity; why was nothing of the kind seen in the intermediate houses? Why, when the symptoms were so common in the village of Marcilly, were they not observed at Ménestreau? Besides, the atmospheric causes are the same, the medicines are the same, the physician is the same, and yet the results are different. This variety, therefore, is not due to the physician, nor to the medicine, nor to the atmospheric conditions; let us then look for the *absent* cause in these who do not experience any extraordinary phenomenon; and for the *present* one, on the other hand, in the midst of those who are struck suddenly with an unusual calamity. This cause is necessarily pharyngeal Diphthérite; since this disease is the only particular circumstance which can be recognized in those whose blis-

ters also present peculiar appearances. This becomes still more evident when we find the disease of the skin exhibiting the anatomical characters, the progress, and the tendency to spread from point to point which are altogether analogous to what is observed in the phlegmasia of the back of the mouth. In fact, just as the diphtheritic inflammation of the throat attacks at first both the tonsils, then the pharynx, and then at last the larynx and the bronchial divisions; so does the inflammation produced in the same patient by the influence of a blister, rapidly seize upon the back and the shoulders, and becomes a speedy cause of death, if remedies are not applied before the pain or the abundance of the suppuration has exhausted the vital powers, and before the cutaneous tissue has mortified.

But we can conceive how the action of cantharides may, under certain circumstances, produce serious symptoms; and although it does not appear to me reasonable to attribute the effects above described to this cause, I think, nevertheless, that some doubts may still remain in the minds of certain physicians. In order to remove these doubts I shall now examine the facts under another point of view.

It very frequently happens that those who are engaged in agricultural pursuits, give themselves slight wounds, such as cuts, punctures, and excoriations. Ulcers are common among the peasantry; tinea of the scalp is also a very common disease, and those coarse persons who regard this disgusting complaint as a means of purification, do all they can to keep up what they call the *gourmes** of their children, or at least they do nothing to cure them. To speak of more simple affections, it is seldom that children do not occasionally suffer from excoriations behind their ears, in the fold of the thighs, &c.

All these affections are so trifling that they never attract the attention of the peasantry; and it will be readily admitted, that a man may practise for a long time in the country without once seeing them lead directly to a fatal termination. Then suddenly, in certain villages, these very mild cutaneous diseases assume such a severe character that death is the consequence, but a singular circumstance strikes us from the first. This is, that out of ten villages, ten houses, ten hamlets, there are half of them where nothing similar is observed,

* A word signifying mumps or glanders, but to which no correct corresponding English name can be given.—(Ed.)

and yet these villages, houses, and hamlets are pretty nearly in the same locality. Thus in the town of Marcilly, in Villette, the slightest excoriations sometimes become the causes of such severe symptoms as to induce death; but nothing similar is observed at Ménestreau, Saint-Cyr, or Vouzon; symptoms of the same kind present themselves at Chaumont-sur-Tharonne and Ivoy, but Neung and La Ferté-Beauharnois are exempt from them.

Besides this, some houses remain healthy in the midst of an infected town; this is what we have seen at Marcilly, at La Ferte-Saint-Aubin, and at Chaumont; others are infected in the midst of a village, where, up to a certain time, all are healthy; and this fact was observed at Neung, Nouan-le-Fuselier, and at Mennetou-sur-Cher. On the other hand we find isolated farms, all the inhabitants of which are ill; as at Colombier, La Grange, and Bouchebrant; and others where all persons enjoy excellent health.

This difference in the health of the inhabitants of one village and one farm, had struck even persons who were unconnected with our profession. Madame Briolet du Cyran, who lives in the château of Louan, is very benevolent, and over the whole country enjoys a well-deserved reputation in the treatment of *evils* (*maux*), and in this denomination are comprised all kinds of sores—from ulcers to the smallest wounds. She told us, and we shall repeat her expressions:—"That for the last eighteen months or two years, the humours of the people of Marcilly were changed, and that their evils were much more difficult to cure; that the cerate which she had employed for fifteen years with the greatest success, now envenomed the wounds, and she was able to cure them only with Saturnine extract." It must be remarked as a very important peculiarity, that in the town of Ménestreau, near Marcilly, nothing similar was observed, and that no one had sore-throat at Ménestreau. Let me add that in the farms we visited, the different sores and wounds exhibited no unusual severity except when some one in the house was suffering from or had suffered from Malignant Angina, or rather what the peasants called *Le Chancre*. In another Memoir, I may return to this last affection, which is nothing else than Diphthérite of the gums.

If we now examine the causes of these differences, we shall remark that it is only in the locality where some one is dying of Malignant Angina that wounds assume suddenly a character of severity which they did not before present; shall we not then be forcibly led to this conclusion, that the introduction of Diphthérite into a house is the

only cause of these new symptoms? Is it possible not to see here the relations of causes and effects? But there can remain no doubt when the existence of the false membranes can be ascertained with facility, and when the anatomical characters of the cutaneous phlegmasia are the same as those of the inflammation of the back of the mouth and of the larynx.

If then it is no longer possible to doubt that the affection which seizes the skin of persons attacked with Malignant Angina is of a diphtheritic nature, we are equally obliged to admit that the persons who are in relation with those who have at once the epidemic sore-throat and Diphthérite of the skin, or either of these affections, also present cutaneous inflammations of an identical nature, although in them the Angina has not developed itself. For in the first place, the blisters which are applied to their bodies are equally covered with false membranes, and may even cause death. In the second place, the slightest inflammations of the skin assume in such persons the serious character which we have remarked in others, and the consequences are no less terrible. Lastly, to complete the parallel, we find cutaneous Diphthérite commencing in a house, propagating Malignant Angina in that house, in the same manner as the pellicular Angina, when it has taken the initiative, becomes the cause of cutaneous Diphthérite.

BOUCHUT.

BOUCHUT ON CROUP.*

(DIPHTHERITE OF BRETONNEAU.)

The name of Croup is given to the disease of the larynx in which the inflamed mucous membrane is covered by a fibrinous layer of new matter, called false membrane.

Causes.

Croup is an affection which is much more common in cold and moist climates than in countries where the climate is temperate; it is a disease which especially affects the populations of the north of Europe. It is developed particularly in children, and in boys rather than in girls. It is observed in new-born children, and in children at the breast, and examples of this kind have been related by Billard, Dewees, and Trousseau. I have met with this disease in a child eight days old. M. Scoutteten saw it in his own child, aged six weeks. Still it is more frequent at the period of life comprised between two and eight or ten years.

Although Croup is to be considered as a disease of infancy, it must not be supposed that adults are exempt from its attacks. It has been met with in young persons of eighteen to twenty years old, and even in old subjects in their seventy-second year. M. Trousseau has also observed it in persons of rather advanced years. He has himself, in a case of this disease, performed tracheotomy upon a woman who had attained her fortieth year.

Croup generally attacks the same individual only once; still, Home, Vieusseux, Albers, and Jurine, quote some remarkable cases of

* Traité Pratique des Maladies des Nouveaux nés et des Enfans à la Mamelle. 1852.

relapse. M. Paul Guersant has seen a very curious example of relapse, and has himself operated twice on the same child, at an interval of two years.

It is an epidemic affection. This character is difficult to be determined in Paris, where the greater number of our facts are disseminated, and lost to an individual physician who, in his own practice, perceives only a portion of the picture of the public health. There is in that city no general epidemic; there are only partial epidemics, developed in one quarter, in one house, or in an Hospital devoted to children. It must also be admitted that these epidemics are very rare, for there has never been more than one at the Hôpital des Enfans in Paris, and then it was not clearly marked. The epidemic character is particularly revealed in small localities. It is impossible to mistake it when we are observing it in the provinces and the country districts, where nothing escapes attention, and where we can closely follow the ravages which are caused by this disease upon the population.

Croup, then, is an epidemic affection. It generally presents itself in the sporadic form, and it is thus that we usually observe it in Paris. Its contagious nature is far from being demonstrated; still, we must not resolve this question in the negative, as Croup often succeeds Membranous Angina; the contagion of which latter disease is no longer a matter of doubt in the minds of physicians, for it has been demonstrated in the most positive manner by the observations of Bretonneau and Trousseau. It is, therefore, possible that Croup, which, in its nature, very much resembles Membranous Angina, may, like it, be communicated by contagion. I say it is possible, for in the present state of science, we cannot express ourselves in a more positive manner. It is consequently advisable to separate children affected with Croup from other children who have not yet experienced any attack.

Pathological Anatomy.

The presence of a false membrane on the surface of the mucous membrane of the larynx, is the fundamental anatomical character of the disease. Without this new product, Croup does not exist.

The false membranes present themselves under the form of thin elastic layers, of a whitish-grey colour, and rather tough consistence. They adhere more or less firmly to the mucous membrane; they are exclusively formed of fibrine; their form and extent are variable.

They occupy, in some subjects, the tonsils and the upper part of the larynx, without penetrating into its interior. In others, this organ is at the same time affected. In some cases they exist only in the larynx; and in a small number of children they extend into the trachea and into the bronchi as far as their smallest divisions.

They form, in the mouth, more or less extensive patches; they often cover the epiglottis like the finger of a glove. In the larynx, in the trachea, and in the bronchi, they form tubes which it is possible to remove entire. I have collected several of these false membranes; their dimensions are exactly those of the cavities in which they were contained. Those which come from the bronchi perfectly represent all the divisions of these tubes. Some have been found infinitely divided like bronchial tubes and forming an excessively loose hair-like mass of a very remarkable character.

Their upper surface is smooth and covered with plastic mucous matters. Their lower surface which corresponds to the mucous membrane is unequal and is scattered with very numerous red points, which are very well described by M. Blache in his Memoir on Croup.

These false membranes are all insoluble in cold water and even in hot water. The sulphuric, nitric, and hydrochloric acids harden these productions, and they also shrivel and detach them. Liquid ammonia, and alkaline solutions dissolve them and convert them into a transparent and diffluent mucus. It is important not to forget these characters, which will be found useful to bear in mind in treating the disease.

The mucous membrane is thickened, and sometimes slightly softened: its epithelium has disappeared; its surface is unequal, eroded, and covered with a series of reddish points, which correspond to the red spots placed on the inferior surface of the false membranes.

Symptoms.

Croup presents in its progress three periods, which it is almost always possible to distinguish.

First period.—It is rather difficult to distinguish this period in children at the breast. Thus, the shiverings and the uneasy feelings which are observed in subjects in the second infancy pass unperceived in those who are in the first. But in the absence of

these signs, there are others more important, the study of which ought not to be neglected. Young children who are affected with this disease have some uneasy feelings, and a little fever; they have sore-throat, their voice is hoarse and they cough occasionally.

The cough and the hoarseness are two signs of extreme importance. As soon as they are observed, the lower part of the mouth ought to be examined; the pharynx presents a more or less intense redness, and on the tonsils false membranes are seen already formed. Sometimes we observe, at this period, an abundant nasal flux and false membranes in the nostrils. On the body where there exists a wound, or a blister, for example, its surface is often covered by a production of the same nature.

The duration of this period is sometimes difficult to establish for the parents do not always perceive the commencement of the symptoms, and they are found to hesitate when they are questioned on these points. In general this period lasts from four to five days, but this limitation is by no means constant. There are circumstances in which it has lasted twenty-four hours.

Second period.—The symptoms of the second period are increase of fever and of the general disturbance of the economy; dry cough, returning by paroxysms which are at first slight and afterwards excessively painful, followed by efforts of vomiting and even by the rejection of matters in which there are false membranes; hoarse and sibilous cough, feebleness and sibilous character of the voice, difficulty of respiration, and more or less anxiety.

The cough presents characters which deserve to be studied in a special manner. It is hoarse, dull, and followed by a strange, and, as it were, metallic sibilation. Its tone is very extraordinary, and resembles a little the noise made by young chickens when they are trying to crow. Much more generally, the cough is hoarse like the voice, and often like it, it is stifled or extinguished.

When the cough is accompanied by expectoration (which is not the case in young children), or when it is followed by vomiting, it is necessary to examine the rejected matters. We may find in them some false membranes, the form of which it may be useful to examine when it is necessary to establish the seat of Croup. Thus, when we find the false membranes tubulated, we may judge of the seat of their formation by their dimensions. We may very easily recognize the membranous tubes of the trachea, and those of the second, third, and fourth orders of bronchial divisions.

The respiration is then more frequent than in the ordinary state; mucous and sibilant rhonchi are developed in the chest; and these are the only auscultatory phenomena which are observed at this period. The disturbances of the respiratory functions are especially external. They are betrayed by dyspnœa, the dull colour of the face, the anxiety of the countenance, and by the gestures and the attitude of the child.

The skin of the face is pale, and its hue slightly bluish, the eyes are sunk, and the lips are of a reddish-brown colour, indicating venous congestion of the head. The dyspnœa supervenes by fits, often after an effort of coughing; extreme anxiety is depicted on the face: the child makes gestures to be placed in a sitting posture, and he springs up into that posture when his strength permits him; suffocation threatens him for a moment, and then these symptoms disappear, and tranquillity rapidly returns.

This period is generally rather short, and lasts from twenty-four hours to two or three days. Then comes what is called the third stage of Croup, the stage of struggling against asphyxia which threatens to destroy the patient, and perhaps is about to do so.

Third period.—In the third period the cough and the voice are altogether extinct; respiration is accompanied by a well-marked sibilation which is heard at a distance; it is very painful, for all the inspiratory muscles are in action; thus the muscles of the nose, of the neck, of the abdomen, and the diaphragm contract energetically; the child appears overwhelmed by the disease; his face is bluish, his pupils contracted, his eyes hollow, his lips cyanosed, and his head remains thrown backwards. This state of depression is, however, disturbed by violent fits of suffocation. In the midst of sleep, after a fit of coughing, the respiration is embarrassed, the face becomes blue, the looks restless and suppliant, and the child raises himself forcibly carrying his hands to his neck before falling into the arms of the persons around him.

If the termination of the disease is to be favourable, the symptoms gradually lose their intensity. We observe a gradual decrease of the preceding symptoms, respiration becomes more easy, and sibilation no longer accompanies the respiratory movements. The fits of suffocation disappear. The cough becomes less frequent and more moist, and it gradually loses the character of hoarseness which at first it presented. However, this modification, as well as the alteration of the voice, still lasts a long time after the cure of the

disease. At the time when the respiratory functions are restored, the circulation becomes regular, the pulse resumes its ordinary character, and the skin of the face and of the rest of the body, recovers its natural white colour.

Progress.

The progress of Croup may be traced by the type which we have just indicated. The disease begins in the back of the throat before it extends to the larynx and the bronchi; it is a true Membranous Angina becoming transformed into Croup. When we carefully observe children at the commencement of the disease, such is almost always the case. Still, some well-observed, but very rare facts, demonstrate that Croup may commence at once in the larynx and bronchi. In these cases, the first period, such as we have described it, is altogether wanting; and the disturbances of the respiratory functions characterize the first appearance of the disease.

Croup, then, generally presents three periods, when the disease commences in the back of the mouth and extends into the air-passages; it presents only two when it begins in the larynx and the bronchi.

It would be erroneous to believe that the false membranes ought actually to be developed over the whole continuity of the air-passages. This is fortunately not the case; for although these accidental productions, developed at first in the mouth, are always formed on the epiglottis and on the borders of the aperture of the larynx, yet they may not, perhaps, penetrate more deeply. The disease is then much less severe. Its symptoms are in other respects the same as in the cases where the development of the false membranes is much more considerable, and when they extend as far as the bronchi.

The progress of Croup is almost always regular; the symptoms succeed, in general, in the order which we have indicated; however, there are sometimes rather well-marked remissions, which present themselves towards the end of the second period. It may happen at this time that some efforts of cough and vomiting carry away a great portion of the plastic exudations which obstructed the larynx. Tranquillity then returns, but it is not of long duration. The false membranes are again formed, although they are thinner than at first, and the symptoms of dyspnœa are presented afresh. Thus, we

observe in some children, two or three remissions of this kind, produced by the detachment of the false membranes, and their immediate replacement by others.

Some authors have undoubtedly mistaken the nature of these remissions, for there are some, and Jurine among the number, who have admitted the existence of intermittent Croup. I do not think that we ought to consider Croup with false membranes as an intermittent affection. As soon as these exudations are established, a certain number of symptoms make their appearance which are due to their influence, and which last as long as themselves. We can consider as intermittent only the Croups of former days, that is to say, the Croups without false membranes, and the cases of false Croup and stridulous laryngitis. These are truly intermittent; they return in well-marked paroxysms, as we shall mention hereafter. In fact, wherever there is a complete intermission of the symptoms, there can be no pseudo-membranous Croup.

Complications.

Croup is almost always combined with Membranous Angina; it commences with this affection, as we may be convinced by observing the back of the throat at the commencement of the disease. This complication rapidly disappears, the false membranes of the mouth fall off, and if we examine children when the disease has been established for some days, the buccal mucous membrane may appear quite healthy. We may then believe that the Croup has commenced in the larynx. This would probably not have been the case, if the mouth had been examined on the first day of the invasion of the symptoms.

Membranous Coryza sometimes co-exists with Croup; this is a complication of extreme importance in children at the breast. It must be opposed by the most energetic means. The children can no longer suck nor drink, for while they exercise suction at the breast or the breast-glass, they breathe through the nose, and, in such a case, this part is obstructed by the false membranes. As soon as the children wish to suck, they are suffocated, and are obliged to leave the breast in order to breathe more freely.

Sometimes œsophagitis and pseudo-membranous gastritis are found; but these complications are very rare.

The most frequent and most dangerous complication of the disease now under discussion, is lobular pneumonia. This observation has been made by MM. Blache, Guersant and Trousseau, and has been confirmed by all the physicians who have studied Croup. Pneumonia, in the state of bronchitis in the first period, takes its own peculiar character only towards the end of the second; it is almost constantly followed by a fatal termination.

We meet with lobular discrete pneumonia and confluent pneumonia. In some children it exists concurrently with a capillary pseudo-membranous bronchitis. In this case the disease is beyond all the resources of medicine.

Croup has sometimes been observed in combination with hooping-cough, phthisis, eruptive fever, &c. Among these diseases, only scarlatina has a direct connexion with Croup. It is, as is well known, pretty frequently accompanied by Membranous Angina, and then there is everything to fear from the manifestation of Croup.

Diagnosis.

The diagnosis of Croup sometimes presents difficulties, for there are other diseases of the larynx which are accompanied by symptoms somewhat similar to those which it presents.

In simple laryngitis, the cough and the cry are hoarse, but we do not observe the hoarse, feeble, and sibilant cough of Croup; the respiration is not accelerated, and there are no fits of suffocation as in that disease.

The symptoms of œdematous laryngitis, or of œdema of the glottis, are more nearly allied to those of Croup. The cough is equally hoarse and sibilant, the respiration is painful, and suffocation is imminent, but the fundamental character of Croup does not exist. There is no expectoration of false membrane. This product does not exist in the back of the mouth. Still, as it is not always possible to be sure of its non-existence, an error may be easily committed, and we are liable to mistake these diseases for one another. We must, therefore, take notice of the progress of the symptoms, which is much more rapid in œdema of the glottis than in Croup. There are besides few chances of misapprehension; for, as we have already said, œdema of the glottis is a very rare affection in children. The mistake can never be prejudicial to the patient; for in both cases the medical treatment

is the same; there is only one resource against asphyxia, namely, opening the trachea.

It is more difficult to distinguish Croup from pseudo-membranous tracheitis. Their anatomical characters are the same; there may be in both cases expectoration of false membranes; but as M. Guersant remarks, the symptoms observed in these two states are essentially distinct:—"Pseudo-membranous tracheitis does not present any of the signs of the first period of Croup; it commences with a more or less intense fever, and a dry, sharp cough, which causes a more or less tearing pain; the voice is low, but it is not extinguished as in Croup; the respiration is not sibilant; it is evident that the larynx is free. In the second period, the cough becomes more moist; the respiration, although difficult and rhonchous after the fits of cough, and between the fits, presents nothing which can be compared to the dry and metallic rhonchi of Croup, and to the paroxysms of croupal suffocation. In the third period of this disease, the difficulty of respiration increases, and after some violent fits of coughing, the patients throw up membranous, ribbon-shaped shreds, of greater or less dimensions. Then they become convalescent, if there is not at the same time an attack of bronchitis or pneumonia, which is the cause of the prolongation of the symptoms."—(*Dict. de Méd.*, t. IX.)

The disease which has been most frequently confounded with Croup and which has given rise to mistakes which are fatal in their results, is false Croup or stridulous laryngitis. It is important to establish a precise distinction between these two affections which acquire entirely different therapeutical appliances. M. Guersant has contributed more than anyone else to clear up this subject which remained so long confused and obscure.

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 membranes. The phenomena which are 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 becomes gradually more feeble, and at last it 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, they become, on the contrary, more alarming every moment, and they terminate by carrying off the patient.

It will be observed, that there exists a rather close analogy between the manifestations of these two diseases; between the cough, the dyspnœa and the suffocation; but the similitude is only apparent. When we carefully watch the progress of these symptoms, their character is changed, and the interpretation which may be drawn from them is necessarily changed likewise. This progress is so different that it appears to me difficult henceforth to confound Croup with false Croup, and pseudo-membranous laryngitis with stridulous laryngitis.

Prognosis.

Croup is an affection of a very serious character which always endangers life. It is a disease difficult to overcome or to arrest in its course. It is very often fatal. Nevertheless, we must establish some distinctions according to the seat and extent of the alterations. When the false membranes developed in the mouth exist only upon the epiglottis and at the superior opening of the larynx, the disease may be cured by means of suitable treatment. It is still the same when they do not pass beyond the limits of the larynx. But if these products are extended to the trachea and the bronchi, Croup is almost inevitably fatal.

The complications of the disease add still more to the seriousness of the prognosis. Pseudo-membranous coryza, in children at the breast, is a very serious affection, as we have already shown, because it exposes them to die of starvation. Lobular pneumonia may increase the dyspnœa, and if the obstacle in the larynx is not of a nature to produce fits of suffocation, the difficulty of breathing which accompanies the pulmonary inflammation does not fail to excite them. In this case, if the child did not sink from the closure of the larynx, it would die in consequence of the disease of the lungs.

Treatment.

The treatment of Croup has been advantageously modified in the present century in consequence of the researches of two able physicians, MM. Bretonneau and Trousseau. It is divided into two parts, one medical and the other surgical. Formerly the first alone was in favour; in the present day the second is definitively accepted, and we are indebted for it to the two physicians whom I have just mentioned.

Blood-letting, revulsives, alteratives, emetics, and sternutatories, form the basis of the medical treatment. Local medications and tracheotomy belong to the surgical part of the treatment.

Before examining the value of these different methods, it will be useful to understand the end which we propose to ourselves to fulfil in putting them in practice. The due comprehension of the indications forms the basis of our therapeutics, which would otherwise be only a blind and dangerous empiricism.

It is necessary to moderate the inflammation of the mucous membrane of the larynx, and to destroy the specific character of this inflammation by blood-letting, revulsives, and alteratives. Tartarized antimony, employed as an emetic, also contributes to this result; but it has, like sternutatories, a different action. It acts as a mechanical remedy, and by the efforts which it occasions, it excites the expulsion of the false membranes which are impeding respiration.

By means of local applications we may hope to favour the rapid detachment of the false membranes, and when we are unable to succeed in this object, and suffocation is imminent, tracheotomy then becomes serviceable. It is a method of delay, by means of which we may for a time save the lives of the little patients, even if we fail in arriving at their definitive cure.

Blood-letting.—A period once existed when nothing was thought more efficacious for subduing the specific inflammation which exists in Croup, than the abstraction of blood. Experience has remarkably contradicted this view, and it has been found that blood-letting does not succeed in this instance as in ordinary inflammations. It is useful only in strong and vigorous children, when the reaction is very intense, and when, from the commencement, the breathing is found to be so embarrassed that suffocation is imminent. It is in general dangerous with children at the breast, who are far from exhibiting

the same strength of constitution. However, if it should be thought necessary to have recourse to this measure, it is preferable to employ bleeding at the arm rather than local depletion of blood. The latter method has the great inconvenience of exciting the little patients, who are frightened by the leeches, and are agitated to a dangerous degree. The internal spasm which they suffer is, moreover, injurious to the respiratory functions, and more rapidly induces asphyxia. Moreover, in order to apply leeches, the children must be laid on their backs, with their heads thrown backwards, a position which in itself is sufficient to occasion suffocation. Lastly, the neck is the region of the child's body where it is most difficult to stop the bleeding from the leech-bites. It cannot be compressed in this disease, without danger of obstructing still more the entrance of air into the chest. The leeches then allow blood to flow in abundance; and the results are an anæmic state of a very serious nature, and sometimes even fainting followed by death.

We must, therefore, employ the greatest caution in taking blood from children at the breast who are attacked with Croup. Bleeding at the arm is preferable to bleeding by leeches. If, however, the latter method is decided upon, care must be taken to proportion the loss of blood to the strength and the age of the patients. Three or four leeches ought to be sufficient, and it is better to repeat them than to endanger life by an application of too great a number.

Revulsives.—The employment of blisters on the neck and on the different parts of the body does not produce such favourable results as might be expected. Besides the uncertainty of their action, they expose the patient to great danger. The wound which they make is often covered by a false membrane, similar to that of the larynx, which may extend to a great distance, constituting a second disease, and one very difficult to manage. Thus, as the utility of blisters cannot compensate for such an inconvenience, it is advisable, I think, to banish them from the therapeutics of Croup. They may be of service in exceptional cases, pneumonia for instance; but they are employed less against the affection of the larynx than against the complication.

Alteratives.—Alterative treatment has been especially employed with the object of modifying the organism and, at the same time, the nature of the diphtheritic phlegmasia. M. Bretonneau has sanctioned the employment of this method by numerous observations, and

MM. Trousseau, Guersant, Blache, and the majority of physicians have derived much advantage from its use.

Mercury, sulphuret of potash, and sulphate of copper have been successively employed; the first of these medicines is the most useful of all. Mercurial frictions are usually resorted to on the upper part of the chest, the axillæ, the internal surface of the arms and the thighs, and calomel is given internally. The frictions ought to be employed night and morning, and calomel administered, in children at the breast, in the dose of one, three, or four grains in the day. This medicine promotes the expectoration and the rejection of the false membranes. The cough is diminished and loses its special character in proportion as the difficulty of breathing ceases.

In children subjected to this treatment, there are copious alvine evacuations and a discharge from the gums which is salutary when it is not carried too far. As soon as the motions are too abundant, the use of the mercurials must be discontinued, so as to avoid throwing the patient into an excessive state of prostration. Salivation is excited with difficulty in children at the breast. When it exists, it may be judged that the mercurial poisoning is very intense, and we must interrupt the use of the medicines to avoid the supervention of very serious symptoms, such as gangrene of the mouth and necrosis of the maxillary bones, which affections have been observed by M. Bretonneau.

The internal use of sulphuret of potash has also been recommended in the dose of twelve to fourteen grains each day, and sulphate of copper in the dose of four grains in two portions, with an interval of ten minutes, in a spoonful of syrup of gum; but these methods require their efficacy to be established by new observations. I shall not allude to them further, for it is useless to vary our therapeutical agents, when we cannot substitute more evidently useful medicines for those which are already known. Mercury is the best of the alteratives with which we are acquainted, and it is impossible to replace it by any other drug.

Emetics.—Emetic treatment promotes the rejection of the false membranes when they are ready to be detached, and assists in the expulsion of the mucous matters which fill the larynx. This kind of treatment is most usefully employed in the management of Croup. Besides, one of the substances which is generally administered, namely, tartarized antimony, produces a double effect. It acts as a mechanical agent, as we have just said, and it has afterwards a well-

marked alterative action; it modifies the nature of the blood, and promotes the softening and the removal of the false membranes.

The emetics which may be given to children attacked with Croup are ipecacuanha and tartarized antimony. The latter deserves more confidence than the former. Ipecacuanha is given to children at the breast in the dose of five or six grains, which may be repeated in the same day. As to tartarized antimony, a draught should be formed containing two or three grains of this substance, and it should be taken in teaspoonfuls at a time, every half hour, till it produces vomiting. It may be suspended at the third vomiting, and it may be recommenced during the day, if necessary. In general we must not fear to employ this method energetically, for it can be useful only in this manner. If the tartarized antimony produces too copious alvine evacuations, with a sensible alteration of the countenance, its employment ought to be immediately discontinued.

Sternutatories.—Irritating fumigations with vinegar, and the insufflation of snuff into the nostrils, have been employed against Croup as mechanical agents for promoting the expulsion of the false membranes. They can produce advantageous results only when these accidental productions are floating and ready to be detached. This may be considered the case when the character of the respiration assumes a valve-like sound; when the cough is moist and mucous, and when there is a tracheal gurgling, indicating the presence of bronchial mucous matters.

Local Treatment.—In our local treatment, we make use of the information acquired on the chemical composition of the false membranes. We employ for their destruction the substances which have the property of dissolving them, or detaching them by causing them to shrink. Alkalies dissolve them, and acids shrivel them powerfully.

Cauterization by acids is the best method to employ. Weak hydrochloric and nitric acids are usually applied; or nitrate of silver in the proportion of two drachms and a-half to eight drachms of distilled water. It is necessary to use a small fine sponge, firmly fixed at the end of a rod of whalebone, curved in a hook-shaped form; when the sponge is soaked, it is gently squeezed and applied to the pharynx and upon the glottis, so that some drops of the caustic liquid may penetrate into the larynx.

This operation is exceedingly disagreeable to the child; it leaves a very unpleasant taste in the mouth, and it induces violent efforts of

vomiting, which are very painful but salutary. It must be performed at the commencement of the disease, if false membranes are observed on the pharynx, and it must be repeated twice a-day at least, as long as these products exist on the surface of the mucous membrane.

Although the cauterization of the back of the mouth and of the upper part of the larynx is advantageous, it has also its inconveniences which ought to be known in order to be avoided. Immediate suffocation may be the consequence, if the sponge has been left too long on the glottis, and if too great a quantity of liquid has penetrated into the larynx. This accident is a very serious one, for it may cause death, or at least may give rise to the necessity of immediately performing tracheotomy. It may be avoided by the most simple precautions; thus the cauterization ought to be made rapidly, and the whalebone should be withdrawn from the mouth before the efforts of vomiting are in full activity. On the other hand, the sponge ought to be lightly squeezed, and should contain only a small quantity of liquid, so as not to fill the larynx or the œsophagus, as I once saw done by an inexperienced manipulator. In such a manner we improve, as far as possible, this important medication of Croup, and we do not endanger its success by imprudence and thoughtlessness.

The different methods of treatment of which we have just spoken are never employed exclusively. Each of them presents great advantages when we know the proper use of them, and we must combine their action in order to derive from them all the success which we desire. The following are the results of my experience in this respect.

Three children fully attacked with Croup, were treated at the same time by emetics and cauterizations; one of them at the Hôpital Necker, under the care of M. Trousseau; the two others in the town. All three were cured; but it must be stated, that in the application of the remedies we took such precautions as were very favourable to the result.

These patients were visited every five hours. At the commencement of the attack, the back of the mouth and the upper aperture of the larynx were cauterized with nitrate of silver, and the operation was repeated every day, three or four times in the twenty-four hours, until the disappearance of the false membranes of the pharynx. At the same time, we gave also tartarized antimony during the day, at one or two intervals, until vomiting was produced. The false membranes were rejected from the mouth. The cough which was

entirely inaudible, became gradually stronger, more moist, and less hoarse. The voice by degrees resumed its intensity, and the functions, disturbed for a time, recovered their natural state. It appears evident to me, that these three children escaped death only by the judicious employment of the two kinds of medication combined. This result deserves to be recorded. It would have the greatest value if, as may be hoped, other observations should be added in its support.

Tracheotomy.—When all the preceding means have failed, and the disease, becoming every day more serious, has produced that state approaching asphyxia, in which a fit of suffocation may involve the death of the child, there is no more time for hesitation, and we must open artificially a new passage for the external air; we must, in fact, practise tracheotomy.

This operation is not new. It was formerly put in practice in the case of patients suffocated by different forms of Angina and by Croup; but it had been abandoned. It our own time it has again come into favour, thanks to the perseverance of MM. Bretonneau and Trousseau. These physicians have rendered a true service to humanity and science, for tracheotomy is, in fact, the only resource in the last period of Croup.

The operation is performed with facility as will be seen hereafter; it presents no danger in itself, and if it does not succeed more frequently, it is because the cases in which it is employed are really beyond the resources of art. Thus tracheotomy has the greatest chance of success when it is performed on a child suffocated by Croup of the larynx; it has much less chance when the false membranes descend into the trachea; and it may be said that there is no chance at all when these false membranes extend as far as the bronchi.

Still, as the precise seat of Croup is ascertained with difficulty, we must, in every case, at the period of asphyxia, and unless there are serious complications, decide upon performing the operation. Immediately after tracheotomy, the respiratory functions are re-established, and we observe the fits of suffocation disappear, at least for a time. The children revive; some resume their amusements and appear to enjoy an unexpected degree of health. Unhappily this condition does not always persist in a definitive manner; the symptoms of asphyxia reappear, and death is the consequence.

In any case tracheotomy uniformly results in the prolongation of the life of the patients. Such a resource is not to be despised, for

in this period of respite, the false membranes of the larynx and trachea may be thrown up, and the inflammation of the mucous membranes may be dissipated.

Tracheotomy is, therefore, the ultimatum of the therapeutics of Croup. The physician ought always to be ready to operate, under such circumstances, when the fits of suffocation are multiplied, and when asphyxia is imminent.

The following are the rules to be observed in the performance of the operation. M. Trousseau has laid them down in a very precise manner, in a chapter of the work of MM. Rilliet and Barthez, and still more recently in an article in the *Union Medicale*. He explains himself in the following terms on this point :—

"When we have determined to practise the operation, ought we to perform tracheotomy or laryngo-tracheotomy ?

"Those who especially advocate simplicity in an operation, prefer laryngo-tracheotomy, and they base their practice upon the following considerations :—

"Fewer parts are concerned ; very few veins are found ; the air-tube is more superficial, an inestimable advantage in children whose neck is thick and short. We never run the risk of wounding the innominata artery or the common carotid of the left side, which in certain abnormal conditions, crosses the trachea. These considerations are not without some value.

"I confess that the operation is more easy ; but as to the immediate dangers of tracheotomy compared with those of laryngo-bronchotomy, I cannot very well make the comparison, for having performed the operation of opening the trachea a hundred aud twenty-one times, I have never had any immediate mischances to deplore, except in an adult who died of syncope at the moment when I made the section of the skin. It may have happened to me, undoubtedly, to meet with some arterial anomaly ; but as I have always taken care to operate very slowly, and not to give a single cut with the bistoury without being safely guided by my finger and my eye, I am persuaded that I should avoid the left carotid, even if it sprang from the innominate trunk and crossed the upper part of the trachea. As to the innominata, I have had it several times under the edge of my bistoury ; but by inclining my section to the left, and in separating all the tissues with my finger and the hooked forceps (*erigne*), I have terminated these operations which are apparantly so dangerous, without fear and without untoward accidents. The surgeons who boast

of performing the operation with wonderful celerity, and who boldly plunge the bistoury into the trachea to divide it from below upwards, as soon as they have terminated the incision of the skin, may conclude by deploring their imprudent and useless rapidity, when they find under the edge of the knife, some vessels which it is easy to avoid if they have more regard to operating safely than to operating quickly.

"By the side of the above-mentioned advantages of laryngo-tracheotomy, which have no very great value, let us endeavour to place its inconveniences.

"In the case of Croup, the introduction of a canula, which is to remain in the wound, is an indispensable condition. This canula ought to be of considerable size; it should remain in the aperture at least six days and sometimes fifty. The canula, besides, is fixed below the thyroid cartilage, through the crico-thyroid membrane, and between the lips of the divided cricoid cartilage. At the point of contact of the canula there arises a violent inflammation from the purulent infiltration which, at the time of the tracheotomy, almost constantly induces denudation and necrosis of the cartilages which are adjacent to the lips of the wound in the trachea. What happens in the cartilages of the trachea will happen in the cricoid and thyroid cartilages; and that which, in the trachea, cannot entail any kind of accident, because the elimination of the necrosed products takes place easily and without appreciable contraction of the air-passage, will become, on the contrary, in the larynx itself, the cause of the most serious complications; for, when the Croup is cured, it will then be necessary to cure the necrosis of the cricoid and thyroid cartilages. Besides, in this part, the enucleation of the necrosed portions is accompanied with chronic inflammation and suppuration; and it is to be feared either that the skeleton of the larynx may remain ever afterwards distorted, or that the tumefaction of the laryngeal mucous membrane may cause orthopnœic symptoms as serious as those of Croup, or that at least the voice may remain ever afterwards impaired.

"These considerations alone would be sufficient for the rejection of laryngotomy in the case of Croup. There is still another, which, although having less value, no less deserves to be placed in the balance; it is, that by tracheotomy we open the air-tube much lower down, and in a point which the false membranes have not yet reached, or at least which they will reach later than the larynx; so that in opening the trachea we have more chances of being able, by opportune

treatment, to prevent the extension of the disease into the bronchi."

(Here M. Trousseau describes and figures the instruments used in the operation.)

"The child is laid upon the mattress; the cushion is placed under the neck and shoulders, so that the head is thrown well backwards and the trachea projects. If the cushion is only under the neck, the little patient, at the first stroke of the bistoury, draws the chin near the sternum, and tends to slip downwards, and the trachea sinks, and shortens itself so much that it is sometimes difficult to reach it. I have many times seen an extremely laborious operation become simplified in a moment, merely by placing the cushion under the shoulders at the same time as under the neck.

"Before making the incision in the skin, I trace, with a burnt cork or a little ink, a line, which passes under the lower part of the thyroid cartilage to the superior notch of the sternum. In this manner the incision of the skin is made in a straight direction, and the course of the bistoury is the better secured during the rest of the operation. This little precaution, which surgeons may regard as superfluous, is very useful for unskilful physicians like myself, and I cannot tell how many times I have had reason to be grateful for having observed it.

"The operator being placed on the right of the patient, if he uses the right hand, makes a fold of the skin, one side of which he confides to the assistant who is opposite to him, and he cuts this fold in its whole thickness, following the line previously traced.

"He then cuts upon the median line, and separates the pairs of the muscles, either with the blade of the bistoury, or, what is better, with a grooved director, taking care to separate with the hooked forceps those of the left side, while he himself, with another pair of forceps, separates those of the right. He then meets with a rather thick layer of cellular tissue, the plexus of the thyroid veins, and the bridge which unites together the two lobes of the thyroid body. Up to this time, the operation presents no difficulty and demands no particular care; but now some circumstances present themselves which require a little more attention. The veins of the thyroid plexuses most frequently pass almost parallel to the axis of the body; and with some attention we may succeed in not cutting them, although cutting lightly

the cellular tissue which unites them, and separating them with the hooked forceps. When they completely cross the trachea, which sometimes happens, they may be tied on both sides before cutting the part which cannot be avoided, and then the incision is made between the two ligatures. I have never yet tied the veins in a child; but I can understand why an inexperienced operator should wish not to cut any large veins, for the violence of the hæmorrhage may disturb him and make him act with two much precipitation. If, however, a large vein has been cut, do not be afraid, place one finger in the *inferior* angle of the wound and another in the *superior* angle; sponge, and wait, and generally before a minute has elapsed, the flow of blood will be reduced to a very small quantity.

"If the bridge of the thyroid body presents itself under your bistoury, never hesitate to cut it through the middle; you will generally have a jet of arterial blood as large as a thread which ceases after some seconds; and by this section you will have remarkably facilitated the operation.

"Then continue the incision in the median line after introducing the index finger of your left hand in order to assure yourself that you are in front of the trachea and not on the side of this tube; do not make a cut with the bistoury unless you have sponged the part previously; always separate with the hook all the parts you have cut, and you will thus arrive at the cartilages of the trachea, which you will recognize by their white colour and their hardness. Do not yet be in a hurry to cut into the air-passage; lay bare three or four rings, suspend the operation for a moment, and place within your reach, and in some measure under your hand, the blunt-headed bistoury, the dilator, and the canula. When all these are prepared, carefully sponge the bottom of the wound and the trachea, and make a very small puncture in the trachea with the point of your bistoury. As soon as you have heard the hissing sound of the air, put the index finger of the left hand on the passage which you have just made, take your blunt-headed bistoury, and plunging it into the trachea, cut upwards and downwards, so as to make an opening at least half an inch long. Do not be alarmed at the introduction of a little blood into the trachea and at the noise made by the air, the mucus, and the false membranes escaping by the incision; introduce your dilator, open the wound in the trachea, take the canula in the left hand, make it pass between the two open branches of the dilator, and when you hear the air passing through the canula, re-

move the dilator, make the child sit down, tie the strings of the canula behind the neck, and the operation is finished.

"The little hæmorrhage which may still exist is arrested; a violent cough expels the blood and the mucous matter which may be present in the bronchi, and the respiration is soon calmly established.

"Surgeons may find all these details very puerile. Physicians who have not yet performed tracheotomy, and also those who have already performed it, will, perhaps, thank me for having entered into these particulars.

"But this operation, which is so simple in the child, is very laborious in the adult. In the latter case it is necessary to tie the cut vessels, from the fear of sometimes seeing hæmorrhage continue after tracheotomy; in the adult also, we must never open the trachea unless the bleeding is arrested. In eleven operations for tracheotomy which I have performed on the adult for chronic affections of the larynx, I have several times had occasion to repent most seriously of not having taken the most minute precautions. I have, however, never tied any vessels, but twice I met with serious hæmorrhages which were prolonged after tracheotomy, and which I had much difficulty in arresting. If I were obliged again to perform this operation under similar circumstances, I should not hesitate to tie all the great vessels which might pour out blood, and I would not open the trachea until I was perfectly secure from hæmorrhage.

"*Accidents during the operation.*—The accidents which occur during the operation are:—Hæmorrhage. We have just remarked how rare hæmorrhage is, and how little severity it exhibits. If it had happened that we had divided a great number of thyroid veins and the blood was flowing in streams, it would be essential to fix the trachea between the ulnar border of the index finger and the radial border of the middle finger, passed down as far as the vertebral column, and to divide the trachea freely and rapidly from below upwards, and then to introduce the dilator at the same moment; thus hæmorrhage would be arrested. I do not speak of such hæmorrhage as might result from the section of a thyroid artery, or even from a wound of the brachio-cephalic trunk; in such a case it would be evidently necessary, in order to save the life of the patient, to tie the vessels before terminating the operation. I do not know whether this misfortune has ever happened; but I have several times felt the trunk

of the innominata beating under my fore-finger, and I should, undoubtedly, have wounded the vessel if I had directed my bistoury incautiously into the inferior commissure of the wound.

"I have seen a patient die of convulsions during the operation; this was a man fifty-two years of age, on whom I operated at the Hôtel Dieu for a laryngeal affection which induced extreme suffocation. The patient, in place of being laid in the recumbent posture, was seated in an arm-chair, which was a great error on my part. I had scarcely cut the skin when an epileptiform convulsion occurred. I was imprudent enough to continue, and before I had reached the deep cervical aponeuroses, a second convulsion ensued which was immediately followed by death. I placed the patient in bed; I cut into the trachea; I introduced a canula; but the divided vessels allowed the blood which had not been expelled, to flow into the trachea, and nothing revived the patient, who had been perhaps the victim of my inexperience.

"I have several times seen asphyxia supervene, and respiration cease during the operation; in these cases the patient was in a state of apparent death. I terminated the operation as quickly as possible and introduced the canula; then having placed the patient on his side if any blood flowed into the trachea, and on the back in the opposite circumstances, I made, on the abdomen and the chest, alternate pressure to drive the air from the chest and to bring it back again, and thus all my patients were restored to life.

"Syncope is an accident which is far from common. It manifests itself generally immediately after the operation, at the moment when, the respiration becoming free, the cerebral congestion suddenly ceases: I once saw it last for nearly an hour; but it was never fatal. I content myself by dropping cool water on the face, and also throwing a few drops into the trachea, while mopping out that tube rather briskly; and at the same time I make the patient lie down.

"As to the introduction of blood into the trachea, on which much stress has been laid, I have never seen this occurrence lead to any serious results, provided we make use immediately of a dilator to keep the lips of the trachea wide open, or rather if by any means we can succeed in immediately introducing a wide canula; for if, after having incised the trachea, the surgeon gropes about and cannot introduce the canula, during each movement of inspiration the blood is sucked

into the trachea; and as the air cannot penetrate there at the same time, an almost immediate asphyxia may be the consequence; added to which, the hæmorrhage may continue, because the respiration remains still embarrassed.

"But if, on the contrary, the dilator holds the wound in the trachea open, the air penetrates with facility, rejects powerfully the small quantity of blood which has been introduced, and the return of the normal respiration causing the hæmorrhage to cease, the introduction of blood no longer takes place; and if, by chance, some little blood still flows trickling into the bronchi, the patient can generally get rid of it without assistance, and a little sponging is sufficient to assist in this expulsion, which is not very difficult.

"The respiration generally becomes very easy immediately after the operation. If it remains embarrassed, it is because some clots of blood, or some false membranes are filling up the principal bronchi. When there are some clots of blood, it is sufficient, while the trachea is kept open by means of the dilator, or even after the introduction of the canula, to instil once or twice some drops of cold water into the bronchi.

"When there are false membranes in the trachea, it is proper to leave the dilator in the wound until the removal of these foreign bodies, the expulsion of which is likewise promoted by some instillations of cold water into the bronchi. Sometimes in spite of this proceeding, the false membranes remain fixed by the roots which they have thrown out in the lung, even when the upper part is detached and floating. In this case, we must try to seize them with the forceps, between the lips of the wound, and exercise upon them a very slight degree of traction which is generally sufficient to remove them.

"The wound is covered with a layer of waxed plaister, pierced with a hole for the passage of the canula, and a double canula is afterwards introduced and firmly fixed by means of its two strings tied together behind the neck. When the operation is finished, the neck of the child is enveloped in a cravat, in such a manner that the expired air is partly taken back, preserving its warmth and especially its humidity. From this arrangement it results that the mucus of the trachea and of the bronchi no longer hardens, that the expectoration is easy, and that the injections and the sponging are never necessary.

"Every time that the respiration appears to be embarrassed, and even without any such embarrassment, it is necessary, about every three hours, to withdraw the internal canula in order to clean it, and then put it back immediately in its place. The wound is sometimes covered with false membranes, and as soon as they present themselves they ought to be strongly cauterized night and morning with hydrochloric acid.

"When, about the fourth or fifth day, the disease appears to be advancing towards a favourable termination, we must not be afraid to allow the canula to be a little obstructed, in order that the air, in making an effort against the larynx, may displace the mucous matters and the false membranes, and may force for itself a passage through this organ. We may thus measure tolerably well the degree of permeability of the larynx. This is the more important, as the capital precept in tracheotomy is to withdraw the canula as soon as possible.

"As soon as the canula is removed, the edges of the wound are brought together by adhesive plaister. This dressing, which is renewed two or three times a-day, is sufficient in the greater number of cases. A few days are generally sufficient for the wound in the trachea to close completely, and then there remains only the solution of continuity of the deep tissues and of the skin, which soon cicatrizes and leaves a scar which is not very unsightly.

"In one case only was I able to remove the canula definitively at the end of four days; sometimes from the sixth to the eighth; generally from the tenth to the thirteenth; once on the forty-second day; and also once on the fifty-third day. When no untoward circumstance occurs, the passage of the larynx is re-established from the fourth to the thirteenth day. I have not yet seen in a single case an air-fistula remain after tracheotomy."

Of the treatment after the operation.—Formerly, M. Trousseau, like M. Bretonneau, performed tracheotomy only in order to inject caustic solutions into the trachea and the larynx, for the purpose of detaching the false membranes and removing them by the aid of brushes (*écouvillons*). At present, M. Trousseau has renounced this practice, which he considers dangerous, and he contents himself with only cauterizing the edges of the wound if they are covered with false membranes, or the interior of the mouth if these products still exist upon the tonsils.

He also places the children in a well-ventilated room, at a mild temperature, with their necks surrounded with some network or a loose woollen cravat, and an assistant withdraws the canula every two or three hours in order to clean it.

"After the operation, children drink and eat with extreme facility. This facility generally remains for four or five days, but then it is perceived that there is something rather amiss in their mode of swallowing. Every time that they drink, a convulsive cough ensues, and some drops of drink are seen to spout forth through the canula. This occurrence is generally observed for five, ten, or even fifteen days, especially when the children drink quickly. It even persists when the canula is removed, and the wound in the neck is exactly closed. Most commonly the quantity of liquid which thus passes through the larynx is inconsiderable, and causes only a slight inconvenience; but sometimes almost the whole of the drink enters into the trachea and the bronchi, causing severe inflammatory symptoms, and the children then refuse anything whatever.

"I make it almost an invariable rule, when this accident happens, to deprive the children of drink, and to give them thick soups and particularly vermicelli, macaroni boiled in milk or made into soup, but removing the milk and the soup; fish, meat lightly boiled, in rather large pieces; and thus I avoid untoward symptoms such as I have mentioned. Then they swallow solid food, and with their strength the facility of deglutition is restored, and soon the children are able to drink, provided they do so slowly."

The local medication of M. Bretonneau, which M. Trousseau appears at present to abandon, ought to be employed only in the following manner:—

"If the child is vigorous, and has energetically expelled the false membranes contained in the air-passages, and if, after the operation, the respiration is very easy, then before introducing the canula, we instil into the trachea, at two or three intervals, fifteen or twenty drops of a solution made with twenty-four grains of nitrate of silver to seven drachms and a-half of distilled water. This instillation is repeated four times the first day, three times the second and third day, once or twice the fourth day; and then it is discontinued.

"Concurrently with this treatment, we pass into the trachea a kind of brush (*écouvillon*) made with a very small sponge fixed at the extremity of an extremely flexible piece of whalebone and dipped

in a concentrated solution, of fifteen grains of nitrate of silver in a drachm and a-half of distilled water.

"We may be satisfied with this last method if we have reason to suppose that the larynx alone has been attacked. The cauterization by means of the sponge ought to be performed as long and as often as the instillations of the cleansing solutions.

"Instillations of water and the spongings (*écouvillonnements*) still hold an important place in the treatment. If the cough is moist, and the expectoration is easy, there will be no necessity for instilling the water. Under the contrary circumstances, we may instil, once or twice in an hour, eight or ten drops of tepid water, which will mix with the mucous matters, will soften them, and favour their ejection.

"It will be always necessary to instil water after having applied to the trachea some solution of nitrate of silver, in order to divide the mucous matters which may have been coagulated and to facilitate expectoration. The instillations of water ought to be performed several times in the hour; when the respiration is frequent and *serratic*, that is to say, imitating the noise of a saw cutting a stone, it will be necessary to practise them after each sponging.

"It will be necessary to sponge (*écouvillonner*), every time that the canula or the trachea appear obstructed. The sponging will be rendered more efficacious by a previous instillation of water. If we hear in the trachea a valve-like sound or a peculiar hissing noise which gives us reason to suppose that there are some false membranes floating about, it is necessary to sponge at several intervals until the false membranes are detached and expelled. The sponging will never be more efficacious than when it is practised at the moment when the canula has just been removed, and when the lips of the wound in the trachea are held open by means of the dilator. The sponging is the more necessary in proportion as the symptoms which follow the operation are more severe. It never causes any untoward results; it is always followed by a much greater calmness of respiration, even when the children are in their last moments, and when the sponge draws away neither mucous matters nor false membranes."

Although the success of tracheotomy is not very striking, yet the results are such as ought to encourage its adoption by a physician placed in charge of an infant half asphyxiated by Croup. On the one

hand, M. Bretonneau, in twenty operations, saved six children; out of one hundred and sixty, I have saved forty-five. M. Leclerc of Tours, who has adopted the same treatment, reckons one favourable case in two operations. M. Velpeau has cured two children in ten. M. Pétel of Cateau Cambresis, who has followed the same system, has performed successively three operations out of six which were operated upon. Thus out of one hundred and ninety-eight cases of tracheotomy we reckon fifty-seven cases of success; that is to say rather more than a fourth.

Aphorisms.

Croup exists from the time when fibrinous false membranes have been effused on the mucous membrane of the larynx.

A veiled, hoarse, dull cough, followed by a metallic hissing sound, and accompanied with fever and gasping, reveals the presence of Croup.

In Croup, the feeble cough and voice, joined to noisy, rasping, *serratic* respiration, announce the fits of asphyxia and death.

Croup, arrived at the period of fits of suffocation, is fatal.

There are cases of Croup which get well, and others which are cured.

Croup ought to be treated by repeated emetics, alternating with doses of calomel.

A case of Croup which has arrived at the period of fits of suffocation, when death appears to be approaching, ought to be immediately treated by tracheotomy.

EMPIS.

EMPIS ON DIPHTHERITE.

RESEARCHES ON DIPHTHERITE, FOUNDED UPON AN EPIDEMIC OF THIS DISEASE OBSERVED AT THE HÔPITAL NECKER, IN 1848.

BY G. S. EMPIS.

(*Archives Générales de Médecine*, 1850.)

DIPHTHERITE (*διφθερα*, membrane, pellicle,) is the term by which M. Bretonneau, in 1826, described an affection which, although far from being new, had, up to that time, been mentioned by nosographers under denominations almost as varied as the different parts of the body where it may develop itself. Since the excellent works of M. Bretonneau upon this disease, the result of his researches has been to establish and demonstrate the unity of nature in an affection of which the morbid lesions are very different in relation to their situation on the body, but *only* different in situation; and in consequence, it appears that under the influence of an erroneous interpretation of the descriptions given by the celebrated physician of the Hospital of Tours, most physicians have learned to apply the epiphet *diphtheritic* to every pseudo-membranous production, whatever may be, in other respects, its characters and nature.

If in a child at the breast, affected with enteritis, the mucous membrane of the mouth is seen covered with a whitish pseudo-membranous layer, it is Diphthérite! A phthisical patient, in the last stage of marasmus and emaciation, exhibits as the last complication an eruption of *muguet* on the tongue and the mucous membrane of the mouth, and it is Diphthérite! If in a patient attacked with Scarlatina the specific cause of the bucco-pharyngeal inflammation is seen to produce a plastic and pseudo-membranous exudation, it is still Diphthérite! I shall not pursue further the enumeration of all the exudations to which we every day hear the denomination of Diphthérite applied.

Having had occasion to observe an epidemic of Diphthérite last

year, at the Hôpital Necker, I have profited by this circumstance to study thoroughly the pseudo-membranous exudations which are peculiar to this disease, and I have been enabled to convince myself that they possess characters sufficiently marked to prevent us from confounding them with the exudations peculiar to other diseases.

I do not give, in this Memoir, a particular description of the different forms presented by Diphthérite in relation to the localization of its products on the different parts of the body; for to study, in all their details, Croup, Membranous Angina, the Diphthérite of wounds, &c., would be to write a complete Treatise on this disease, and this is not my object. I purpose only to study Diphthérite in general, and as it has presented itself to my notice in the epidemic which I have been enabled to observe.

I shall therefore treat the subject in the following order:—

1. The pathological anatomy and physiology of Diphthérite, endeavouring to describe clearly the characters of the false membrane peculiar to the disease.

2. I shall offer a few remarks on the general state of health under which the false membranes are developed.

3. I shall treat of the diagnosis and draw a parallel between the different pseudo-membranous exudations observed in different diseases distinct from Diphthérite.

4. I shall glance at the progress of Diphthérite, and at its presumed causes.

5. Lastly, I shall offer some observations upon the prognosis and treatment of the disease.

Diphthérite is a specific disease, characterized anatomically by the development of a perfectly specific pseudo-membranous exudation on the mucous or cutaneous surfaces.

I shall not, like some authors, take upon myself to criticise the denomination given to this disease by M. Bretonneau; it was indispensable to find a new word which might be applied to the same affection, whatever might be, in other respects, its localization in the economy; this word was *Diphthérite*. If it presents the serious inconvenience of being capable of application to affections of a totally different nature from that of the disease which it ought to designate, it has, at least in the present day, this advantage, namely, that it has been current in science for the last twenty-five years, and by that very circumstance, requires no longer to be created.

Pathological Anatomy and Physiology of Diphtherite.

The study of the false membranes which constitute the pathognomonic character of the disease, ought in the first place to engage our attention. The differences which exist between the false membranes developed on the mucous and cutaneous tissues, are not sufficiently marked to prevent us from giving one general description of this exudation.

The evolution of the diphtheritic pseudo-membrane may be divided into three periods; first, the period of development, second, the period of complete formation, and third, the period of decline and cicatrization.

1. *Period of development.*—It is often difficult to discover the first modifications presented by a part which is covered with the diphtheritic membrane, and to ascertain by observation the phenomena which precede the specific exudation. The reason is to be found in the extreme rapidity with which the muco-serous liquid covering a wound or an inflamed portion of mucous membrane, suddenly changes its character in order to be converted into a pseudo-membrane. Still, when I have been warned by the appearance, in a patient, of some points of Diphthérite and have suspected the repetition of this formidable affection on other points previously excoriated or inflamed, I have observed that the exudation of a sero-mucous, transparent, slightly viscous, and ropy liquid, preceded the appearance of the pellicle on the affected part. The serous liquid is sometimes very abundant, and in some cases there would even be, in the vicinity of a part already covered with pellicular exudations, a kind of sub-epidermic exudation, sufficiently considerable to raise the epidermis under the form of phlyctenæ, by the rupture of which the dermis, being exposed, soon becomes covered with the false membrane. This mode of development was very evident in one of the children whose case fell under my observation, and an analogus case is related by M. Trousseau in his *Memoir on Cutaneous Diphthérite.* But I shall return to that subject when treating of the methods by which the disease is propagated, and it is sufficient at present to state that the presence of this liquid appears to me always to precede the development of the false membranes, which are only an ulterior modification of it.

In fact, this liquid when once exuded, rapidly acquires more

density and adhesion, and coheres, so to speak, more intimately to the surface which secretes it. It soon presents, at different points of its surface, little spots which are less transparent and gelatiniform, soon assuming a yellowish tint, and which, at the commencement of their appearance, being isolated from one another, although imperfectly circumscribed from the rest of the liquid from which they emanate, yet terminate after a time by uniting and being confused together. By these means a kind of pellicle is formed, still very delicate and having little cohesion, which I regard as the first stage of false membrane, or, if such a view should be preferred, which is in reality only the pseudo-membrane itself at the period when it has just begun to form.

In fact, a sero-mucous liquid, perhaps of a specific nature, is exuded on the surface of a raw part, and by a kind of coagulation of this liquid the wound is covered with its first pellicle.

2. *Period of maturity.*—If this pellicle is studied in its fully formed state, it will be found that it is the more thick in proportion as we pass from the centre to the circumference of the surface which it invests. It is slightly opaque, so as to conceal the condition of the part which it covers, and it presents, during the whole period of its extension, some limits which are often made more appreciable by a border of a rather vivid colour which circumscribes it, than by the sudden cessation of its substance. The first pellicle may still be removed rather easily from the surface of the affected tissues; but in consequence of its slight cohesion and its want of thickness, it is rather difficult to obtain large strips of it. The dissecting-forceps which are generally used for this purpose, tear away between their points some little, membranous, very narrow fragments, which are separated from the rest of the pellicle under the influence of a slight degree of traction.

The removal of this rudimentary membrane is generally effected without occasioning the bleeding of the wound, as may readily be supposed. In fact, the deep surface of this pellicle is still immersed in the serous matter which is exhaled on the surface of the wound, and which is found intermediate between this surface and the diphtheritic exudation; then gradually the serous exudation just described, still continuing to be poured out, is superadded to the internal surface of the pellicle, is incorporated with it, and increases its thickness and density. By these means, at the end of a short time, the primitive pellicle is found transformed into a true membrane (*couënne*),

covering the whole of the wound, presenting a yellowish tint, and perhaps acquiring some amount of thickness. Its cohesive power is then considerable, and its adhesion to the subjacent parts is very strong; it becomes rather difficult to separate it from them without producing a small flow of blood at the surface, the hæmorrhage being due to the erosion of the superficial vascular network, either by the instrument employed, or by the mere act of tearing away the membrane which is strongly attached to the vascular tissues.

In certain cases, this pseudo-membrane, when once developed, appears to remain for some time nearly stationary; it seems only to extend superficially, and to invade the surrounding parts by degrees; it is, besides, circumscribed by a rose-red border, which remains during the whole period of its extension; in other circumstances, there is a highly exaggerated force of production. As soon as one pellicle is formed, another replaces it by forming itself below it, and raises the first, which it passes beyond by its superficial extension; the second pellicle is soon in its turn raised by a third, and so on in succession, so as to give rise, on the surface of the wound, to an accumulation of membranous matter, having a stratified arrangement, in which each plastic layer is imbricated one over the other, like the tiles on a roof. When a large quantity of serous liquid is joined to this great activity of production, the former soaks and softens the concreted parts, which adhere to one another, putrefy, become greyish or blackish, exhale a very fetid smell, and then put on pretty closely the appearance, at first sight, of a gangrenous affection.

This phenomenon is especially very remarkable on the mucous membranes, the deep situation of which favours the accumulation of the membranous production. Thus, in the throat, between the tonsils, and, above all, in the vulva, between the labia and the anterior part of the walls of the vagina, we find remarkable examples of Diphthérite simulating gangrene.

A child in the ward Sainte-Julie, gave us the opportunity of carefully studying this singular phenomenon, which is clearly distinguished from gangrene by the preservation of vitality in the tissues covered by these putrefied membranes. In fact, the child in question died of the disease, and we were enabled, at the autopsy, to ascertain that the gangrenous appearance was solely due to the presence in the vulva of a large quantity of pseudo-membranes accumulated upon one another and partly decomposed. We were able to remove them with

facility from the mucous surface, which, being exposed, exhibited itself quite free from any trace of mortification. The epithelium was alone destroyed, and the vascular network was very much injected. It is by no means surprising that an analogous phenomenon, taking place in the throat, may have deceived some very intelligent practitioners, and that cases of Membranous Angina of this kind may have been confounded with Gangrenous Angina, which is not a common affection.

When the diphtheritic pseudo-membrane has acquired its entire development, and ceases to extend superficially, the circumference which up to that time had always been thinner than its centre, and was always limited by a well-marked red border, increases in thickness, invades the border which formerly circumscribed it, and even appears to pass beyond it into the surrounding healthy tissue. This is its stationary condition, if indeed it is permitted to us to regard as stationary any condition of the economy, which is always in activity, even when its activity is not manifested to us by any outward signs. But whatever may be the case, the diphtheritic patch preserves the same appearance for a period of very variable duration, and during this apparent repose, the work of cicatrization is being prepared.

3. *Period of decline and cicatrization.*—I have already remarked that during the few days which precede the shrinking of the false membrane (*coïenne*) the latter becomes thicker on its edges, which sometimes slightly encroach upon the healthy tissue. If we then attempt to detach and remove this pseudo-membrane with a pair of forceps, by seizing it at one of the points of its circumference, we find that these points adhere much less than before to the subjacent surface, and that the adhesion is the stronger in proportion as we advance from the circumference towards the centre. This is because a process of reparation and cicatrization has been established from the healthy towards the diseased parts, and by degrees is bringing back the latter to the healthy condition. In proportion as this process is accomplished, the diameter of the membranous patch contracts, and, what is a remarkable circumstance, the thickness of the membrane diminishes also: it appears that a kind of resorption is taking place on its internal surface, and that the points last formed are the first to disappear. We never see the membrane disappear all at once, leaving a cicatrized surface in its place, and consequently detaching itself like a crust or an eschar; on the contrary, it is by a continuous physiological process that the pellicle

diminishes in thickness in proportion as the edges of the wound are cicatrized. If, however, by local and energetic treatment, the exuding surface is modified, the complete disappearance of the membrane may be effected, and nothing will be left except an excoriated or granular surface, which is ready to be covered with a healthy suppuration. I have several times been enabled to ascertain these facts in wounds attacked by Diphthérite against which energetic cauterizations had been employed.

Of the seat of Diphtherite.

Up to the present time, I have considered the false membrane only in a general manner, without establishing any distinction relative to the different tissues on which I have observed it. In the epidemic of the Hôpital Necker, this disease presented itself sometimes on the cutaneous tegument, sometimes upon the mucous membranes, and often it has simultaneously affected both these tissues. It is, therefore, advisable to examine the tissues attacked by Diphthérite, and to inquire, in the cases of the patients, whether the course which the false membrane has taken, has presented any difference in relation to its seat.

I shall first examine it on the skin and on the mucous membrane.

1. *Cutaneous Diphthérite.*—All the parts of the external surface of the body may become the seat of the pseudo-membranous exudation, but an essential condition of its development is the absence of epidermis; thus we almost always see cutaneous Diphthérite exhibiting itself only on excoriated and inflamed surfaces, or upon wounds in a state of suppuration. We see it pretty frequently developed in children in regions where, as at the fold of the thigh, the skin, by excess of stoutness, is found in almost permanent contact with itself, and thus assumes the most perfect analogy with the mucous integument. In fact, in very fat children we often find in positions where the natural folds of the skin are exaggerated by the development of the subjacent cellulo-adipose tissue, modifications of the external tegumentary surface which considerably resemble the mucous membranes in appearance; for as in them, the epidermis, under the circumstances mentioned, becomes exceedingly delicate, and is often even completely destroyed, while an accidenal secretion of a sero-mucous product lubricates the surfaces which are in contact, and seems, by a

wise provision of nature, to put an obstacle to their adhesion. These then are frequently the points which, in children exposed to contract the disease, are the first to be covered with diphtheritic pellicles. There is no other part of the skin which is specially predisposed to become the seat of the exudation, the essential condition of which is the absence of the epidermis. The reason why we see Diphthérite most frequently commence in children round the mouth, on the upper lip, below the nares, or behind the ears, is because these points, more than any others, are frequently excoriated in consequence of eruptive diseases, or of coryza, and often from want of cleanliness.

The existence of a suppurating wound may also become the origin of the membranous exudation, which, under these circumstances constitutes a most formidable complication. I shall have occasion, in the course of this Memoir, to refer to some of the facts related by M. Robert, in his *Memoir on the Diphthérite of Wounds*, in which he appears to me to have completely understood the very specific nature of the disease which I am describing.

Whatever may be, in other respects, the seat of cutaneous Diphthérite, the evolution of the pseudo-membrane runs through its periods on the skin, as I have remarked in my general description.

It is particularly under these circumstances that we can properly understand the first period of the development of the exudation, and that we are enabled to observe the serous exudation preceding and accompanying the formation of the false membrane, which, as I have stated, appears to be developed by the coagulation of the exuded liquid.

It is also in cases of cutaneous Diphthérite that MM. Bretonneau, Trousseau and Robert have particularly observed, around the place of the exudation, an erysipelatous redness and swelling attacking the edges of the wound, and the epidermis sometimes rising up by the presence of the serous exudation, so as to form little phlyctenæ, by the rupture of which the dermis, being exposed, soon becomes covered by false membrane; but when the latter is once developed, it does not differ from the false membrane of the mucous tissue. Being of a yellowish-white tint, glistening and moist at its surface, it adheres firmly to the tissues which it invests, and tends always to increase superficially, until, by properly directed treatment, the secretion changes its nature. We then find the wound assuming progressively a better appearance, and tending towards cicatrization by means of a healthy suppuration, for the mode of cicatrization which I have

pointed out, taking place from the circumference towards the centre, is particularly observed in the Diphthérite of the mucous membranes, in which the reproduction of the epidermis appears much more active than upon the cutaneous dermis. M. Robert, in his work on *The Diphthérite of Wounds*, affirms that the diphtheritic pellicle can never be organized at the surface of a wound and assist in its cicatrization, and that this is one of the remarkable characters which separates this specific exudation from certain simply plastic exudations, such as we often see formed on the surface of blisters, and which, being susceptible of organization, assist in the cicatrization of the denuded surface rather than oppose any obstacle to the process.

2. *Diphthérite of the Mucous Membranes.*—I have never found any remarkable difference between Diphthérite developed on the mucous tissues and cutaneous Diphthérite; the presence of a previous irritation of the mucous membrane is one of the conditions which chiefly dispose this tissue to become the seat of the diphtheritic exudation.

It is often difficult to ascertain upon a mucous membrane whether a serous exudation precedes the appearance of the pseudo-membrane, because the presence of the natural secretion, proper to this tissue, constantly lubricates its surface. Such is at least the case on the mucous membrane of the mouth, which is always in contact with the product of its secretion and with the saliva. Still, if we consider the abundance of the muco-serous secretion which is found in the trachea and bronchi of a child attacked with Croup; if we observe that this fluid also flows from the nostrils, in the cases where Diphthérite occupies the anterior part of the nasal fossæ, as I have seen in several cases, and if we recollect the accumulation of this fetid serosity softening and putrefying the false membranes developed on the mucous membrane of the vulva and vagina, as I have ascertained;—then it must be admitted that the phenomena, which attend the development of the false membranes on the surface of the mucous membranes, are very little different from those which I have described in the formation of cutaneous Diphthérite.

It is particularly on the false membranes produced on the mucous membrane of the mouth that I have been enabled to study thoroughly the mode of cicatrization of the diphtheritic surfaces; that I have easily seen the colour of the red border limiting the exudation, gradually lose its intensity in proportion as the edges of the false membrane are, as it were, raised by the cicatrization; and that I have

observed this gradual diminution in the thickness of the false membrane, which seems to disappear by a kind of insensible absorption of its deepest parts, or by a molecular destruction of the superficial parts. The adhesion of the pellicle to the tissues which secrete it has appeared to me a constant phenomenon. There is, however, a fact which has struck me, and which cannot have escaped those who have made numerous *post-mortem* examinations of children who have died of Croup, during the first days of the attack, namely, that when we examine the interior of the trachea and the bronchi of a child affected with laryngeal Diphthérite, we meet with a quantity, often considerable, of a serous mucus and of small, very delicate pellicles, some of which are bathed in this liquid without adhering to the mucous membrane, while others adhere to the latter by one of their surfaces. If we remove these pellicles from the internal surface of the trachea or the bronchi, we ascertain that they adhere very slightly to the mucous membrane placed below them, and that the latter, scarcely at all irritated, frequently presents no trace of erosion.

The existence of this fact, does not perhaps imply a contradiction to what I have before advanced relative to the adhesion of the false membranes to the excoriated tissues.

In fact, I have often observed, in children who had just undergone the operation for tracheotomy, and in whom a tracheal canula had been adjusted, that there flowed through the latter a considerable quantity of a liquid similar to that which is met with in the trachea and the bronchi on opening a body, and that some very delicate pellicles were expelled with this liquid. Then at the end of a few hours, whatever care might be taken to clear the canula, the instrument was seen to be lined with a layer of whitish exudations, the thickness of which continually increased; these exudations were evidently nothing more than the result of the coagulation of the liquid, with which the walls of the canula were constantly covered. We therefore asked ourselves whether the presence of this same liquid in the air-tube might not, by its coagulation, give rise to the existence of these small pellicles on the surface of the mucous membrane, even although it was still healthy. Whatever may be the truth, the mucous membrane of the trachea is the only part where we have observed pellicles adherent to a mucous membrane, without the latter having been more or less denuded of its epithelium. On whatever other part I may have had occasion to study Diphthérite, whether on the mucous membrane of the lips, the tongue, the pharynx,

the nasal fossæ, the vulva, &c., the mucous basement membrane was found in immediate contact with the false membrane, and the epithelium no longer existed.

The difference between cutaneous Diphthérite and Diphthérite of the mucous membranes, is then very small in an anatomical point of view; for in both cases we see the false membranes passing through the same phases and presenting the same characters. We therefore justly regard these false membranes as the pathognomonic character of the disease, and consider that we are authorized to describe them in a general manner. One fact which is rather remarkable in relation to the seat of Diphthérite is this, namely, that all the parts which are completely removed from the contact of the air are preserved from the invasion of the disease. Thus, we very frequently see the membranous affection occupying the lower part of the throat, and the posterior wall of the pharynx, and spreading gradually to the larynx and the deeper parts of the air-tube; but I have never seen *true Diphthérite* propagating itself by continuity into the œsophagus and the parts of the digestive canal which are withdrawn from the influence of the air. Thus, in several children under my observation, I have seen Diphthérite commencing on the upper lip, or in the nasal fossæ, extending from the posterior part of the latter to the pharynx, and from the pharynx to the air-passages, without at all extending into the œsophagus. The same occurrence is not observed in the exudations of *muguet*, which, unlike those of Diphthérite, have a great tendency to extend into the digestive tube, while they do not propagate themselves into the respiratory organs.

May the presence of the air, then, exert, in these circumstances, some influence which escapes our notice?

General Pathology of Diphtherite.

Membranous Croup, when once formed, is an affection of a most serious nature from its situation independently of its nature, and the symptoms which accompany it place the life of the patient in imminent danger. The physician is so much engaged in observing the suffocation of his patient and its mechanical cause, that all his attention is directed to this point, and he sees only strangulation and asphyxia, and thinks only of the means of destroying or eluding the obstacle in the wind-pipe. It is, therefore, evident that in such a case

surgical indications would carry more weight than medical ones, and if the case presents itself in a child who has been previously healthy, and apart from all epidemic influences, and if the patient has not exhibited a rapid and almost simultaneous propagation of Diphthérite, the latter will probably be considered as a wholly local affection, and its most important character, namely, the property which it has of being generalized in the economy like the diseases *totius substantiæ*, will run a great risk of being misunderstood.

Even supposing the child to be attacked with a well-marked Diphtheritic diathesis, and to be destined from the first to experience all the local determinations of this affection, and that we see its products generalizing themselves on all the surfaces which are susceptible of its influence, and if the first manifestation of this morbid disposition has exhibited itself at the entrance of the respiratory passages, then a sudden death will probably cut short the diphtheritic phlegmasiæ which would otherwise have been ulteriorly produced. If, therefore, from such a fearful local symptom, any one should pretend to recognize the *diphtheritic* disease, he would act like a botanist who should describe a vegetable, such as wheat for example, by delineating this plant in the state of a blade of grass broken by the storm. To comprehend this proposition, correctly, it must be known, moreover, that the tendency of Diphthérite to repeat itself in the different parts of the economy goes on augmenting, up to a certain limit, with the number of cutaneous or mucous surfaces already attacked.

It is certain, therefore, that at a distance from the sources of epidemics and from the Hospitals, the cases of Sporadic Diphthérite which the practitioner in the large towns may observe in his private practice, can scarcely furnish materials for a general history of the disease such as M. Bretonneau has written. His predecessors in this labour, as Huxham, Fothergill, Marteau de Grandvilliers, Samuel Bard, and Lepecq de la Clôture, had already collected their valuable observations under circumstances the most appropriate for bringing into notice the general characters of what they then called Malignant Angina, and Gangrenous Sore-throat; and in their descriptions they have attached as much importance to the general and specific condition of the patients as to the local symptoms.

It is also under the epidemic type that I have been able to study Diphthérite, and to convince myself that, like all disseminated phlegmasiæ, this affection presupposes a general morbid condition or

a peculiar diathesis, generating and interweaving together inflammations which are different in their seat, extent, intensity, duration and number, but identical in their nature.

In fact, it cannot be denied that inflammations which are spontaneously or successively developed in an individual, in a limited space of time, and having common generic characters, are the expression of an affection which is single in its origin, and consequently of a well-marked pathological nature.

From this general character, therefore, it may be affirmed that such inflammations are not simple; and that almost always in their progress, duration, products, and general symptoms, and by the constitutional morbid condition of the subjects in whom they are observed, they reveal the presence of a special pathological element, intimately united with inflammation in its species, but differing from it *essentially*, or, in other words, in its proper nature. Hence, therefore, the word *Diphthérite*, equivalent to *diphtheritic inflammation*, which perfectly expresses the double nature of the disease of which I am now endeavouring to present a general sketch.

From the circumstance that Diphthérite is a phlegmasia, it should at first present the phenomena which are common to every inflammation; and this is, in fact, consistent with my observations, and all my cases testify to the truth of this view. I shall not insist upon it. What interests us is much less the *common generic character* than the *specific difference*. It must be known, however, that we can only study the one by means of the other, that is to say, the specific element only by means of the inflammatory element, and the specific characters being only manifested in and by the characters of the genus. It must not, then, be imagined that a diphtheritic phlegmasia is formed of a pure or *unspecific* inflammation, and then of a specific alteration without inflammation, which are, in some manner, placed in juxtaposition.

This separation is merely an artifice of the imagination, a useful abstraction by which we isolate two elements which are very distinct in their nature, while taking care never to forget that in the diphtheritic phlegmasia, these two factors are inseparably united together.

I maintain that these two elements, the inflammatory and pseudo-membranous, are perfectly distinct in their nature, although very intimately associated in the diphtheritic phlegmasia. I shall be very probably asked, what proof exists of this distinction in their nature, and consequently of this possibility of a distinct existence and

manifestation, since I confess that I never observed one of these characters without the other in the epidemic which I witnessed.

To this I shall reply in the first instance, that as to what constitutes inflammation in general, its existence, independently of the production of false membranes, has no need to be demonstrated. It is in every one's power to determine artificially a simple inflammation; but it is in the power of no one to impress the diphtheritic character upon this lesion from external causes!

As to the morbid disposition by which the pseudo-membranous exudations are produced, I think that we are unable to identify it with the inflammatory diathesis: and as to the act itself, as well as the product of this morbid formation, who would venture to assert that it does not differ, like one species from another species, from the act and from the product of a simple and *healthy* inflammation, to make use of the correct expression of Hunter? If we were to conclude from the fact that the false membrane could not be formed without inflammation, that therefore these two things are not distinct in themselves, and that the inflammation is the cause of this species of morbid secretion, we should confuse all our ideas, and destroy our nosology. An inflammation may be the most favourable, and the most common condition of the production of the diphtheritic false membranes, without at the same time being the *cause* of them. This cause consists in a special morbid property, manifested by an inflammation on which it impresses its special characters; but in itself it is altogether independent of this inflammation.

Whatever the truth may be, and without stepping beyond the limits of clinical observation, we may assert the following proposition; that in Diphthérite there is no relation between the intensity of the inflammation and the intensity, the abundance, and the rapidity of the formation of the false membranes. It is even certain that the force of the pseudo-membranous secretion, or the diphtheritic diathesis is in an inverse ratio to the intensity of the inflammatory diathesis, and the simple activity of the inflammation, and that the production of the false membranes is the *more* easy and the *more* abundant, in proportion as the phlogistic element is *less* marked. If we examine plethoric children at the onset of Diphthérite, we shall be able to find a pretty exact proportion between the common element of the disease and its specific element, and we can remark between these two facts a relation so exact, that we shall be led, if not to identify them, at least to connect them together like an effect with its

direct cause; but if we observe the disease in children who have reached the last stage of the diphtheritic cachexia, or in whom the pseudo-membranous diathesis is so intense that it seems hardly to require any other condition than its own force to be able to manifest itself, then we shall see the false membranes formed suddenly and spread indefinitely under the influence of the least mucous or cutaneous irritation, so as to convince the most incredulous persons that, in such subjects, the irritation has only been the mere occasion, and not the cause, of the development of the false membranes.

In the purulent fever of the wounded, and in that of puerperal women, is it not the same case with the pus? Does not this morbid product exhibit itself in so little proportion to the inflammation that we may be allowed to ask ourselves if the inflammation is essentially necessary to the formation of pus?

Hence we must conclude that, speaking nosologically, Diphthérite is a phlegmasia, considered in relation to the study of the morbid elements and the formation of diseases, the types of which serve to construct nosologies; and that it results from the intimate association or the fusion of two factors which are very distinct and susceptible of being perfectly separated by clinical analysis.

I have written somewhat at large upon this question, because it is the foundation of the idea of the specific nature of Diphthérite, and is the point which I am chiefly endeavouring to establish, for the prognosis and the treatment are intimately associated with it.

Is it possible that this existence of a specific local element, produced by a diathesis, is not otherwise confirmed by the general symptoms of Diphthérite? How can we recognize the general state accompanying healthy inflammations, and exhibiting itself in a simple inflammatory fever, *febris inflammatoria simplex vel genuina*, in the general symptoms of an epidemic Diphthérite? If we appeal to the epidemic type rather than the sporadic, it is because at the time when the diphtheritic diathesis is at its maximum, the general symptoms which reveal it are better characterized; and first, the prodromata are longer than in the pure phlegmasiæ, then the fever is never so intense, nor the reaction of the circulatory apparatus so energetic, the heat so intense, or the skin so much injected and so red. All these symptoms have a character of mildness and slowness; the children do not appear to be seriously ill; the functional disturbances are less alarming, because the morbid activity is not so violent; the

tissues are a little flabby; the tint of the countenance often pale; the pulse small, and more or less frequent, as in all the Anginæ of a malignant character (the contrary being the case in simple inflammatory Angina); lastly, and this is a striking point, there is always a swelling of the sub-maxillary glands accompanying, and most frequently preceding, the appearance of the false membrane, and not only of the false membrane, but of the pharyngeal phlegmasia. We then observe, and in a still more constant manner, what happens in the same region before the development of erysipelas of the face. Who will venture to allege that this last inflammation is simple, healthy, and not special? On the contrary, it is certain that it exhibits many striking points of analogy with Diphthérite; and the same is the case with Angeioleucitis. These affections, if not of the same species, are at least of the same genus. Is this leading circumstance of the existence of a general state preceding the local lesions in Diphthérite, and appearing to control them, sufficient to make us *unclassify* this disease and transfer it from the phlegmasiæ into the pyrexiæ? I think not, or at least, if some modification ought to be introduced into nosology on this point, it appears to me that Diphthérite, instead of passing from the phlegmasiæ into the fevers, ought rather to be ranged among those acute diseases which participate of the nature of both, and which some pathologists propose to designate under the hybrid name of *febri-phlegmasia*. It would be found by the side of erysipelas and many non-virulent and non-contagious eruptive fevers, in the rigorous acceptation of such a term, as impetigo, pemphigus, erythema nodosum, certain cases of herpes, and of spontaneous Angeioleucitis, &c.

At present, if we glance at the symptomatological picture of Diphthérite, we find that the individuals who are attacked by it, pass from health to disease by an intermediate state which from the first presents some peculiarity and may enable us to foresee the specific affection which is in preparation. Thus, certain prodromata always precede the appearance of the false membranes; the subjects attacked by Diphtheritic Angina have always, before the appearance of the pseudo-membrane, felt a certain degree of uneasiness, loss of appetite, a slightly febrile condition, difficulty in swallowing, tumefaction of the lymphatic glands, &c. Every one has observed that Croup, before manifesting itself, is announced by uneasiness, cough, hoarseness, often by Angina, &c. I have been enabled to confirm the fact indicated by M. Robert, that wounds before being invested with the diphthe-

ritic pellicle, change their aspect, become more painful, and furnish a less abundant and thinner suppuration.

In young children, I have always met with the following prodromata, setting aside the local phenomena which I have just pointed out and which are connected with the localization of the morbid product, namely:—a slight degree of excitement; the child was agitated, lost its playfulness, and became fretful; there was sleeplessness, deficient appetite, the child sometimes refusing all kinds of nourishment, and even its mother's breast-milk; the skin became rather hotter than usual, and the pulse was slightly accelerated. These prodromata were then succeeded by other symptoms which were more significant, but entirely relating to the seat of the lesions.

These general prodromata, which do not appear to furnish any characters or signs of one acute disease rather than another, afterwards acquire, however, some degree of importance on the appearance of the different phenomena relating to the seat of the exudation, and they may then even become serious signs in the diagnosis. Croup, for example, is almost always preceded by two or three days of uneasiness and the existence of the prodromata which I have pointed out, before it manifests itself by the threatening train of symptoms which are peculiar to it. On the other hand, Stridulous Laryngitis or false Croup, most frequently takes children suddenly by surprise, while they are in perfect health, and without the appearance of any of the prodromata announcing the approaching attack. This absence of prodromata may then become an important sign, and may facilitate the diagnosis in cases where the other symptoms peculiar to each of these affections might not be sufficient indications; but the previous and concomitant swelling of the cervical glands is, in particular, a leading differential character.

I cannot enter here into the description of the symptoms which are peculiar to each of the varieties of Diphthérite in respect to its seat, for such a course would make me deviate from my object, which is the study of the disease in general. But the great peculiarity presented by Diphthérite as a general disease, is a certain progress and duration, and we are called upon to study the modes of generalization of its products in the economy. This is the most interesting point of view which it presents as a general disease, for it is precisely that which makes it one.

Let us now examine the different parts of this question.

Progress of Diphtherite.

After what I have observed, in the general description of the diphtheritic exudation, upon the part which it attacks, I have but little to add upon the progress of the local lesion. I have described the stages which it passes through, and I think it would be superfluous to expatiate anew upon this point.

But independently of the progress made by the false membrane on the tissue which exudes it, we have to consider the general progress of the morbid state under the influence of which the exudation is developed on the different parts of the economy. Let me explain myself. The greater number of the simple eruptive fevers are characterized anatomically by a special eruption which attacks the surface of the body in one and the same outbreak. Smallpox, for instance, presents a general eruption of which every small constituent papular point is subject to the same evolution, and every one runs through its phases in pretty nearly the same period of time; and when the desiccation has become general, we never see a second eruption developing itself by a fresh outbreak on the surface of the body. There is indeed sometimes, in varioloid (a modification of variola), a certain irregularity in the general progress of the eruption; all the pustules do not appear at the same time, each of them runs singly through the phases of its evolution, and some are already in a state of desiccation, while others which have appeared more recently, have not yet acquired their entire development. But this is an exception, and in the simple eruptive fevers, as variola, rubeola, scarlatina, when the eruption has terminated, however confluent or discrete it may have been, we never apprehend a fresh appearance of the disease. Let it be understood that I am not now speaking of the possibility of relapses, which are quite another affair.

On the contrary, there are morbid conditions with a chronic progress, the anatomical manifestations of which take place at irregular intervals. It is sufficient to quote syphilis or scrofula as instances without entering into more details. Well, Diphthérite is one of the intermediate states between those, the progress of which is acute and rapid, and those which last a certain time, so that repetitions of the morbid manifestation take place in the same individual at rather irregular intervals.

Let me say a few words on this generalization of Diphthérite and of its modes of appearance.

I have already called attention to this tendency of the exudation to extend in surface and to spread gradually to the parts which surround the spots first affected.

M. Bretonneau has particularly noticed that the depending parts are those which are most rapidly attacked by the exudation, and he has explained this fact by the presence of the special liquid which exudes from the diphtheritic surface, and which, under the influence of the natural laws of gravitation, tends continually to flow over the parts situated below the seat of those first affected; this is unquestionably one of the frequent modes of extension of Diphthérite by way of continuity. However, it does not always happen that the most depending parts are attacked by Diphthérite, for we sometimes see the exudation extending by way of continuity from the inferior to the superior parts. Thus Diphthérite commencing on the upper lip may ascend towards the nostrils, and gradually invest all the inside of the nasal fossæ and ultimately extend to the pharynx and larynx.

But there is another very remarkable mode in which the disease is propagated, and this consists in the reappearance of the exudation on regions which are more or less distant from each other; thus when an individual presents a point affected with Diphthérite, we must always be apprehensive that this formidable exudation will establish itself on other parts, and as the air-passage is almost a favourite seat of Diphthérite, we must always, in the circumstances indicated, apprehend that the mucous membrane of the larynx may be covered with pseudo-membranes, giving rise to the terrible affection called *Croup*.

In an individual attacked with Diphthérite, all the parts of the surface of the body which are inflamed, excoriated, or in a state of suppuration, become almost constantly, if not always, the seat of the exudation. If blisters are applied, their surfaces habitually become covered with pseudo-membranes, and in this case the false membrane assumes all the characters of the diphtheritic exudation, and no longer resembles those pseudo-membranes which are often observed on the surface of certain blisters, and which have no relation with the disease I am now describing.

In children who have undergone the operation of tracheotomy, and when the lips of the wound are not yet cicatrized, we very often see Diphthérite develop itself, but then it is only an extension of

the disease by way of continuity, for the serous liquid which exudes from the trachea by the canula, or between the latter and the wound, will sufficiently explain the circumstance.

How long, then, will an individual who has had a patch of Diphthérite, remain liable to a reappearance of the exudation on other parts, and for how long a time ought we to fear the supervention of Croup? This question, the solution of which would be to fix the duration of the general state under the influence of which the false membranes develop themselves, is very difficult to answer; for it frequently happens that a child affected with Diphthérite in a limited part, will recover rapidly under the influence of energetic local treatment, and that subsequently no new appearance of the exudation may supervene, while at other times we observe, that a patch of Diphthérite is almost completely cured, when suddenly the exudation is renewed with violence upon another part of the body, and at very irregular intervals of time.

Thus I have seen, in a child, that Diphthérite began on the point of the tongue, ran through its stages on that part, and disappeared on the thirteenth day after a complete cicatrization of the affected part. Then, on the fourteenth day, and when by the disappearance of this local lesion, it might have been supposed that the child was thenceforward out of danger, the mucous membrane of the larynx became the seat of a reappearance of the membranous exudation, and the patient was carried off by Croup. Such examples are frequent. At other times, the Diphthérite generalizes itself with great rapidity, and we see it, in the space of two days, occupying several excoriated parts of the face, the interior of the nasal fossæ, the folds of the groin, the vulva, and lastly the larynx. Sometimes Diphthérite remains localized in one spot for a long time, without producing many symptoms, and without any ulterior appearance manifesting itself on other parts. Thus, in one of the children under my care, Diphthérite remained twenty-seven days localized on the same region, and terminated by disappearing without its being repeated on other parts.

It therefore does not appear possible to be able rigorously to fix the duration of this disease. Let me state, however, that the persistence of several characters of the general state and even of only one, which sometimes happens, should always make the practitioner apprehensive, even when, for several days, all the diphtheritic points have disappeared. In treating further on the prognosis of this disease, I shall have occasion to return to the consideration of some

of the symptoms, which appear to me necessary to be most generally considered, as signs of the persistence of the diathesis in an individual, or of his predisposition to the repetition of the exudations.

Diagnosis of Diphtherite.

The diagnosis of Diphthérite is generally easy to be established, and the confusion which may prevail on this subject in the minds of some physicians, arises from the great latitude which they allow themselves in comprising, as connected with the disease now under consideration, the greater part of the pseudo-membranous exudations which are developed in different diseases.

If the reader recollects the characters I have assigned to the true diphtheritic product, namely, the appearance, on a mucous membrane or an excoriated surface, of a yellowish-white pellicle, rather dense, rapidly augmenting in thickness, ready to be renewed when it is detached from the tissue which exudes it, strongly adherent to this tissue, and having a great propensity to extend superficially by progressive invasion from the first limits of the exudation;—if he considers the remarkable change induced in the general state of the patient by the appearance of this disease, one of the fatal properties of which is to determine the repetition of the same exudation on all the parts which are excoriated or in a state of suppuration;—if, lastly, he will consider the absence of the symptoms which characterize other affections, and which, in relation to Diphthérite, are negative signs, he will then be readily able to distinguish this disease from every other which may resemble it in the presence of a pseudo-membranous production.

But, as several of these exudations are still, in the present day, confounded with Diphthérite, it is advisable to describe their most prominent distinctive characters.

Let us see, in the first place, if Muguet, on the nature of which so many opinions have prevailed and still prevail, can be regarded as a form of Diphthérite.

1. Muguet presents itself in the form of a multitude of small white points, at first distinctly separated from each other, but which, in proportion as they become more numerous, touch one another and are accumulated together so as to form a continuous, whitish layer, which invests all the inflamed mucous membrane, and thus constitutes a pseudo-membrane; this is the case in confluent Mu-

guet. If we endeavour to detach this false membrane with a pair of forceps, we find that is difficult to obtain strips of it, because each of the points, the accumulation of which on the mucous membrane has given the appearance of a false membrane, adheres too slightly to the others to enable us to obtain strips, at whatever period we may make the trial; but if, with a fine compress, we lightly wipe the part covered with Muguet, we easily remove all the whitish layer, and we uncover the mucous membrane, which is red and inflamed, but by no means raw. This operation, which I have many times performed, has never caused the flow of the least drop of blood, because the adhesion of the Muguet to the mucous membrane is inconsiderable, and is never so close to the dermis as in Diphthérite. In the latter, as I have already explained, there is a great force of cohesion; and true membranes are formed, which are surperposed upon one another when their thickness has attained a certain degree. Their colour is yellowish, and the adhesion to the tissues is such that we are rarely able to detach them without causing the raw part, covered by them, to bleed in some measure.

2. Muguet especially affects the buccal mucous membrane, and never extends into the larynx or trachea; there has hitherto been no example of Muguet extending to the respiratory passages and producing Croup, but it often extends to the pharynx and the digestive canal. The diphtheritic product, on the contrary, has the greatest tendency to propagate itself over the mucous membrane of the air-passages, where its presence constitutes Croup, and it perhaps never reaches the digestive canal below the pharynx.

3. The appearance of Muguet is always preceded by a general inflammation of the mucous membrane of the mouth, characterized by a general redness and a very acute sensibility which, in young children at the breast, presents an obstacle to sucking. The appearance of Diphthérite is preceded only by a very circumscribed irritation of the parts of the mucous membrane which are completely covered by the pellicle.

4. Muguet is never preceded by the serous exudation which is the forerunner of the pseudo-membrane of Diphthérite; but it appears on the mucous membrane when still covered with its epithelium or at least not excoriated. Diphthérite is never developed *above* the epidermis, and it always adheres to raw parts. I have formerly pointed out the only case in which I found remnants of exudation on a mucous membrane which was still unaffected.

The microscope which, as a method of exploration, has already rendered important services to science, may also serve to determine several points in the study of pseudo-membranous exudations. I shall terminate the section on diagnosis by a succinct statement of my researches on this subject, and I shall briefly sum up the result. But before entering upon this microscopical examination of the different pseudo-membranes, and determining how far this mode of explanation may be useful in the solution of the question I am now discussing, it will be expedient to take a rapid view of the semeiological aspect of these different exudations, and to determine the circumstances which ought to cause their rejection from the nosological scheme of Diphthérite.

Scarlatinal Angina, which is so frequently accompanied with a pseudo-membranous exudation, is one of those diseases to which practitioners most willingly accord the epithet of diphtheritic. These two affections, however, differ totally from one another; the exudation is not the same in an anatomical point of view, and the assemblage of phenomena accompanying each, make of them two very distinct diseases. The mode of development and formation of the scarlatinal membrane does not resemble that of Diphthérite; it would rather present an analogy with that of Muguet. This pseudo-membrane appears simultaneously on both tonsils; the mucous membrane covering these glands, being uniformly red and inflamed, is studded with a multitude of small white points, the aspect of which is rather similar to that of Muguet; and these little points, which become very confluent, soon unite together and become superposed on one another, giving rise to a continuous whitish layer, covering both tonsils and the pillars of the velum palati and extending only very rarely to the other parts of the mucous membrane of the mouth. This pseudo-membrane, the whiteness of which is more marked than in the diphtheritic membrane, which assumes a more yellowish tint, differs also from the latter by its less degree of cohesion, and by a much less intimate adhesion to the tissues which exude it.

In fact, it is almost impossible to obtain strips of this pseudo-membrane, by seizing a point of it between the blades of a pair of forceps, for each of the whitish particles which constitute it has so little cohesion with the others, that they are separated with very great facility. On the other hand, the adhesion of this matter to the mucous membrane is far from being so considerable as in Diphthérite. It is rather easy, by scraping the internal surface of the tonsil with the

extremity of a spatula, to obtain a sufficient quantity of this matter to understand its arrangement and to study its microscopical characters, which I shall hereafter explain. The pseudo-membrane of Scarlatina does not form a continuous and consistent membrane similar to that of Diphthérite, and does not present that intimate adherence to the dermis which is one of the characters of the latter. Let me add to these anatomical facts, that the pseudo-membrane of Scarlatina does not possess the *invading* property of Diphthérite; that it remains localized at the point of its development; that it does not exhibit the unfortunate character possessed by Diphthérite of generalizing itself by being repeated on all the surfaces which are excoriated, or in a state of suppuration; and that lastly, we never find it extending to the air-passages, where Diphthérite becomes so suddenly formidable. The authors of the *Compendium de Médecine*, however, assert that they are in the possession of the case of a child, who, at the termination of Scarlatina, was attacked with Croup; but I am able to show them several cases proving that Croup may also develop itself at the termination of variola, hooping-cough, and other diseases besides. The fact attested by these able writers is therefore very interesting; but it appears to me to prove only one point, namely, that at the termination of Scarlatina, children are in a general morbid state, not incompatible with that under the influence of which the diphtheritic exudation is developed; for this fact no more demonstrates the identity in nature of the scarlatinal membrane with that of Diphthérite, than we are able to prove that this latter disease is of the same nature as smallpox and hooping-cough, because it has been consecutive to these two affections.

The distinctive characters of Scarlatinal Membranous Angina and of Diphtheritic Angina, have been described with so much clearness and ability by M. Trousseau in a Memoir which he has written on an epidemic of Membranous Angina in the *Archives Générales de Médecine*, that I think it superfluous to insist further on this part of the diagnosis.

Can the membrane which sometimes covers the whole surface of a blister be confounded with Diphthérite?

Here it is indispensable to enter into a little explanation; for this question may give rise to discussion, for want of being put with sufficient clearness. In fact, blisters may be covered with a fibrinous membrane which has no relation to Diphthérite; but they may also become the seat of this disease. There are, therefore, two kinds of pseudo-membranes which may be observed on the surface of blisters;

one diphtheritic, presenting all the characters I have assigned to cutaneous Diphthérite, and particularly remarkable by its extreme degree of adhesion to the dermis of the skin; the other differing totally from the latter, and forming a greyish-white membrane, on the surface of the blister, being, in fact, a continuous membrane, sufficiently coherent to be removed in large strips, and even sometimes easily detached in a single piece; its thickness varying from one to two millimetres (about four-fifths of a line). The adhesions which it forms with the denuded dermis is inconsiderable, when it is observed at a period not very remote from its formation; it is then found, in detaching this fibrinous membrane from the dermis, that the latter is more or less inflamed on its surface, and that the projections of the papillary body are in a slight state of inflammation; but there is not any trace of ulceration. A little later, we observe a simple flying blister, and if the dressings have been made only with cerate, it is found that this fibrinous layer becomes more compact and more adherent to the dermis; that it is identified, as it were, with the latter, and that far from opposing an obstacle to the reproduction of the epidermis, it appears to assist in its formation. At other times, the epidermic secretion is formed below it, and when, at the end of a few days, the blister is completely dry, it is detached from its surface in the form of scales or irregular fragments, often incorporated with a little cerate. These certainly are not the characters of Diphthérite! Do we ever see the latter disease becoming organized, and assisting or favouring cicatrization?

M. Robert, in his *Memoir on the Diphthérite of Wounds*, published in the *Bulletin Thérapeutique*, has already drawn attention to this latter difference distinguishing the diphtheritic membrane from that of a blister, which he justly regards as a pure and simple plastic exudation, analogous to those which may be formed in the bladder under the influence of cantharides, several examples of which have been adduced by M. Morel-Lavallée.

It would appear to me to be as much contrary to the truth to consider the fibrinous exudation now under consideration, as a form of Diphthérite, as it would be erroneous to regard, as belonging to this disease, the fibrinous membrane which invests the pleura in certain cases of pleuritic effusion. No one, so far as I am aware, has yet entertained the idea of referring to serous Diphthérite the fibrinous coagulation in question, which has the greatest analogy with the inflammatory membrane (buffy coat) of the blood.

In many cases of Tonsillar Angina, destitute of any malignity, we frequently observe, towards the second or third day of the disease, on the internal surface of one or both tonsils, the appearance of small, whitish grains, of a sebaceous character, and exhaling a very fetid odour when they are crushed between the fingers. This small pathological product, which occupies only a very limited portion of the tonsils, really differs in too many respects from Diphthérite to require any further notice.

I have just described the exudations which are sometimes confounded with Diphthérite, and it now remains for me to explain the information which may be obtained by the microscope in the study of these exudations.

Microscopic characters.—Among the false membranes which, under the influence of various causes, appear either upon the mucous membranes, or upon the external integument previously denuded of its epidermis or already occupied by a suppurating wound; or which appear upon inflamed serous membranes;—there is one kind of them which ought from the first to be clearly distinguished from the others, as it differs entirely from the rest in its microscopical characters. This kind comprises the whitish exudations observed very frequently on the mucous membrane of the mouth, the pharynx and the digestive canal, and which are generally designated under the name of Muguet. When studied by the aid of the microscope, Muguet presents peculiar characters not met with *in any other kind of pseudo-membranous exudation.* It is an organized product, the position of which in the vegetable kingdom cannot now be contested, after the researches of MM. Berg and Gruby; and more recently, a detailed and minute description has been given of it by M. Charles Robin in his work on the *Vegetable Forms growing on living Animals.* (1847.)

M. Gruby regards the vegetable form of Muguet as the analogue of the *Sporotrychium.* Whatever it may be, this production is perfectly characterized by the spores and tubular filaments, so well described by M. Robin, and which are not met with in any kind of exudation.

To discuss the point, whether the vegetable form of Muguet can develop itself spontaneously would be to enter into the great question so often discussed by physiologists, namely, whether there can or cannot exist in nature such a thing as spontaneous generation. In fact, Muguet appears as if it ought not to be regarded as a special disease, nor even as a symptom of a single and identical

disease. It may exhibt itself in persons of all ages, of all constitutions, and affected with the most different maladies. Muguet may be *sown* upon the tongue of a healthy person (Berg) and may rapidly bud there. I know an instance in which a child being affected with Muguet, and suckled by its mother, communicated it to the woman's nipple and the areola of her breast. M. Ch. Robin has informed me of an interesting experiment; he removed the Muguet from the surface of a mucous membrane, and preserved it in a vessel with a small quantity of water. Then he was able to ascertain that, being thus separated from the mucous membrane, the Muguet continued to develop itself according to the laws of its organization, that the spores continued their evolution, and by a peculiar mechanism of their organization, induced the formation of tubular filaments. The work of M. Robin contains besides all the details necessary to be known in relation to this cryptogamous production, and I should think it at least superfluous, in the present state of science to insist upon its characters.

Vogel, who has described the vegetable form of Muguet, states that it is found in children and adults, on the false membranes lining *the mouth in Diphthérite.* This author has evidently confounded all the pseudo-membranous exudations under the name of Diphthérite, without regard to their character and nature; for this vegetable is met with only in the exudations of Muguet, and not at all in truly diphtheritic or fibrinous exudations.

As to the other kinds of pseudo-membranes, independently of the characters recognizable by the physician, and which are related together as much by their appearance and their seat, as by their physiology and the conditions of their development, they present other peculiarities which are only to be determined by microscopical examination.

The principal exudations of which I now intend to treat are the following:—1st. The inflammatory coat (buffy coat) of the blood. 2nd. The pleuritic or serous fibrinous exudation (*coüenne.*) 3rd. The membrane of a blister. 4th. The membrane of Diphthérite. 5th. The membrane of Scarlatinal Angina.

If I write a few words on the buffy coat of the blood, a subject which may perhaps appear foreign to the present discussion, it is because I regard it as the type of fibrinous coagulation, and because I have discovered very manifest generic characters connecting it and the other exudations I have just mentioned. In fact, the micro-

scopic study of these different exudations leads to the demonstration that they all present peculiar characters; and besides that every kind is marked by certain anatomical peculiarities according to the place of its development. But let me observe at once, that these latter peculiarities are completely in relation to the epithelial cellules which every exudation brings with it, and the characters of which vary according to the different regions of the integuments where they are studded.

Before commencing the characters which are distinctive and peculiar to each kind of pseudo-membrane, let me briefly point out the generic characters. 1. A primary character belonging to all the pseudo-membranous exudations already mentioned (with the exception, be it understood of Muguet, which I have distinctly separated from the exudations now under notice) is to present on the field of the microscope a quantity of small filaments of fibrine interlaced with one another in different directions, and crossing one another at acute angles, so as to form a kind of more or less regular network.

2. A second character, also met with in each of these exudations, is to present a great number of small, irregularly rounded corpuscles, forming a series of granular dottings around the filamentous network which I have described, and also occupying the spaces left between the interlacements of these fibrinous filaments. These small corpuscles are found in all pseudo-membranes, but in very variable number; it is to them that M. Lebert has given the name of molecular granules, and which resist for rather a long period the action of acetic acid.

3. A third character, belonging to all these fibrinous exudations, is that when treated with a drop of tincture of iodine, they immediately assume a very deep-brown colour.

Special characters.—A. *Buffy coat of the blood.*—In the buffy coat of the blood we find the common characters which I have just pointed out. The filaments of fibrine are very manifest, and under the influence of the tincture of iodine they become of a very dark-brown colour. But their interlacement is much less close than in the diphtheritic membrane; so that the kind of network which they form is much more loose. This at least is what I have been able several times to observe, when comparing alternately the diphtheritic membrane and the buffy coat of the blood on the field of the microscope. Molecular granules are found equally in both, but in a quantity gene-

rally much less considerable than in the other pseudo-membranes. Other characters which, in addition to these, always enable us to recognize the buffy coat of blood, relate first to the presence of the red and white globules of the blood; the specific gravity of these latter being inferior to that of the red globules, they are found in great number on the adherent surface of the buffy coat after bleeding. Secondly, two negative characters ought also to be noticed, namely, the absence of epithelial cellules and of pus globules.

B. *Pleuritic false membrane.*—This is unquestionably one of the false membranes which have most analogy with the buffy coat of the blood; the common characters being so far identical that it would be superfluous further to insist upon them. We find in this false membrane, in fact, the fibrinous network which is completely similar to that of the buffy coat, and the molecular granules exist in it in great quantity. Still, it will always be easy to ascertain by the microscope, whether we are examining the buffy coat or a pleuritic false membrane; for in the latter case, we find a great quantity of pus-globules which do not exist in the buffy coat seen after bleeding; and on the other hand, we do not find blood-globules, which are so abundant in the buffy coat. The pleuritic false membrane is further characterized by the absence of epithelial cells which we shall find to exist in the other kinds of false membrane.

C. *Membrane of a blistered surface.*—When studied by the microscope, the membrane of a blistered surface may be distinguished from the two preceding false membranes, although their common characters are almost identical. We find in it the fibrinous network very well-developed and perhaps more condensed than in the buffy coat. By the addition of a drop of tincture of iodine, the fibrinous filaments assume equally a very deep-brown colour. The molecular granules are very numerous, and just as in the pleuritic false membrane, we find many pus-globules. Still, it may be distinguished from the latter by the presence of epithelial cellules which are constantly found in it, but which are wanting in the pleuritic exudation; while the almost complete absence of the blood-globules will not allow us to confound it with the buffy coat of the blood.

D. *False membrane of Diphthérite.*—Here microscopical examination ceases to afford us much information. The diphtheritic exudations, whatever in other respects may be the place of their development, present, in a microscopical point of view, the greatest analogy with the membrane of a blistered surface. We find in them,

as common characters, fibrinous filaments which are very abundant and very closely interlaced together. The molecular granules present no difference, and exist in both in considerable numbers. We also find some pus-globules, perhaps in less numbers than in the false membrane of a blistered surface, but still we do find them; the difference is no longer anything more than their greater or fewer numbers, which is always an unsatisfactory microscopical character.

The epithelial cells in the diphtheritic membrane are always very numerous, and they present some peculiar characters according to the region where they are developed; but as Diphthérite may present itself on a great number of parts of the body where we also observe other exudations of a different nature, this microscopical character cannot be considered sufficiently diagnostic. It happens besides, as I have above stated, that blisters often become the seat of Diphthérite; and it is particularly in such circumstances that we are able to judge how inefficient the microscope becomes in deciding if we have under our notice a simple fibrinous membrane, such as we so often observe on the surface of blisters, or if the exudation before us is of a diphtheritic nature. The microscope, in such a case, is no more useful in elucidating the question, than it would be in distinguishing a syphilitic pustule from a variolus or a vaccine pustule.

E. *False membrane of Scarlatinal Angina.*—I have endeavoured in vain, by means of the microscope, to discover some character which might serve to distinguish the Scarlatinal membrane from the diphtheritic membrane; in both we find the filamentous network coloured a deep-brown by tincture of iodine; and in both there are molecular granules and some pus-globules, and, lastly, epithelial scales.

We may therefore conclude, from what has preceded, that it is easy to recognize, by means of the microscope:—

1. The pseudo-membranes of Muguet, which have no character in common with the other false membranes.

2. The buffy coat of the blood.

3. The pleuritic false membrane; and I may state that it is impossible by the aid of the microscope alone to decide whether we have under our notice either a simple membrane of a blister, or a diphtheritic exudation, or lastly, a scarlatinal membrane.

Now, if from the fact that the examination by the microscope demonstrates the formation of the false membranes of Diphthérite from anatomical elements similar to those which enter into the for-

mation of the false membranes peculiar to other diseases, certain persons would conclude that these different exudations belong to a single disease, we might object to such a view that the same microscopic examination would lead them to conclude that the primitive pustule of syphilis, the pustule of variola, the vaccine pustule, &c., are also only lesions peculiar to one and the same disease, since the microscope discovers in them only the same identical elements.

The application of micrography to medical studies would become, in my opinion, the most unfortunate method of investigation, if it should lead to such results. But on the other hand, it is precisely by establishing and putting in evidence the similarity of the anatomical elements of many lesions peculiar to different affections, that the microscope brings out still better all the influence and force of that *quid divinium* which presides over the development and the evolution of diseases, by impressing upon them a certain special seal, rendering them clearly distinct from each other, and making from them so many pathological unities distinct from all other analogous diseases.

Besides, micrography is still in its cradle, and we must not compromise the future; let us even hope that the microscope, or some other method of investigation, will allow us one day to penetrate into the specific differences of morbid products. All the sensible elements of diseases will then be known, and what the mind now admits solely upon the faith of the progress of phenomena, will then be supported on the most positive and solid data.

Etiology of Diphtherite.

Of Diphthérite we may make the same remark as we may of most other diseases, namely, that its etiology remains one of its most obscure parts. This affection, which is sometimes sporadic, is often developed in an epidemic manner; but the different authors who have written upon the disease are as yet unable to discover under what concurrence of circumstances it appears, and to what influence its visitations are to be attributed.

Attempts have been made by turns to explain the development of the disease by the influence exercised by moist air, by atmospheric temperature, or by the unhealthy situation of the localities where it has raged, but it cannot be said that the investigations made upon these points have thrown much light upon the subject.

M. Trousseau thus expresses himself on this question:—"In the towns and hamlets in the Department of Loiret, which are remarkable for their salubrity and for their excellent geographical position, I saw Diphthérite raging with excessive violence, while some villages of Sologne, situated in the midst of marshes, remained exempt from the scourge; and on the other hand, some hamlets and towns situated on the banks of ponds were depopulated by the epidemic, while others enjoyed a perfect immunity, which was thought to be attributable to the ordinary salubrity of the place."

The influence which may be exerted on this affection by bad food and the different privations entailed by misery, is still surrounded with much obscurity, and although constitutions which are weakened and undermined by chronic diseases, have sometimes appeared more apt than others to contract this formidable disease, yet it is no less true that we often see it attack persons who are in the most vigorous health.

In relation to the question of contagion, we find still more difference of opinion among nosographers, but with some it is one of the most established properties of the disease.

Caveant angue pejus parentes suos filios secum gerere, ubi puerulus hoc modo infirmatur; et si in domo ejus continget, statim alios pueros valetudine fruentes separent (Alaymus). Carnevale and Marcus Aurelius Severinus also admit its contagious nature; and Francis Nola does not much differ from them. Samuel Bard expressed the following opinion on the Suffocating Angina:—"This disease has appeared to me to be of a contagious nature; every infection proceeds from some principle received into the economy, and this principle, whatever it may be, being drawn in by the respiration of a healthy child, irritates the glands of the throat and the trachea, penetrates into them, and by so doing, induces a change in their secretion. The infection, however, in the present case, does not appear to depend so much upon some general influence of the air as upon the influence of effluvia transmitted by the breath of infected persons; which explains why the disease may attack a whole family without affecting the adjoining houses."

M. Bretonneau, whose competency in this matter cannot be disputed, admits the contagious property of Diphthérite, but in a degree very much inferior to other diseases.

Other authors, with whom Diphthérite comprises all pseudo-membranous affections, entertain no decided opinion as to its contagious

character. Still, M. Daviot, of Autun, thus expresses himself:—"I *dare* not refuse to it this property which is too readily attributed to it. When, however, it is complicated with scarlatina or variola, it may resemble these diseases, although in a somewhat accessory manner, in their essentially contagious character." This assertion, in which everything is confounded by M. Daviot, does not deserve much attention.

Let me now cast a rapid glance over the progress of the epidemic, and the order of succession in which I have observed numerous cases of Diphthérite during the past year, and let me explain whether, according to my own observations, we have any right to admit contagion as a property of this disease.

It was on the 19th of January, 1848, that a child, aged eighteen months, and attacked with Croup, was brought from without and admitted into the Hôpital Necker; when, being placed in the Salle Sainte-Julie, it appeared to become the exciting cause of the development of Diphthérite. Now, for more than a year, no child in the Hospital had been attacked with this dangerous affection, which, it is important to observe, exhibited itself at this period in several quarters of Paris, and especially at the Hôpital des Enfans, with an epidemic character. This child, who was lying in the cradle No. 13, died after remaining only twenty-four hours in the ward. Almost simultaneously, another child, lying in cradle No. 8, and who had already been a fortnight in the Hospital for hooping-cough, presented at the point of the tongue an excoriation which soon began to be covered with the specific membrane, and on the 28th of January, he presented all the phenomena of Croup, of which he died forty-eight hours afterwards.

It is rather difficult to admit that this child was the victim of contagion, for, although in him Croup did not develop itself until the 28th of January, it is no less true that on the 15th, he presented a kind of aphthous affection on the tongue, and that already, at this period, a commencing pellicle covered the excoriated surface. It is, therefore, quite rational to admit that the child was seized with Diphthérite under the influence of the same general cause which had already developed this affection in the child who was brought into the Hospital on the 19th of January, and in whom no indication of contagion could be discovered. The child in cradle No. 8, presents, however, this interesting point, that Diphthérite, the first appearance of which was observed in him on the 15th of January,

remained for thirteen days localized on the tongue, before attacking the air-passages. However, on the 22nd of January, a third child was brought in from without; and for a week he had been attacked with cutaneous Diphthérite, which appeared in him to have also originated spontaneously. For the last two days he had begun to experience the phenomena of Membranous Angina and Croup; he remained in the Salle Sainte-Julie, No. 9, for thirty-six hours, and died after the operation of tracheotomy, on the 24th of January, at one o'clock in the morning.

The three children above-mentioned, do not, therefore, afford us any proof of the contagious character of Diphthérite; they even appear to prove that this affection may have developed itself in them spontaneously, or under the sole influence of the medical constitution; and although it cannot be affirmed that contagion, the modifications of which are so obscure to us, was completely absent, we must at least admit that its source remains unknown. The following facts prove, moreover, if not the positive existence, at least the possibility of the contagion of Diphthérite.

Thus on the 2nd of February, that is to say, fifteen days after the first appearance of Diphthérite in the ward, and three days after the death of the last child attacked with Croup, of whom I have just spoken, I saw a child, lying in cradle No. 6, and consequently separated only by one bed from the cradle of the child who had just died of Croup three days before, presenting in his own person the symptoms of this disease, which carried him off in forty-eight hours.

Now this child, who had been in the Hospital since the 11th of January, convalescent of a varioloid affection, which he had contracted four months before, in spite of having been vaccinated, retained a slight bronchial catarrh which latterly had become rather acute. The child, therefore, had remained fifteen days in circumstances favourable to the development of Diphthérite by contagion, and he was the more predisposed to it, because independently of the general influence then prevailing and to which he must have been exposed, he presented, besides, an irritation of the mucous membrane of the air-passages, a condition very favourable to the localization of the pellicular affection on these parts.

A day afterwards, namely, the 3rd of February, a fifth infant aged six months, of a good constitution, who had been in the Hospital since the 6th of January, and who presented at the lower and back part of the neck a wound suppurating favourably, the result of a

burning by the actual cautery, applied in order to destroy a sanguineous tumor in the region indicated:—was attacked with Diphthérite; in fact, the wound which had previously presented a good appearance and produced a laudable, thick and creamy pus, became more painful, produced a less abundant and thinner suppuration, and soon exhibited little whitish and adherent patches which united together to form a large patch of Diphthérite, having all the characters which I have indicated in my general description of this affection. On the same day, the 3rd of February, in the cradle No. 9, of the same Salle Saint-Julie, where on the 24th of January, a child was lying who died of Croup, and by the side of the cradle No. 8, where another child had also just died of Croup on the 30th of January,—there had been for three days a little girl presenting excoriations at the fold of the thigh and at the umbilicus, but who was otherwise in good health. On the 3rd of February, these excoriated parts were attacked by the diphtheritic pseudo-membrane. This last fact, and the two which precede it, appear to me to be of great importance in reference to the question of contagion. It may be objected, indeed, that I am now dealing with an affection which has many times raged in an epidemic manner, and which, at this very period, was exhibiting the same character, and that it cannot be therefore affirmed that this coincidence of facts was not the simple result of the general influence of the medical constitution. Let me, however, be permitted to add, although without attaching more value to this last fact than it deserves, that in the Salle-Sainte-Therèse, placed immediately above the Salle Sainte-Julie, there was no child attacked with Diphthérite.

There are yet two more facts which seem to support the opinion as to the contagious character of the disease. On the 16th of February, while Diphthérite was attacking the two last children of whom I have just spoken, a seventh child, lying in cradle No. 5, affected with syphilitic ulcers, was also attacked by the membranous affection, and four days afterwards, the 20th of February, an eighth child, lying in cradle No. 3, was also seized with this disease in the same ward. The other patients who were subsequently attacked with Diphthérite, in the Salle Sainte-Julie, confirm the epidemic character of this affection, without affording us evident proofs of its contagious power.

The same uncertainty prevails as to the cause of the development of the disease in the Salle Sainte-Cécile, situated in a portion of the building opposite to that occupied by the Salle Sainte-Julie. It was on the second of February, that a child who had been six weeks in

the Hospital, and was lying in the Salle Sainte-Cécile, in cradle No. 2, experienced the first phenomena of cutaneous Diphthérite, which subsequently extended to the nasal fossæ, the pharynx, and lastly to the larynx, so that the child died of Croup. I should observe that some fine days had already succeeded the frosty days of winter, and that when the first rays of the spring sun invited the nurses to go out into the court-yards, some means of communication began to be established among the patients of the different wards of the Hospital. It is, therefore, possible that this child, aged eight months, predisposed to the disease as well by the general influence as by the syphilitic coryza with which he was affected, met with the efficient cause of Diphthérite in the contact which may have existed with some other patient of the Salle Sainte-Julie. But I strongly maintain that these are only possibilities and not certainties. On the 3rd of April, a child who was lying in cradle No. 3, in the Salle Sainte-Cécile, was seized with Diphthérite, after a child who had come from without and was admitted into the same ward on the 28th of March, died there of Membranous Angina and Croup. In this case, if the disease had been propagated to the child in No. 3 by the effect of contagion, the incubation must have lasted six days. It is impossible for me to conclude anything from the result of my own observations, as to the time which this disease may have occupied in its incubation, for, as I am induced to think, it must be admitted that contagion was not altogether wanting as an agent in propagating the infection. In fact, for two months, Diphthérite prevailed constantly in the Salle Sainte-Julie; and the first children whom I have mentioned as having probably contracted the disease in the ward under the influence of contagion, may have presented an incubation at the most of thirteen days, and at the least of two days. Such a latitude, which becomes still greater in relation to the children who were subsequently the victims of the disease, does not permit me to form any definite conclusions on this question.

Inoculation, which, when it gives a positive result, is the most indisputable proof of the contagious nature of a disease, has not been repeated by me. When M. Trousseau, some years ago, induced by the love of science rather than guided by prudence, inoculated himself with Diphthérite on the tonsils, the result was negative; but can a single experiment be regarded as conclusive? Do we not daily see cases of vaccine inoculation turning out unsuccessfully, although success is obtained in the majority of cases?

Prognosis of Diphtherite.

At present, if we glance at the severity of the epidemic, the progress of which I have observed, we shall find that Diphthérite is a disease which is always serious, although its danger is in great part dependent upon the seat of the exudation.

When Diphthérite has commenced on the cutaneous integument, and has first attacked excoriated parts, or those which are in a state of suppuration, the local disorder which it produces is not generally so severe that the existence of the patient appears immediately threatened; for, by energetic local treatment, the exuding surfaces have often been speedily modified, and have rapidly proceeded towards cicatrization. This fact was attested by several of my patients, in whom Diphthérite, limited to certain parts of the external integument, rapidly yielded to the action of caustics, and did not again exhibit itself on any other region of the body. Still, when this disease appears upon a great number of parts at a time, and when it attacks persons who are already the victims of a serious disease, it may be followed by a fatal termination, although the false membranes may not be seated in the organs of respiration. Thus I have seen a child affected with constitutional syphilis, sink rather rapidly under the influence of Diphthérite, developed simultaneously on a great number of parts.

The prognosis of Diphthérite becomes always extremely serious when this formidable affection is developed in the air-tubes, and in this case the danger becomes the more imminent in proportion as the exudation occupies the deeper parts of the air-passages. A child under my care presented a remarkable example of Diphthérite attacking at once the ultimate ramifications of the bronchi and rapidly causing death; and it may be readily understood why, in such cases, even when we had recourse to tracheotomy, the operation was useless. The circumstance which ought always to make us very cautious in the prognosis of this disease, is the fatal property which it possesses of being able to reappear on different regions in the same individual and at uncertain intervals, and of affecting a kind of predilection for the air-tubes. In fact, whatever may be the first seat of the exudation, and even when by energetic local treatment we have succeeded

in favourably modifying the exuding surface, we have not yet completely protected the patient from the reappearance of the exudation in the organs of respiration. Thus, several of my patients, in whom Diphthérite, at its origin, occupied only a very small surface, and did not appear likely to prove fatal, subsequently fell victims to the reappearance of this terrible affection in the larynx and trachea.

Now, independently of the persistence of every local manifestation, the most important symptoms of the general state of the patient, and those which ought to cause the most anxiety to the practitioner, and make him fear the reappearance of the exudation, are, fever, the cachectic state, and the persistence of painful glandular swellings. If these three orders of symptoms have remained after the disappearance of the local lesions, we should be apprehensive of the return of some diphtheritic inflammation, just as in acute articular rheumatism, if the rheumatic fever continues, we must expect some fresh arthritic, cardiac, or pleuritic complications.

But it is not necessary that this assemblage of general symptoms should be so complete in order to testify to the imminent danger of fresh local lesions; it is sufficient that one of the three should continue, in order to make us distrustful and vigilant against a relapse of the disease. Thus the existence of fever, the diphtheritic cachexia alone, the still painful swelling of a few lymphatic glands, independently of every other sign, will impose on the physician the necessity of making a careful prognosis, and adopting vigorous therapeutical precautions. The frequency and smallness of the pulse, to the exclusion of every other element of the febrile state, especially if the child continues pale and of puffy appearance, will afford to the physician a reason, which is sometimes very cogent, of apprehending the more or less speedy outbreak of the local manifestations of Diphthérite.

These remarks, which are as important in a practical point of view as they are in relation to the general pathology of the disease now under consideration, will add new weight to what I have already stated above, concerning the almost chronic progress of Diphthérite, a disease which is acute in its nature, but which may, in fact, during its progress, assume some of the characters of chronic diseases. This peculiarity, namely, its mixed character, will not perhaps be altogether inexplicable, if we observe that the continuation of the

symptoms and the successive relapses of the local lesions, separated by intervals during which there is a persistence of the diphtheritic cachexia, are more common in weak, ill-nourished, badly-lodged, miserable children, who are surrounded by unfavourable hygienic conditions, than among children who are placed in opposite circumstances. This is observed especially towards the decline of epidemics. All these circumstances recall and confirm one of the most incontestable and most consoling facts in the general history of Diphthérite. We know, in fact, that this disease, besides its epidemic conditions, rages principally among poor and weak children, living in unhealthy habitations. Hence may we not be permitted to hope that the blessings of civilization, by multiplying comforts and their attendant circumstances, such as the healthiness of dwellings, the amelioration of the hygiene of food, and the means of protecting the surface of the body from the influence of atmospheric vicissitudes, so fertile in producing catarrhal affections, &c., will weaken every day the predisposing and occasional causes of Diphthérite, and will gradually reduce it, like many other diseases which were formerly malignant and epidemic, to a state of *sporadicity* and benignity, over which our local methods of treatment will most frequently triumph when the physician is called in at the commencement of the disease.

On the Treatment of Diphtherite.

The epidemic which I witnessed was subdued principally by local treatment; and my observations therefore enable me to judge especially of this method of medication. The hydrochloric acid, the nitrate of silver, the acid nitrate of mercury, calomel, and alum, are the agents which have been most employed as local applications.

I have observed, that under the influence of these caustics, we could pretty rapidly modify the morbid secretion, and limit the extension of the Diphthérite to the tissues surrounding the affected part. But unfortunately Diphthérite, as I have shown, is not altogether a local affection, the persons who are the subjects of it being the victims of a general condition, under the influence of which the repetition of the exudation has a great tendency to fix itself upon points which had not been primarily attacked. Now, the local medication can act only indirectly upon this general condition. If, as

experience appears to demonstrate in many cases, a person is the more predisposed to a repetition of the exudation on different surfaces in proportion as he already presents a greater number of diphtheritic patches, we can understand how by the rapid disappearance of this morbid secretion, we may diminish, in a given case, the predisposition of the patient to a repetition of the disease.

But local medication does not afford a complete protection, at least according to my own observations. Thus in many of my patients, Diphthérite began with a patch which was often very circumscribed, and which was vigorously treated by the frequently repeated action of caustics. The local application was rapidly followed by a great amelioration; the Diphthérite ceased to extend in surface, and at the end of a few days proceeded towards cicatrization: still, even when cicatrization was complete, as in many of the patients, we saw Diphthérite, at the end of from ten to fifteen days, reappearing violently in the air-passages and producing death.

To oppose the general condition under the influence of which the false membranes are developed, and to destroy them when they are formed, are the two great therapeutical indications to be fulfilled. The first of these indications unfortunately finds but few auxiliaries in the pharmacopœias. The specific agents which are capable of rapidly modifying a general morbid condition, and rare in the domain of therapeutics, and that which ought to be opposed to Diphthérite remains still to be discovered.

In the absence of any specific remedy, the physician is reduced to the treatment of symptoms, which is the only kind of treatment from which he can expect any favourable results when called upon to attend cases of Diphthréite.

Blood-letting, which in certain circumstances has appeared to diminish the inflammatory symptoms often accompanying Diphthérite, has generally been banished from the treatment of this disease by MM. Bretonneau and Trousseau; these able practitioners having remarked that under the weakening influence of losses of blood, patients became more liable to repetitions of the exudation, and that the temporary relief which resulted from the measure did not compensate for the unfavourable consequences by which it was often followed.

Calomel, employed both locally and internally, has been often used among my patients in the Hôpital Necker. Its administration pro-

duces two effects: one, which may be called local, is exerted on the secretions and determines salivation, which, in certain cases of pharyngo-laryngeal Diphthérite, may have some favourable influence over the morbid secretion, and over the expulsion of the false membranes; the other effect is more general, and is exerted over the whole organism and the circulation.

Among the patients who were subjected to this treatment, and in whom the diphtheritic surfaces were at the same time energetically cauterized, several recovered completely without being attacked by any subsequent repetition of the exudation; while others, less fortunate, were not exempt from relapses, in spite of the internal administration of calomel. It is, therefore, an agent which may be useful, but the influence of which on the general morbid condition cannot be regarded as infallible.

When Diphthérite occupies extensive surfaces and remains for a long time on a patient, his constitution is much weakened and deteriorated; and he may even fall into the last condition, called cachectic. It is especially in order to prevent and oppose this condition that we must have recourse to analeptic and tonic remedies, such as succulent food, bark, and iron, which will be employed by the physician according to the particular indications of each case.

Alum has appeared to me to possess a certain degree of efficacy; in some children already affected with cutaneous Diphtherite, hoarseness, cough, and roughness of voice supervened at the end of a few days, and these children appeared to be imminently in danger of the attack of Croup, when insufflations of alum in powder, frequently repeated at the lower part of the throat, caused a rather rapid cessation of all the precursory symptoms of laryngeal Diphthérite, and the health was completely re-established. I think, therefore, that when a child is attacked with Diphthérite, and any alarming symptoms are manifested in the region of the throat and larynx, we ought, without waiting any further, to treat the case with insufflations of powdered alum, which cannot produce any unfavourable result, and which may, on the contrary, prevent the development of the false membranes, by directly modifying the inflamed surfaces.

I cannot, in this general sketch of Diphthérite, enter into all the peculiar indications which every variety in the seat of the disease may present in its treatment, for such a course would lead me beyond

the limits which I have prescribed to myself. Let it suffice, therefore, to repeat that one of the first indications which present themselves in all the cases where Diphthérite is accessible to the direct action of medicines, is to endeavour to modify the morbid sercetion by means of caustics, the choice and the application of which, more or less energetically repeated, will depend upon the special circumstances in which each patient is placed.

DAVIOT.

DAVIOT ON DIPHTHERITE.

(*Relation Historique d'une Epidémie de Diphthéropathie observée dans le Département de Saone-et-Loire et de la Nièvre, pendant les années* 1841, 1842, 1843, *et* 1844, *par D. Z. Daviot.* Autun, 1845.)

EPIDEMIC PHARYNGEAL DIPHTHERITE.

As this disease has not exhibited the same severity in all the subjects who have been attacked by it, we shall recognize three very distinct stages in its progress and the violence of its symptoms:—

1. In the first stage, the pathological conditions were sometimes limited to a slight sense of uneasiness in the throat, accompanied by scarcely any difficulty in deglutition. There was, most commonly, in addition to these symptoms, a more acute pain in the pharynx, while the movements of the neck were constrained, and there was some degree of torticollis. The cervical and sub-maxillary glands soon became engorged; the face was congested and puffy, with injection and lachrymation of the eyes. On examining the lower part of the buccal cavity, all or nearly all the parts constituting the guttural fossæ were seen to present a deep rose-red colour in children, and a more deep-brown one in adults. There was also swelling of one of the tonsils, more rarely of both, more marked in the inverse proportion to the age; the uvula was almost always tumefied and relaxed; there was almost habitually coryza; the fever was often absent or was little felt, and young subjects were able to continue playing as usual; in some few cases, a little depression was observed. In some patients, on the contrary, the general phenomena were either developed at first, or were very intense from the commencement of

the disease, and therefore caused an apprehension of the most serious danger. At this period, the disease when suitably treated, lasted, in certain cases, for several days, but was terminated in other cases at the end of a few hours.

2. When the disease passed to a more advanced stage, commencing often on the very day of the invasion, and sometimes a few hours afterwards, this transition was inaugurated by a very remarkable state, and one which has not hitherto sufficiently attracted the attention of practitioners; a circumstance which may be explained by the fact that the period of commencement is often so short that the medical attendant seldom observes it. I have constantly remarked, on the parts which were about to become the seat of the pseudo-membranous exudation, a fresh transparent coloration, presenting an œdematous appearance, and similar in tint to a piece of meat blanched by the action of boiling water. Soon afterwards there were observed upon the tonsils, the uvula, the velum palati, the posterior surface of the pharynx, &c., &c., either solitarily, simultaneously, or progressively small vesicular points, formed by partial elevations of the epithelium, of a shining and whitish appearance, and which, though at first separated, in general soon become united and confused together, and then were transformed into patches of a lardaceous, smooth, whitish, yellowish, or brownish appearance, irregularly circumscribed, more prominent in the centre, and becoming thin at their edges. Sometimes the primitive patches remained isolated, and appeared to rest upon a depressed surface. This variety of form which has not yet been described, has been seen by myself principally upon the tonsils, which then presented an entirely peculiar appearance. By the side of these depressed dipththeritic points, these organs preserved their tumefaction and redness, and their surface became, as it were, anfractuous.

Sometimes the uvula was affected on one side only, and curved upon the diseased side in the form of a hook; sometimes, as M. Guersant has already stated (*Dict. de Méd. Art. Angine Couenneuse*), it was enveloped entirely as in the little finger of a glove.

With the appearance of the false membranes, the grandular engorgement increased considerably, especially on the side where the tonsil was more swollen, and the pellicles were more numerous and thicker. Deglutition was more difficult, but rather in proportion to the volume of the lymphatic glands, than to the swelling of the tonsils and the extent of the membranous exudation; and it was never painful in

proportion to the inconvenience which must have existed, a character which establishes a well-marked line of demarcation between pharyngeal Diphthérite and simple Angina. The voice was altered and became nasal; cough was infrequent or absent altogether; there was stoppage of the nose and a flux of serous liquid by the nostrils; the patient was abundantly salivated, and voided a semi-transparent fluid interspersed with large bubbles, pouring out like white of egg and manifestly albuminous; liquids were often thrown up and ejected by the nasal fossæ; the mouth exhaled an odour *sui generis,* compared by M. Guersant to that of carious teeth, less perceptible in the child; and there was also painful torticollis.

With the local pathognomonic symptoms which we have just described, were united some general symptoms dependent on the direct or sympathetic lesion of many other structures: such as more considerable swelling, but less deep coloration of the face; more or less intense febrile reaction, according to the age and strength of the subjects, and according to the more or less favourable hygienic circumstances in the midst of which they had been attacked by the disease; the pulse was generally frequent, nearly always small and compressed, even in individuals of a good constitution, which is again one of the marks of epidemic Diphthérite; cephalalgia more or less marked; tongue swollen, covered with a thick and yellowish mucous coat; rather frequently nausea and vomiting; and sometimes phlegmonous abscesses were formed at the base of the lower jaw, in the neighbourhood of the lymphatic glands, or in their tissue. We often also remarked on different parts of the body, diphtheritic patches, especially on the lips, around the alæ of the nose, behind the ears, around the circumference of the anus, of the vulva, of the nipples, on the penis, and the hands, and on the blisters which had been applied upon the patients.

When the disease was about to terminate favourably, the extension of the false membranes ceased; the latter were then circumscribed by a red areola, were swelled up, and began to separate, and being detached in strips, allowed of the oozing of a few drops of blood, and were then thrown up by the patients together with a frothy saliva, which was of a viscous consistence, and of a nauseous smell. These pellicles would be frequently reproduced in a short space of time, and we were often astonished at the prodigious quantity of decomposed matters which was expelled in certain cases. Those of the second or third formation were more white, thinner and more trans-

parent than those of the first; at last they ceased to be reproduced after their detachment, or rather, according to the remark of M. Guersant, instead of being elevated, the primitive exudations adhered firmly to the mucous surfaces, were always covered by epithelium, appeared to be absorbed, layer by layer, and to be worn out in some manner; then soon becoming transparent like gauze, they exhibited the mucous membrane beneath them, which was generally of a red tint, but less deep than that of the adjacent parts which had not been covered by the membranous coat. I may add that when the membranous exudation assumed this condition, which I shall call *état couenneux*, it had no tendency to be renewed or propagated, and that although the action of the local applications was more slow in these circumstances than in the cases mentioned above, it was nevertheless an infallible condition of cure.

After the detachment of the diphtheritic exudations, the tonsils could be seen more or less retracted upon themselves, and sometimes so constricted that they could be scarcely seen between the arches of the palate. If the uvula had been totally enveloped by the false membrane, it was uniformly diminished in size, and its volume often reduced by three-fourths; if it had not been covered except on one side by a membranous patch, it remained for a certain time curved like a hook on this same side. The edge of the velum palati appeared also in some cases as if it was ulcerated, and had lost a portion of its tissue. However, this was only an illusion, for, after a careful examination, no traces of cicatrices nor loss of substance were found.

This retraction of the tissues clearly depends, as I agree with M. Roche (*Dict. de Méd. et de Chirurg. prat.*, Paris, 1829, t. II. art. *Angine Couenneuse*, p. 551), on the destruction of the bloody fluid which had furnished the materials for the formation of the pellicular exudations. I shall give as proofs of this assertion, both the less deep colour and the depression of the surfaces which are invested by the pseudo-membranes.

I have also sometimes found, after the detachment of the pellicles, small purulent spots in the interior of the tonsils; at other times these glands have remained in the state of scirrhous induration which has required their removal.

In proportion as the resolution of the disease took place in the pharynx, the lymphatic glands diminished in volume and ceased to be painful; there was a diminution, and then a complete cessation of all the general phenomena; lastly, after a variable duration of from six

to twelve days, convalescence was established, but slowly and with difficulty, and was remarkable for a state of languor which remained for a long time, by a peculiar paleness of the face, and often by pustular eruptions (*Ecthyma Luridum*) on the limbs, the face, &c. The voice often remained nasal for a certain period; liquids, and sometimes food, were rejected through the nostrils, and relapses were also common.

3. Lastly, the disease was aggravated and would attain its highest degree of intensity, sometimes in the space of thirty-six to forty-eight hours. The tonsils became enormously enlarged, so as to touch one another, and to form, with the uvula, which was very large itself, a mechanical obstacle to the introduction of liquids, as well as to the passage of air. The membranous patches began to thicken, were very adherent, of a dull yellow-greyish or brownish colour, and invaded the whole guttural cavity, the nasal fossæ, and very often the palatine arch: there was considerable tumefaction of the cervical and submaxillary glands extending sometimes as far as the clavicular regions, more marked especially at the base of the lower jaw, a circumstance which gave to the patients a peculiar expression; laborious respiration, accompanied by a more or less noisy guttural rattle; not much cough, and that not taking place except at the moment of the introduction of liquids, which, by the difficulty of swallowing, remained in contact with the opening of the glottis; voice generally feeble; discharge by the nostrils of a sanious and fetid fluid; frequent epistaxis, sometimes so abundant as to require hæmostatic measures; mouth always open, and exhaling a gangrenous odour; spitting of a viscid purulent matter, mixed with membranous flakes, often blackish, and then presenting altogether the colour and aspect of gangrene; lips bleeding and covered with brownish crusts; greater puffiness of the face; remarkable lividity of the complexion, a phenomenon which depends on the obstacle opposed by the embarrassment of the respiration to the return of the blood, and on its accumulation in the venous system; continual cephalalgia, especially severe in the supra-orbital and auricular regions; an expression of weakness and languor, but never great alteration of the features; constipation either persistent or replaced by a fetid diarrhœa; and fever with irregular paroxysms. The cutaneous patches which existed in the second stage of the disease, like those which came on at that time, became brown and diffused a fetid odour. The pulse soon became thready and lost its regularity; the extremities were cold, and covered with a

viscid sweat; there was drowsiness in children, agitation and anxiety in subjects of a more advanced age. Lastly, the patients after having presented that paleness of the face, which Laennec calls a semi-cadaverous phenomenon (*Traité de l'auscultation méd.* 4^e^ *edit.* Paris, 1837, t. 1, p. 388) and without experiencing any disorder of the intellectual functions, expired, having exhibited all the symptoms of true asphyxia. The disease sometimes advanced very rapidly towards a fatal termination, especially when it attacked cachectic subjects, on whom the false membranes presented a brown colour from the commencement. Death, in most cases, did not occur until about from the seventh to the tenth day. The organs of respiration were seldom attacked by diphtheritic inflammation in the course of the epidemic, and this complication occurred in an altogether exceptional manner. The extension of the pellicular inflammation then ceased, and the symptoms of Croup supervened.

There is a mode of termination of Membranous Angina, on which M. Guersant (*op. cit.* p. 119) has strongly insisted, and which I have noticed on several occasions. At the time when this affection was in progress of cure, and at the period when convalescence seemed to be established, the patients were seized with a consecutive broncho-pneumonia which was generally double. The supervention of this formidable complication was very insidious, and the symptoms which existed were always slightly marked. I observed, in such cases, a rather infrequent cough, which was not at all dry or guttural, and was accompanied with aphonia as in Croupal Diphthérite. There was an expectoration of scarcely rusty sputa, containing little air, and presenting some streaks of blood. Percussion and auscultation gave all the signs of pulmonary engorgement, more or less well-marked; there existed intense fever with irregular paroxysms, and the respiration seemed habitually less dfficult than in ordinary peripneumonia. I always found this a fatal complication. Scarlatina and measles sometimes accompanied the disease, but only rarely in the districts of Poil and of Millay, a canton of Luzy. These cutaneous exanthems impressed a more serious character on the principal disease. I should have wished, in order to complete this description, to present it in an essentially scientific form, namely, with the addition of the description of the post-mortem examinations. Unfortunately, the prejudices which are still opposed, in our districts, to the opening of dead bodies, acted as an obstacle to these investigations.

This defect is, however, comparatively unimportant when we con-

sider the valuable pathological researches with which M. Bretonneau has interspersed his *Memoirs on Diphthérite*. These researches are so accurate and complete that, in my opinion, it would be very difficult to add to them any new facts worthy of notice.

To what form of pseudo-membranous Angina can our epidemic be referred? Let me begin by showing, as briefly as possible, the varieties of Membranous Angina admitted by M. Bretonneau, and adopted by more modern writers; and I shall then endeavour to indicate the points of resemblance which may exist between the disease I am describing, and the species recognized in nosological science.

1. *Common Membranous Angina.*—This variety of the disease occurs at other times than those of the epidemic, and has no tendency to propagate itself from the guttural cavity where it is developed, towards the more deeply-seated organs. It is not very common, is generally benignant, and is of short duration. I propose to give to it the name of SPORADIC PHARYNGEAL DIPHTHERITE.

2. *Scarlatinal Membranous Angina,* or *that of Fothergill.*—This variety, which is more serious than that just described, generally shows itself during epidemics of Scarlatina, and like that disease, it is not propagated into the air-passages. This point of resemblance is not the only one which connects these two diseases; indeed, I am induced to believe they are identical, for they differ from one another only by the epidemic circumstances which impress a greater or less intensity upon sporadic diseases in general, and by the nature of the exanthematous affection which produces in the whole organism, a pellicular modification, under the influence of which the cutaneous inflammation assumes a greater degree of development. To maintain a contrary opinion would be to assume that common typhoid fever, sporadic cholera, &c., are different diseases from typhoid fever, epidemic cholera, &c., &c., because these latter may present an unusual degree of severity. It appears to me, therefore, that it would be better perhaps to designate the Scarlatinal Membranous Angina by the name of *Epidemic Pharyngeal Diphthérite;* in the first instance, because several very different kinds of Angina are met with in combination with Scarlatina (Planchon, *Journal de Vandermonde*), and also, because this Angina often accompanies measles and smallpox; and in the last place, because it may prevail with all the characters which have been given to it, in the epidemic state, by authors, and independently of any eruptive fever, as was observed in our districts.

3. *Diphtheritic Angina.*—This would differ from the last two varieties by its disposition to attack the air-passages. If, according to the observations of M. Bretonneau himself, and also to the opinion formerly expressed by the author of the article on Croup *in the Dictionnaire de Médecine,* Diphtheritic Angina is nothing but common Croup, which in nearly all cases begins in the pharynx, why should we assimilate it to two diseases, in which *all* the phenomena begin and end in the guttural cavity? Why have we given and preserved for it a denomination which is not appropriate for pointing out its true seat? I think, therefore, that it would be most convenient to name it *Croupal or Pharyngo-laryngeal Diphthérite,* provided, as I repeat, that the appearance of the pellicular exudation at the back of the throat is usually nothing more than the stage of the invasion of Croup.

We shall not require, I think, to reproduce literal scholastic descriptions in order to arrive at the classification of our epidemic Angina, and to show that it belongs incontestably to the second variety. But I say, with the authority to which I so often appeal upon the great question in which we are occupied (M. Guersant), that if we admit in these diseases, varieties which are very distinct, it is impossible not to perceive that the differences which constitute them are weakened by intermediate shades, sometimes so imperceptible that the nosological boundaries become almost abolished between the different forms of pseudo-membranous Angina, as they often are in smallpox, for example, and in many other diseases.

I have been able to distinguish, in the course of the epidemic, a great number of cases which had quite the appearance of sporadic pharyngeal Diphthérite, and other cases, not less numerous, presenting all the appearances of the Fothergillian disease, but without any scarlatinal complication; in short, I have several times seen croupal Diphthérite, either originating in the pharynx or terminating in this organ. Now, although the same cause may induce the different shades of the diphtheritic disease, some authors would recommend us to consider these modifications as so many distinct affections. I am induced to believe that in the present instance, and generally in all epidemics of the same kind, the seat of the disease and its complications are alone sufficient to establish the line of demarcation, if we admit any, between the different cases of Angina called pseudo-membranous.

Presumed Causes of the Epidemic.

Shall we be able to discover the determining causes of Diphthérite in the conditions of the climate of the cantons where it has prevailed, or in the hygienic state of their population? According to the general rules which I have laid down in the article on historical documents, the reply must be in the negative. Shall we find these causes in certain modifications of the atmosphere? We are compelled to confess that all our hygrometric, thermometric, and barometical researches have not explained any better the appearance, the increase, or the extinction of the epidemic.

Shall we consider with M. Bretonneau (*loc. cit.* p. 83), and Professor Trousseau (*Archiv. Gener. de Med.* t. XXI.), that contagion plays the principal part in the propagation of Pharyngeal Diphtherite? This opinion, already admitted by some writers of the seventeenth century (Lassis, *Malad. épid.*, Paris, 1785, t. II., p. 158; Ozanam, *op. cit.* t. III.), would seem, *à priori*, to offer a certain amount of probability, and to remove the doubts attached to the question of the development of the epidemic of which I am writing. As for myself, before I witnessed this disease, I had adopted the generally received theory; but in the present day, since I have been enabled to verify all the facts which have presented themselves in support of this view, I venture to deny the contagious property which is too readily attributed to it. If, however, it should be complicated with measles, scarlatina, or smallpox, then it will partake, although in a somewhat accessory manner, of the essentially contagious nature of those diseases. Besides, contagion would only explain the propagation of Diphthérite, and not its origin or its primitive cause. I shall soon return to this important subject.

In my opinion, Pharyngeal Diphthérite must derive its origin from some agent, which is occult in its nature, but which always determines pellicular inflammation, and is similar in its effects to certain chemical substances, as mercurials, chlorine, ammonia, the caustic alkalies, the ethereal tincture of cantharides, &c., &c., which induce the same pathological state. Might not the re-agents which demonstrate the presence of these different bodies assist in discovering in the atmosphere the nature of the epidemic agent? I appeal to ex-

perience. Let me now add a few words on the nature of Epidemic Pharyngeal Diphthérite.

Since the works of S. Bard, who declared the identity of the Angina called gangrenous, with Croup; (New York, 1771); and the most recent researches of MM. Bretonneau, Guersant, Deslandes, (*Journal des prog; des Sciences et Instit. Med.*, t. 1^er^ p. 102, 1827. &c.)—we are no longer permitted to look upon Membranous Angina as a gangrenous disease. These able observers, particularly the last-named, have shown in an irrefragable manner, that a gross error had been committed in taking the pseudo-membranous productions of the throat for eschars; that the fetid smell of the mouth depends only upon the putrid decomposition of the pellicular exudations, under the influence of heat and moisture; and that the different colours of the false membranes are owing to the blood exhaled by the inflamed surfaces, which blood is altered by the concurrence of the same conditions as those which influence the membranous patches themselves, and communicates to them the gangrenous aspect by which they are characterized. These authors have proved by evidence, that Pharyngeal Diphthérite, being of the same nature as Croup, which has always been considered as an inflammation, even by Home, its first historian, ought no longer to be classed among gangrenous affections.

M. Guersant, however, admits a fact which I have had occasion to verify in the case of a young woman recently confined, namely, that true gangrene may be met with in conjunction with the pellicular exudation, but rarely and accidentally (and only in certain special cases), while we are treating subjects who are of a bad or very much enfeebled constitution, and especially during epidemics of measles, scarlatina, or smallpox, complicated with Malignant Angina, when these eruptive fevers determine in the economy a particular state which, according to experience, eminently predisposes to sphacelus. Under these circumstances, there is always a loss of substance, and there are evident traces of ulceration which has succeeded the detachment of the eschars. The patient in my own case presented, after the exfoliation of the false membranes, a partial gangrene of the left tonsil with an ulceration of a bad appearance.

The same author adds that although it is incontestable that gangrene is sometimes observed in the pharynx, it is only as a termination of inflammatory Angina, or as a complication of its

varieties. Consequently, he does not think that in the present state of science, we are yet able to recognize a Gangrenous Angina, as a distinct species, having different characters from all the others and a course peculiar to itself. MM. Monneret and De Laberge (*Compendium de Méd. Prat.*) have appealed against this opinion, and have described anew in their nosological descriptions, an Angina primitively gangrenous in its nature. Nevertheless, in the epidemic state, we find no authentic reference to this disease in books; and the chief part of the isolated observations on Gangrenous Angina (Guersant, *Dict. de Med.* 1re *edition*, p. 379: MM. Barthez et Rilliet, *Mém. sur quelques points de l'Hist. des Ang. et des Gang. du Pharynx chez l'enfant.* 1842) show us that the local disease of the guttural fossæ is always connected with a morbid condition of the organs of respiration or of the gastro-intestinal tube, or with a typhoid condition of the system, of which it is only one of the symptoms. Let me here quote two interesting cases which Dr. Guyton has been kind enough to communicate to me. I shall, however, have to inquire whether the deductions drawn from them by the distinguished physician of Autun, although conformable in many respects with the views of the Editors of the *Compendium*, may not also be reconciled with the principles advocated by M. Guersant.

"At eight o'clock in the morning," says he, "I was going away into the country, when I was stopped, on leaving the town, by a person named Chifflot, a cooper, to see his two sons who had fallen ill on the same morning. One was about eight years old, and the other six; I recognized in both of them an incipient tonsillar Angina; there was redness of the velum and of the pillars of the palate; slight tumefaction of the tonsils; difficult deglutition; moderate degree of fever; natural countenance; integrity of the intellectual functions: and in a word, there was a complete absence of every serious symptom.

"At five o'clock in the evening, when I returned, I called again at the house of the patients and I found the eldest child dead and the youngest in the agonies of death: he died half an hour after my arrival. Both had the back part of the mouth sphacelated.

"It is impossible to doubt, in these two cases, the existence of a Gangrenous Angina, in all the force of that term. If the disease had not been such in its intimate nature, it would not have advanced with such rapidity, and without being preceded by symptoms indicating the attack of so serious an affection. It is

certain that the two children were in perfect health on the previous evening."

Dr. Guyton will perhaps permit me to hesitate in adopting, without restriction, the corollary which he would deduce from the cases which have just been related. In fact, if we consult authors who have written upon the gangrene which is developed upon the mucous membrane of the digestive organs, MM. Baron (*Mém. sur une affect. gang. de la bouche. Bulletin de la faculté,* 1816). Isnard (*Dissert. sur une affect. gang. particul. aux enfants,* Paris, 1818). Billard (*Traité des malad. des enfants,* Paris, 3e édit. 1839). Guersant, &c., &c., and an observation made by myself, we shall then be easily convinced that this disease, whenever it is primarily gangrenous, is neither preceded nor accompanied by a simple inflammation as in the cases recorded; that it attacks habitually only cachetic subjects or sickly persons who are destitute of all vital energy, and that it never produces, as in the children of Chifflot, such a well-marked general reaction. The gangrene or anthrax of the digestive passages, so rare in the pharynx that we are disposed to deny its existence, reveals itself from the commencement by pathognomonic symptoms, such as sinking and stupor; and like malignant pustule, it is rather followed than preceded by the inflammatory state.

I can find, therefore, in the case above cited, and characterized by the most decided local and general symptoms of ordinary Angina, only a phlegmasia having had, *by excess of stimulus,* gangrene as its termination.

According to my own opinion, and I make use of the very expressions of M. Guyton, if the disease had been, from the commencement, gangrenous in its intimate nature, it would not have advanced with such rapidity and without having been preceded by such precursory phenomena as generally announce the invasion of sphacelus, properly so called; and I appeal, in confirmation of my views, to the authors above-named, especially Billard. Now, the two subjects of M. Guyton's observation enjoyed the most perfect health on the previous evening.

My esteemed friend will excuse this contradiction in consideration of the importance of the practical consequences, which ought to follow from theory in this question. In fact, if we consider the disease of the children of Chifflot and the like, as a primitively Gangrenous Angina, the indication for the employment of tonics necessarily arises, and in the circumstances, this kind of medication could only produce,

in my opinion, the most serious results. If, on the contrary, according to my own view, we see in them only a phlegmasia, threatening, by the very violence of the irritation, to terminate in gangrene, which is one of the methods of the termination in every inflammation, we shall necessarily have recourse to antiphlogistics of the most active kind, which are the only efficacious barriers we can oppose to this fatal tendency of the disease. The following is another case which fell under the notice of M. Gagnard, an old surgeon of the Hospital of Autun. This gentleman was called to Vaumartin, near Montcenis, to a family attacked with Angina. Of seven persons seized on the same day, and nearly at the same hour, six died in four-and-twenty hours, having their throats entirely sphacelated; the seventh survived; this one presented only the symptoms of *Aphthous Angina, with false membrane or couënne.*

As this case depends only upon recollection, M. Guyton cannot guarantee its accuracy; and I shall, therefore, abstain from making any comment upon it; nevertheless, I am induced to look upon the disease described as belonging to the pharyngeal or rather to the pharyngo-laryngeal Diphthérite of an adynamic form, the characters of which I have elsewhere described. I form this opinion upon the existence of the false membranes, recognized by the physician only in the case of the subject who recovered, and by the very fact that they did not present that brown colour which simulates so completely the aspect of a true gangrene, and which caused an error of diagnosis in the case of the patients who died;—a very common error, I may observe, in these latter days.

Nobody, at present, can call in question the inflammatory nature of Epidemic Pharyngeal Diphthérite; but I agree with many other physicians, and especially M. Bretonneau, that it is a specific inflammation; namely, that it offers some peculiar characters which are not those of ordinary inflammation, and that the existence of the false membranes, which constitute its essential symptom, is due rather to the special character of the disease, than to its intensity.

But the pellicular exudation is not the only distinguishing feature which exists between simple Angina and Pharyngeal Diphthérite. The latter is not a purely local affection like the former, but it is found manifestly connected with a morbid state of the whole economy. This opinion, in fact, has already been offered by the illustrious

Pinel (*Nosographie Phys.* t. II., p. 256, 1818), and sustained by M. Deslandes.

I can discover the proof of this proposition in the miasmatic or epidemic mature of the disease; in the rapidity of its course; in its severity, which is generally but little proportionate to the apparent mildness of the local inflammatory phenomena by which it is accompanied; in the very remarkable disposition of the cutaneous ulcerations to take on the diphtheritic and even gangrenous character in their course, as in typhoid affections; and, finally, I discover this proof in the length and difficulty of the convalescence,—a general indication of a deep-seated affection of the whole organism. All these circumstances seem to me sufficient to separate it altogether from common guttural phlegmasia.

Is Pharyngeal Diphthérite contagious? In support of its immediate and direct transmission, authors have insisted:—

1st. On the fact that it may exhibit itself at one time on several members of the same family; but is not this fact, which I have rather frequently noticed, equally observed in certain epidemics which are generally considered non-contagious? Here, as in Diphthérite, is this simultaneous invasion anything else than the result of a simple analogy of organization and of similar dispositions in individuals placed in similar hygienic circumstances, and capable of experiencing, at that very time, the same morbific influences? On the other hand, the simultaneous attack of the disease upon several subjects belonging to the same family, is not the general rule; I have observed it quite as frequently attacking, under the same roof, a certain number of patients, only at more or less distant intervals, and more usually at every aggravation of the epidemic, that is to say, at every time when the epidemic agent (*agent epixioique*), which had become more active under a certain influence, began to exert itself afresh and in preference upon the same idiosyncrasies. Can we, to explain this fact, admit by any chance that the contagious principle could have six months, or a year or more of incubation, before its development? This explanation, which is against all probability, does not require refutation.

2nd. It has also been alleged that it is to a direct and immediate transmission that we ought to attribute different examples of communication, in the cases in which the parents, attendants at Hospitals, and even medical men, like Bourgeois of Paris (*Journ. Gén. de*

Méd. t. CVI. *et* CIX.), have contracted the disease, either in attending upon patients, or in exploring their guttural cavities, because it often happens, in this examination, that the affected subjects, in coughing, throw up sputa and shreds of membrane in the face of the observer, and also cause him to inhale their breath.

I shall reply that, I have seen several times among the poorer classes, parents sharing the bed of their sick family, and that, in this prolonged contact, I have never been able to ascertain a single case of real contagion, which, however, may still appear to occur from the fact of the family being predisposed to the disease.

I shall also oppose to the views above quoted, the power which parents have possessed, with few exceptions, of approaching with impunity the mouths of patients while practising, in the intervals of my visits, insufflations of powdered alum, a therapeutical application to which I have constantly had recourse in the treatment of the epidemic. Could it be supposed that these persons, for the greater part of small intellectual powers, would choose the moment of inspiration to introduce the medicine, with a view to avoid the breath of the individuals who were affected?

The epidemic has traversed a great extent of country, and has been observed by many medical men, of whom no one, so far as I know has been attacked by it. I myself, in particular, who have been compelled to examine a considerable number of patients in unhealthy houses, often crowded with inhabitants,—conditions essentially favourable to the development of the contagious element, as well as to its direct propagation;—I, who for several years have been exposed to all the circumstances in which Bourgeois and other members of the profession who have taken the disease were placed;—I say, that I have passed through the epidemic without any attack. If it is objected that my fellow-practitioners and myself were proof against the contagious principle of Diphtheritic Angina, as any one might be against that of variola, syphilis, &c.; might we not reply, with good reason, that if we had experienced the epidemic influence, it was because our organization being identical with that of the patients, we ought to be subjected to the same morbid consequences?

If this contagious nature, which is attributed to it in an absolute manner, really existed, I think that it would have manifested itself among the strangers who visited the patients, and yet I affirm that it has not done so.

I have also endeavoured to verify the very important fact cited by M. Bretonneau (*op. cit.*) concerning a student of pharmacy, who, while still suffering from the consequences of Malignant Angina, went to pass a few days in the country, in a house where a short time afterwards three persons were attacked by the disease, and two died. This fact, which, in the eyes of the author, appeared an incontestable example of direct communication, appears to have assisted powerfully in fixing his opinion in favour of the contagious property of the pseudo-membranous Angina, and must have helped in bringing over many persons to his opinion. As for myself, I consider the case to be an exceptional one; and I have never been able, in spite of my best exertions, to meet with any similar instances. On the contrary, it would be easy for me to bring forward a great number of observations, and to quote a multitude of cases offering a totally opposite aspect. I shall adduce only three, which, in my mind, exhibit a striking proof of the non-contagious nature of the disease.

A family named M—., composed of seven members, of whom six lived together, were attacked successively or simultaneously; the seventh, a youth of fifteen, living in service some distance from his relations, experienced also the epidemic influence without having had any communication with the rest. He died, and did not communicate the disease in the house where he lived and where there were four young children.

A family named G—., comprising the father, mother, and three children, became the victims of pellicular Angina. A nephew who was a servant at a distant spot, was soon seized with the disease without having had any contact with his relations. He was ill for ten days, and the affection did not show itself in his employers, in whose house there were a little girl of eight years old, and several young women.

A family named V—., consisting of three persons, received the disease simultaneously; a youth who was a servant soon became similarly affected, although distant from the paternal home. He recovered, and notwithstanding his presence, no case of the disease occurred, although there were three very young children in the family of his employers.

When such facts have been observed by an unprejudiced mind, it would require all the enthusiasm which is inspired by an exclusive

system, to prevent our convictions from being powerfully disturbed, or from doubts, at least, arising in our minds.

Besides, in admitting that it is contagious, it would be necessary, in explaining, for instance, its appearance in La Tagnière, that there should have been a transmission from spot to spot from the affected points towards that commune. Such, however, was not the case, and Saint-Nizier, which is placed between, presented no case of the disease.

But might not this epidemic have exceptionally put on this character which has been attributed to it universally and at all times? Might there not be, as Sydenham states, in epidemic diseases in general, a different nature and constitution at every new outbreak? Might it not sometimes assume the property of being transmitted by contagion, and might not this property sometimes be absent? The question is not easy to solve.

I shall rest my last argument upon the opinion which is professed by the majority of the profession on the non-contagious nature of Croup. But what is Croup, if it is not, as I have already proved, a disease identical with pellicular Angina in its pathological effects? Then Croup, when it begins with symptoms peculiar to itself, would not be contagious, but it might become so when it resulted from the propagation, in the air-passages, of Pharyngeal Diphthérite, because some practitioners have considered the latter as being susceptible of direct communication! There would have been a flagrant contradiction; either we should be obliged to admit, with Starr, Vichmann, Bard, Lobstein, Cailleau, &c., that Croup, as well as pseudo-membranous Angina, is contagious; or like Vieusseux, Jurine, Double, Gardien, Desruelles, Bricheteau, &c., &c., we must refuse this character to both diseases.

I repeat the proposition, which seems to me to reconcile conflicting opinions, that we cannot regard Pharyngeal Diphthérite as contagious when it exists alone and independent of all eruptive fever; but I think that whenever it is complicated with those eminently contagious affections, it may become so, but in an indirect manner.

When, again, we know the fearful destitution which, in the country, threatens the unfortunate persons who are attacked with really contagious diseases, I ask if it is desirable to augment, without incontestable proofs, the number of affections (already too great) which are directly communicated.

I shall not terminate this discussion without relating literally the

conclusions of the contagionist physician who constitutes the greatest authority in this matter (M. Bretonneau, *loc. cit.* p. 85); conclusions well-calculated to shake the convictions of the most prejudiced minds:—"If it were still more positively demonstrated that Diphthérite is contagious, it would not be less certain that it is so in a degree very inferior to other diseases. But on this point, and on the mode and the conditions of the contagion, much remains to be learned. I have made some ineffectual attempts to communicate Diphthérite to animals."

Pharyngeal Diphthérite, I am induced to believe, is purely and simply an epidemic disease. Like the affections which assume this character, it has an origin which is obscure in its development, and it manifests itself only in localities and in individuals presenting most affinity for it. Deriving its source from an alteration in the constituent elements of the atmosphere, such alteration being unknown in its essence, but appreciable in its effects, it is propagated by the medium of the air.

Although this last assertion is perfectly demonstrated in the present day, I shall quote the very remarkable and decisive fact that a great number of persons were seized with the epidemic a few days after their arrival in the infected spots, and without having had communication with any patient.

M. de S—., who had scarcely recovered from an indisposition for which he had been bled, came to pass some time in a country-house situated in a district where the Angina seemed to be on the decline. After a residence of twenty-four hours, M. de S—. was attacked by the disease, though not in an intense degree, but, under the influence of the prevailing constitution it was prolonged far beyond its habitual duration, and disappeared only after a change of residence.

N—., a young mason, who had been living at Lyons for two years, paid a visit to his family, who were settled at Saint-Didier, and no member of whom was ill. The second day after his arrival the epidemic declared itself in him with rather severe symptoms.

I have besides, in conformity with general observation, seen pellicular Angina attacking more particularly children who, by their constitution, are more exposed to inflammation of the mucous membranes; it has affected sometimes adults, and more rarely old persons. For a more ample demonstration, I shall present a comparative table

relating to the age, the sex, and the mortality, in a number of four hundred and sixty-one patients.

AGE.	SEX.		MORTALITY.	
	Males.	Females.	Males.	Females.
8 months to 5 years	75	73	5	2
5 to 10 years - -	59	53	13	10
10 to 15 „ - -	46	40	2	4
15 to 20 „ - -	21	25	1	2
20 to 30 „ - -	12	20	..	1
30 to 40 „ - -	11	17	..	..
40 to 50 „ - -	3	5	..	..
50 to 60 „ - -	..	1	..	..
	227	234	21	19
	461		40	

These statistics demonstrate that the epidemic was more common from eight months (I have not examined any patient below that age) up to fifteen years, and more rare in proportion as we ascend the scale of life. It may also be remarked that, although in the first fifteen years, it attacks male children by preference, it attaches itself to the other sex after that epoch; these results are identical with the facts collected up to the present time. But I may remark that, contrary to what has been admitted, Pharyngeal Diphthérite was less severe at the age of eight months up to five years, and is more frequently fatal, on the contrary, from five to ten years, particularly in boys; this circumstance may be explained in the following manner:—

In our parts of the country, it is the custom to send children of that age to take care of cattle; they are exposed at that period of life to all the inclemency of the weather, and are generally of a bad and deteriorated constitution, which singularly predisposes them to all epidemic influences, and above all to that of Membranous Angina which always assumes, in this case, a more serious character. Out of four hundred and sixty-one patients we lost forty, a number which does not much exceed the ninth part of the subjects attacked, and yet several died for want of assistance, or were treated too late.

Compared with former statistics, this table gives us a less mortality

than that furnished by the epidemics of the same nature, as is indicated by the summary given by Ozanam (*loc. cit.* t. III., p. 279) embracing thirty-nine epidemics, from 1557 up to 1805, and showing as the result a loss of eighty patients in one hundred. The proportion of our deaths is also inferior to that presented by the table of epidemics from 1805 to 1830, made according to the directions of the Académie Royale de Médecine, and in which we find that death carried off the fourth of the patients.

In observing that the mortality continually decreases, in great epidemics, which, like Pharyngeal Diphthérite, depend upon the temperature, the sudden variations, or the other sensible qualities of the air, have we not a right to hope, if not for their complete disappearance, at least that they will become less frequent, and will not be much more destructive than sporadic diseases? This result we shall obtain by the progress of civilization; by the development of the arts and of political institutions which are being brought to perfection every day, so to speak, and will be applied to a much greater number of men; we shall owe this result, without doubt, to a better organization of labour, which in rendering comfort more general, will permit individuals inevitably deprived up to the present time of the benefits of hygiene, to procure for themselves more commodious and healthy dwellings, more suitable clothes, a more wholesome kind of food, and to be, therefore, less exposed to external or atmospheric influences.

TREATMENT.

At the period when the Epidemic Pharyngeal Diphthérite invaded the sphere of my medical practice, I had never observed it except in the sporadic form, in the wards of Professors Chomel and Bouillaud, to whose clinical staff I had the honour of being attached. Knowing, according to the English Hippocrates that a mode of treatment which is beneficial in one epidemic, may in another, although of the same name, have only negative results (for each popular disease has its own peculiarity), I have thought it proper to have recourse to experience, and to consult men of established reputation. Without stopping at the history of the medical treatment of past ages, I shall observe that the treatment of Membranous Angina was, in past times, the object of active controversies. Two entirely opposite opinions have been offered; and while some practitioners have insisted

that the most pressing indication was to subdue the inflammation, have extolled the antiphlogistic method, and have regarded it as the only anchor of safety; others considering the destruction of the pseudo-membranes as the principal indication, have declared asthenic medication to be dangerous; and have put in practice a totally opposite method of treatment. A mixed opinion has arisen from this contrariety, and it must necessarily prevail in the present day.

The modification of this specific nature of the disease by tonics which destroy the pellicular exudations, and which by a direct, and immediate action, prevent their formation and return, and the removal of the cause which gives rise to them, that is to say, inflammation;—such are the principles which have guided me in the application of my therapeutical measures. If, to the followers of Broussaisism, I admit that without the aid of modifying topical applications, the antiphlogistic medication is insufficient, I must also declare to M. Bretonneau and his followers, that without the help of antiphlogistics, the topical medication has most commonly presented only uncertain results. These two methods of treatment ought to lend mutual aid to one another.

Antiphlogistic Treatment.

General bleeding.—This treatment seems to have been much in use in all the epidemics of Malignant Angina cited by Ozanam, except in those described by Fothergill (1746), by Richter (1755), by Bergius (1757), and still it must be remarked that, in these last epidemics there was concomitant Scarlatina; a disease which, even when it is isolated, often takes an adynamic form, imperiously requiring the administration of tonics. I quite admit that in this peculiar complication, and when there is want of vital reaction, we ought to avoid phlebotomy.

But when we find Huxham (1734), Astruc (1745), Marteau (1755), &c., &c., having recourse to general bleeding, three, five, and even seven times in the same patients, and succeeding in effecting cures by this powerful treatment, we are led to inquire what fascination had seized the contemporaries of Pinel, the advocate of the fearful treatment, called expectant, at a time when physicians absolutely banished all evacuations of blood in the treatment of this disease (*Nosogr. phil.*, t. II., p. 248, 1818).

The versatility of the human mind, applied to the science which

ought to be least conjectural, must necessarily astonish and distress us; it was a retrograde step...It required all the authority of physiological physicians to destroy the deep roots which had been laid down in practice by the system of the authors of the *Dictionary of Medical Sciences,* a system which offers us only a therapeutical array, altogether powerless against a disease, the progress of which is sometimes fearfully rapid.

We must come to 1826 to find a treatise, *ex professo,* on Pharyngeal Diphthérite (Bricheteau, *Précis analytique du Croup et de l'angine couenneuse,* p. 419), in which the author shows himself a partisan of general bleeding. In his excellent article in the *Dictionnaire de Médecine et de Chirurgic pratique* (*loc. cit.,* t. II., p. 557), M. Roche also advises this treatment; but still influenced, as it would appear, by a reflection of the thoughts which prevailed in the medical world before physiologism, he appeals to new attempts, and to new experiments, probably forgetful of the historical facts which I have above related. MM. Guersant, De Laberge and Monneret (*op. cit.,* t. 1^er^ p. 67). T. Ridard (*Mémoire sur une Epid. d'Ang. pseudo-membraneuse dans le département de Maine-et-Loire, presenté à l'Académie de Médecine,* 1833), consider phlebotomy as of great utility in the treatment of this disease. M. Ridard especially practised with the greatest success, large general evacuations of blood, although in the epidemic which he had an opportunity of observing there was a coincidence of Membranous Angina and of Scarlatina, which circumstance brought into resemblance the epidemics of former centuries, in the treatment of which epidemics it was thought proper to avoid depletions of blood.

To all these trustworthy authorities, I shall venture to add my opinion, which rests upon an experience of more than two years, and is founded on an examination of a considerable number of patients, as is indicated by the tables which I have presented. Speaking generally, the opening of a vein is one of the most energetic resources in the treatment of epidemic Angina, in cases where the general reaction is great, the skin hot, and the pulse full and accelerated, in strong and plethoric individuals, and even in subjects of ten to twelve years of age (below this age local bleedings are sufficient). I had constant recourse to it in the first two stages of the disease; and abstained from it generally in the third, in consequence of the prostration of strength and the feeble state of the pulse. I have

sometimes been able to repeat the general bleeding several times in the same patients, and always with remarkable success.

Local bleeding.—M. Bretonneau forbids this step in a general manner; but the opinion of this physician cannot have any absolute weight in this question, when we know that M. Gendron (*Journ. complém. des Scienc. Méd.*, t. XXX., p. 269 et suiv., 1828), and M. Guimier (*Journ. Gén. de Méd.*, t. CIV., p. 165, 1828), have made very numerous cures, by this treatment, on the same spot, and in the same epidemic as the learned physician at Tours. Since then, experience has sanctioned the use of local bleedings for guttural Diphthérite, and my own observation confirms not only their utility, but I may say their indispensability, in young subjects, when the inflammatory redness and swelling are very well-marked. As in the performance of general bleeding, I have had recourse to local bleedings only in the first two stages of the disease. I have made use of this treatment even in certain patients whose constitutions seemed weak, and in whom there was little or no reaction; and have obtained good effects from my temerity. I am led to believe, in fact, that, relatively to its intensity, the inflammation is modelled in general, on individual constitutions, and that it everywhere and always requires the antiphlogistic treatment, but appropriated to its degree of acuteness, and proportionate to the strength of the patients.

I have adopted, in the employment of local bleedings, a treatment to which I may be permitted to give a denomination from Professor Bouillaud, and who has applied it to general bleedings, I mean that of *saignées locales coup sur coup.* For instance, every time that the guttural inflammation was very intense, and when the pseudo-membranes had a marked tendency to propagate themselves towards the deeper mucous membranes, I prescribed leeches in less number than in the case of very abundant but not frequent bleedings, and I was accustomed to repeat their application every six or eight hours, in a word, I kept up a flowing of blood till the general reaction had completely ceased, and there was a positive amelioration in the local symptoms.

The signal services which have been rendered to me by this *modus faciendi,* compel me, as a duty, to announce the result of my experience, and to recommend the plan to the profession. It is preferable in my opinion, to bleeding carried out to fainting, a method which has been favourably mentioned by the Anglo-American physicians,

and in France by many able practitioners, amongst others Professor Cruveilhier, especially in the treatment of Croup. Too great a loss of blood involves certain dangers; it throws the patients into a state of prostration which carries away from the economy its power of reaction, and no longer allows a recurrence to blood-letting, when, after the relief generally produced by an evacuation of blood, carried to syncope, the disease regains the hold which it had lost.

I am led to believe, therefore, that local bleedings, practised one after another (*coup sur coup*), taking the pulse as a guide, do not present this inconvenience. Be this as it may, it ought to be fully acknowledged in the present day that repeated evacuations of blood, conjointly with other therapeutical agents of which I shall presently speak, arrest the course of Pharyngeal Diphthérite quite as much as that of Croup. I have frequently applied the leeches to the base of the inferior jaw. I have rarely had occasion to follow the example of Ribes (*Mem. sur l'Ang. Couënn.*, p. 26, 1818), who had recourse to local bleeding upon the epigastric region; but I selected this part by preference when there were manifest signs of gastro-intestinal irritation.

I encouraged the effects of the treatment just indicated, by diluent drinks, in the first stage, and acidulated drinks in the last two stages; by emollient or laxative injections, according to the state of the bowels; by emollient poultices around the neck, gargles of the same nature at the first period, astringent or acidulated at the last; I recommended more or less strict low diet, according to the intensity of the disease.

When, at the commencement, I recognized the Membranous Angina, which I shall term adynamic, as manifested by the absence of reaction, by the rapid progress of the disease, the brownish colour of the membranous exudations, the gangrenous smell of the mouth, the smallness of the pulse, the discomposure of the features, and the general collapse, &c., &c., I avoided all evacuations of blood, in order to have recourse to a stimulant method of treatment.

Emetics.—Most authors, Ribes, for example, recommend emetics in the treatment of Diphthérite of the pharynx, as agents in throwing off the false membranes. As to myself, I think that local treatment leads more certainly to this result, and I have restricted the employment of the emetic method to the following cases:—1st, in very young patients who cannot spit, and with whom it is always difficult to use caustics, from the narrowness of their throats. 2nd, where diphtheritic

inflammation has propagated itself to the air-passages. 3rd and lastly, in primitive Croup. In these last two cases, emetics in repeated doses, every five hours, according to the method of Dr. Delarroque (*Bulletin général de Thérapeutique,* September, 1840), formed, together with local bleedings, often repeated, the foundation of my treatment.

I employed the emetic preparations as follows:—tartar emetic, eight grains, and infusion of tilia (lime tree), twenty-five drachms; or tartar emetic, eight grains, syrup of ipecacuanha, eight drachms, water, sixteen drachms,—to take one teaspoonful every ten minutes, until vomiting takes place.

Purgatives.—I have sometimes used purgatives, and have seen them, without producing any beneficial effect, augment the disposition to gastro-intestinal irritation, which showed itself in nearly all the patients; and these medicines often caused a diarrhœa which exhausted them more rapidly. I am consequently induced, notwithstanding the authority of some distinguished physicians, to condemn the administration of purgatives, in this disease, not even excepting the protochloride of mercury, which the physicians on the other side of the water and in Germany have regarded as a true specific.

I have not thought it right to try calomel in large doses, as having according to the practitioners who recommend it, a direct action, which, being exercised on the mucous membranes, causes a great quantity of mucus to flow into them, thus facilitating the separation and expulsion of the membranous exudations, and even preventing their formation by giving more fluidity to the secreted matters. I believe, with Bricheteaux, that by exciting the mucous tissues, we add an irritation to that which already exists, and that calomel must augment the malady instead of destroying it. If this medicine, administered even according to the method of M. Guersant, that is to say, in small doses, but often repeated, namely, a few grains every hour, sometimes associated with opiate preparations, in order to prevent all purgative effects; if this remedy, I say, exercises the same action as mercurial frictions, and if these last, by the avowal of M. Bretonneau, who was first in France to make use of them, are evidently injurious, I see no motive for persevering in the therapeutical management of the disease which forms the object of this work, an agent which has theoretically and experimentally been recognized to be hurtful.

Cutaneous Revulsives.—I have employed, with success, rubefacient

revulsives, such as irritant foot-baths and mustard poultices, pure or weakened, according to the degree of action which it was desirable to produce.

Almost all physicians, both ancient and modern, advise revulsive blisters to be applied upon the sides or the nape of the neck. Guided by their labours, and placed in circumstances where it was necessary to use all the resources of therapeutics, I have adopted this plan, which, in the course of the winter of 1842, appeared to be useful; but in the following spring, at the time when the atmospheric temperature rose, I was compelled to acknowledge the excellence of the precept given by MM. Guersant and Trousseau, the only scientific men who reject, on all occasions, the use of blisters in epidemic Membranous Angina; the first considering them as useless, the second as hurtful. At the present day, I weigh in the balance the amount of my own experience, and I assert, that this method of treatment has not, generally, and under the influence of certain medical constitutions, any other results, than to become the origin of the development of cutaneous Diphthérite, and, in this manner, to augment the evil instead of diminishing it. In witnessing the singular disposition of these morbid or artificial ulcerations of the skin, to become covered with membranous patches, it is impossible to mistake, in this Membranous Angina, a specific state, and indeed a true diphtheritic diathesis.

I must add, besides, that blisters, which are, by most practitioners, employed in Croup, caused, in my hands, the appearance of cutaneous Diphthérite, in a serious case, in which I was compelled, in spite of my reluctance, to apply one. This blister, after the disappearance of the original disease, very nearly destroyed the life of my patient, and the vesication took a long time to cure.

I think it right to establish this principle, namely, that blistering revulsives may be of use in sporadic pharyngeal and laryngo-tracheal Diphthérite, but rarely, perhaps never, when the disease exists in the epidemic state. I believe, that, at the commencement of an epidemic of this nature, every cautious practitioner ought, before adopting the use of epispastic agents, to devote himself to a careful experimental use of them. The use of the antimonial pommade has never been followed by the same evil results; I have made use of it with advantage in several cases of pharyngo-laryngeal Diphthérite.

Local Medication.

Experience has for a long time dissipated the objections offered against the employment of this kind of medication, in the treatment of pseudo-membranous Angina, and local caustics have definitively acquired, in the domain of science, the high estimation which can no longer be denied them. As, in following the rules established by our teachers, I have thought it necessary again to try the various topical applications which have been recommended at different times, I shall present, in a brief manner, the results of my own observations.

Alum.—The action of alum in pharyngeal Diphthérite has been extolled from the earliest antiquity. It had fallen into oblivion, when M. Bretonneau, learning from Aretæus of Cappadocia (*De causis et signis acut, et diutur. Morb. lib.* IV., *cap.* 9), that in this affection the aluminous gargles, and the insufflation of alum, were sufficient to stop the development of the false membranes, he employed it anew in 1825, with a success which surpassed his expectation. Professor Trousseau, who, in 1828, received a medical mission for many departments where Diphthérite was raging epidemically, was enabled to confirm the excellent effects of this treatment. In my hands it has been of very great assistance to me, and I may thus explain its use. Alum has a certain efficacy in the first stage of the disease; it generally prevents the formation of false membranes, but it has always appeared to be of very little use in the second and more advanced stage, and *à fortiori* in the third.

As to its mode of application, I have had recourse to the insufflation of pulverized alum upon the diseased parts, by the aid of a tube, and I repeated it every three or four hours, according to the intensity of the inflammation. In our districts, I instructed the relations to perform this operation themselves, and they managed it with great facility. The cries of the young patients were advantageous to us, and I profited by them as much as possible, to introduce the topical applications at the moment when the inspiration took place. When the insufflation excited coughing, I applied the remedy with a brush made of hair, using it either in powder, pure, or combined with gum-arabic, in a very strong solution. Sometimes I used, in the case of adults, upon whose accuracy I could depend, an alum-gargle thus prepared:—Common water or mucilaginous decoction,

sixty-two drachms; rose honey or syrup of mulberries, seven-and-a-half drachms; alum, one-and-a-half drachms.

I repeat, that this valuable local application has almost always succeeded in the first stage of guttural Diphthérite, and often in cases belonging to the second, characterized by isolated exudations, which were thin and scarcely adherent. I discarded its employment when these last were very thick and extensive and strongly adherent: its effects were then useless.

I shall here notice that I have successfully repeated the experiments of Professor Velpeau (*Gazette Médicale*, 1837), on the use of alum at the commencement of cases of simple Angina.

Nitrate of silver.—Since the publication of a very interesting Memoir which appeared in 1827 (in the *Journal Général de Médecine*, t. CIII.—V.) in which M. Girouard, after having established a detailed parallel between the different therapeutical agents applicable to the Diphthérite, which is seated upon the mucous membranes, gives to the nitrate of silver in the liquid state, a well-marked preference over alum, hydrochloric acid, &c. New trials of it have been made, and always with remarkable success.

Since the researches of M. Gendron (*Gaz. Méd.* 1834, p. 560 *et seq.*) the *lapis infernalis* is most commonly employed. The use of this salt is more convenient, and its effect more certain, and I, who have used it, do not suppose that for the future we shall be able to dispense with it, unless in the practice of some professional man, whose sight has undergone the effects of age or whose hand has felt the trembling of senility, for this manner of applying the nitrate of silver requires much practice, a firm hand, and an excellent sight, especially when the false membranes are deeply seated in the pharyngeal cavity.

The following is my mode of proceeding, and it is in conformity with the precepts laid down by M. Guersant. I place a piece of the caustic of the length of about an inch, in a silver caustic-holder, or even in an ordinary pencil holder of steel or of brass (taking care to take out the stone after each cauterization, for fear of the chemical decomposition, which renders the stone inert, as has been proved by M. Chevalier). The caustic is completely fixed, and only a very small portion projects. After having slightly wetted it, so that it may act instantaneously, I apply it to the points covered by the false membranes, and even to the surrounding parts. Under the influence of this contact, the membranous matter becomes of a dull white colour and friable consistence, and union with the subjacent membrane is quickly

destroyed. In cauterizing the adjoining tissues, I produce a modification in their vitality, which offers an obstacle to the spread of the disease. I repeat this operation three or four times a-day, and I keep this powerful topical remedy for the last two stages of the epidemic. I have made use of lunar caustic in a great number of subjects, and twice only has it happened to me to allow a fragment to fall into the œsophagus. Fortunately, the accident occurred in children from ten to twelve years old. I immediately hastened to produce vomiting, by the aid of luke-warm water with tartar emetic, taken by half glasses at a time, every five minutes, and the patients soon ejected some bluish-coloured matters, which held the silver salt in solution.

In one of the cases, the patient, after a great many alvine discharges, complained of a violent pain in the epigastric region, and I thought it proper to administer half a tumblerful of slightly salted water, in order to decompose the poison, if any small particles should remain. In very young children, to whom it might be difficult to give a sufficient quantity of an emetic preparation, it would be best to put the fingers upon the root of the tongue, so as to induce efforts of vomiting.

I have also made use of the concentrated solution of nitrate of silver, in the proportion of one part to five of water. The effects that I have obtained from it have been less certain than those from lunar caustic, and towards the end of the epidemic, I have had recourse to it only in cases where the enormous swelling of the tonsils no longer allowed the employment of the latter. I then applied this liquid to the guttural cavity with a sponge fixed to a piece of whalebone, or with a dossil of lint. It is difficult, in general, to limit the action of caustics, and we are likely to let fall some drops of a caustic solution, either into the œsophagus, or into the air-passages.

Protochloride of mercury.—I have insufflated calomel into the throat of some of my patients, either in a pure state, or mixed with some powdered sugar, as is recommended by M. Bretonneau. Not only has the curative action been absent, but the medicine has often provoked in young subjects, who do not spit, a violent reaction in the intestinal canal, or else on the salivary organs. In consequence of this circumstance, and especially owing to its insolubility, which must neutralize its topical action, I think that calomel ought to be completely discarded from the treatment of Diphtheritic Angina, and reserved, as I shall state farther on, for cutaneous Diphthérite.

Hydrochloric acid.—This application, pure or mixed with two or three parts of rose honey, according to the degree of inflammation, has been singularly extolled of late years. After numerous trials, I must declare its efficacy to be less than that of lunar caustic. I employed it concurrently with alum, in slight cases, or with liquid nitrate of silver in the cases in which, as I have said before, the tumefaction of the tonsils would not permit the introduction of solid nitrate of silver into the back of the throat.

Chloride of soda.—I have had recourse to this medicine, either dissolved in a fifth of its weight of water, as a purifying agent, according to M. Guersant, or in the form of gargles, in the proportion of one drachm to forty drachms of liquid, according to the formula of M. Roche. This substance has never produced any beneficial result.

Nitrate of mercury.—I place this preparation, for its utility, on an equality with liquid nitrate of silver and hydrochloric acid.

In serious cases, where it was impossible to have recourse to cauterization, I injected escharotic liquids into the pharynx, by the mouth, and sometimes by the nasal fossæ, by the aid of the syringe, the patient having a basin before him.

I was obliged to abstain from trying anew some other pharmaceutical agents, employed at certain periods, in the treatment of epidemic Membranous Angina, and which have been definitively forbidden. It is thus that MM. Guersant and Roche have pronounced a just anathema against fumigations of ether, ammonia, and chlorine. In fact, by their irritating nature, these vapours are more adapted to increase the inflammation than to destroy or modify it; and is it not known, besides, that one property of these two last gases, is to produce Angina with the formation of a false membrane?

Scarification of the tonsils.—This operation, which has been generally condemned by the medical men of the seventeenth century, and the inconvenient results of which were proved by Van Swieten himself, far from producing the favourable effects which have been attributed to it by some practitioners, has always appeared to me to aggravate the disease, and I very soon abandoned the proceeding.

Ablation of the tonsils.—This operation, to which I have only once been able to have recourse, has, notwithstanding the opposition which I have encountered, completely succeeded in cases where asphyxia was imminent.

I consider this operation as a last, but useful resource, when all rational means have failed. It is only applicable, however, in Pharyngeal Diphthérite.

Tearing away the false membrane.—The effects of cauterization are never more certain than when we are operating on the surfaces denuded of their pseudo-membranes. I was in the habit of practising ablation every time that I was able to succeed in the measure without increasing the local symptoms of inflammation.

Tracheotomy.—I have found everywhere such a repugnance to this operation, that I have not been permitted to make use of it. I have only tried to employ it in cases of primitive or consecutive croupal Diphthérite.

SOME OBSERVATIONS ON CROUPAL DIPHTHERITE.

Several cases of Croup have enabled me to observe a peculiar snoring sound, heard during sleep, and which has not in my opinion sufficiently attracted attention, since only two practitioners up to the present day have mentioned its existence, namely, Albers of Bremen, and M. Marotte. According to the latter author, this snoring sound, to which Albers gave the name of *sonitus crepitans*, and which I propose to call *croupal snore* (*ronflement croupal*) is only the exaggeration of the different sounds caused by the respiratory movements during the waking state, and rendered more intense by the difficulty of breathing, which is usually greater during sleep. This sound would be produced in the larynx, and the back of the throat, and as to its rhythm and intensity, would be regulated by the two movements of respiration, that is to say, it would be composed of two alternate sounds, of which one, stronger than the other, corresponds to the inspiration or expiration, according as either of them is more noisy and difficult.

According to the same author, this snoring sound presents itself with two distinct characters; it is dry or moist. The *dryness* is observed especially at the commencement of the disease, and when the inflammatory state predominates; the *moist character*, more or less marked, appears to belong to a more advanced period. It seems to be due to the passage of the air through the mucus, and the detached pseudo-membranes which obstruct the larynx.

M. Marotte draws the conclusion, that this symptom may furnish useful characters in the diagnosis, prognosis, and treatment of membranous laryngitis. In fact, the laryngeal sound can only belong to an affection of the larynx, and must, consequently, concur with other

symptoms in characterizing Croup. If it is dry and metallic, it must be believed that the inflammatory state continues, and that there is a tendency to the secretion of plastic matter, whence arises the indication for depletion by blood-letting. If, on the contrary, it has become moist and crepitant, it is because the false membranes are beginning to be detached, and to float freely in the air-tube, a circumstance which indicates the use of emetics. Lastly, in the first case the prognosis is evidently more serious than in the second, and it becomes most favourable, if the snoring sound ceases altogether.

Besides these advantages, we may add, that this symptom may serve to establish the differential diagnosis between stridulous laryngitis, or pseudo-Croup, and croupal laryngitis, since its existence is essentially connected with the presence of the pseudo-membranous exudation. We know that cases of stridulous Angina recover spontaneously, and, consequently, under the influence of the most different methods of treatment; while true Croup is never followed by a favourable termination when it is left to the unaided resources of nature; and it even resists, in general, the most skilful methods of treatment. Now, to apply to pseudo-Croup, which requires only the treatment applicable to slight colds, the medication necessary for tracheal Diphthérite, would be to employ therapeutical measures, which are not only useless, but even likely in themselves to prolong the duration of the disease. A symptom which would fix a well-defined line of demarcation between the two kinds of laryngitis, would enable us to avoid this great inconvenience, and the laryngeal snoring sound, when it exists, appears to me to fulfil this indication.

I am also convinced that in intense cases of Croup, this pathological phenomenon may assist in deciding upon the opportunity for tracheotomy. The utility of this operation is no longer contested in the present day, and Professor Trousseau has endeavoured to demonstrate, by numerous cases, that it has never been followed by such favourable results as when it has been practised at the earliest possible period, that is to say, as soon as the exudation was supposed to exist. In conforming exactly to this precept, we should sometimes perform the operation on persons who might recover under an energetic plan of treatment, and we should probably furnish some of those facts which have afforded powerful arguments in favour of practitioners who are opposed to the early performance of the operation, when no pellicles have been found in the trachea. Might not the *sonitus crepitans* serve as a guide, under these circumstances by proving to a certainty the development of the membranous exudation?

On the use of Emetics.

Jurine, Vieusseux, Albers, Serlo de Crossen, &c., had remarked that emetics did not always produce vomiting in frequency proportionate to the repetition of the dose; but that, on the contrary, their action became more and more feeble. In a word, a kind of tolerance seemed to be established, requiring stronger and more frequently repeated doses, in order to obtain results which were sometimes less marked than at the commencement of the treatment. The same observation has been lately made by M. Marotte, and I have myself verified it, and am induced to regard this tolerance as an ordinary state, as the consequence of the prolonged use of antimonial tartar, even in small doses, but given at short intervals.

I have often employed the sulphate of copper, peculiarly extolled by Serlo de Crossen in Croup, and recommended by Dr. Hoffman (*Journal de Hufeland*). This medicine does not lose its emetic property under the influence of a prolonged administration, but it presents the inconvenience of producing on the gastro-intestinal mucous membrane a violent reaction which is never produced by antimonial tartar, even in the dose of twenty-five to thirty grains in twenty-four hours.

In the latter periods of the epidemic, I have been convinced that tolerance might be avoided by the addition of ipecacuan to the antimonial tartar. From its too great bulk and its nauseous and repulsive smell, ipecacuan is administered with difficulty to children, and I have, therefore, made use of the following preparations:— tartrate of antimony, eight grains; brown emetina, fifteen grains; water, fifteen drachms; syrup of orange flowers, one drachm; to be taken in teaspoonfuls at a time, every ten minutes, until vomiting is produced.

I shall conclude these few observations relating to Croup, by declaring the superiority of the method of Dr. Delarroque, namely, *repeated vomiting, considered as a principal agent in the treatment of confirmed Croup.* If membranous laryngitis was considered as one of the most serious and most frequently fatal diseases until the publication of the remarks of the physician of the Hôpital Necker, it was owing, it must be confessed, to the fact that the activity and boldness of the treatment were never proportionate to the rapidity and intensity of the disease.

The adoption of this energetic treatment must, therefore, hence-

forth impress upon this affection, hitherto so formidable, the characters of a benignant disease, since M. Delarroque declares that with the exception of a child, in whom Croup was complicated with meningitis, and who evidently sunk under the consequences of the latter disease, he does not recollect a single person whom he has lost, after having subjected him to the action of the methods which he recommends in his Memoir, namely, the simultaneous employment (and in the space of an hour or an hour and a-half) of local bleedings, emetics, derivatives, &c.

If I have not met with the same success, I must attribute the circumstance both to the epidemic nature of the disease, which at that time was more serious, and to the distance which separated me from the patients, and prevented me from watching over the treatment; and, lastly, to the deplorable negligence of the relations in not calling me in sufficiently early, that is to say, at the commencement of the affection.

It is true that croupal Diphthérite showed itself only towards the end of the epidemic, and continued especially after it. The cases were isolated, and occurred only in localities which were sometimes very distant. The people, too, in our part of the country, who were well acquainted with Membranous Angina, because it had been generally prevalent, always mistook primitive Croup for a simple cold, and the more so as the little patients generally walked and ate, up to the last stage of the disease. The relatives suspected the danger only when asphyxia was imminent. Tracheotomy was itself too uncertain to allow me to attempt its performance, especially at a time when a well-marked opposition was shown against the operation.

CUTANEOUS DIPHTHERITE.

The annals of Medicine inform us that in certain cases of Malignant Angina, some epidemiographers have remarked different conditions of morbid appearance on the skin; but little was known on the subject until 1826, when M. Bretonneau, to whom we owe our knowledge of the true nature of Membranous Angina, demonstrated, in an indisputable manner, that Diphthérite exhibited everywhere the same characters. Professor Trousseau, profiting by the ideas of the learned physician of Tours, has given us in the *Archives Genérales de Médecine,* and in an article in the *Repertoire Génér. des Sciences*

Med., the most complete picture of this disease when it is established on the external tegumentary system.

To these facts, I have only to add one which appears to deserve some attention. M. Trousseau, in the article last mentioned, observes that he has never seen Diphthérite developed on the skin, unless this membrane had been previously deprived of its epidermis; unless, consequently, it presents more or less resemblance to the organization of the mucous tissue.

Although I am compelled to admit, with this author, that different wounds, either recent or chronic, herpetic eruptions, blisters, &c., often become the exciting causes of the development of cutaneous Diphthérite, I must also declare that I have most commonly seen it occur spontaneously. I must even express my astonishment that this peculiarity which I have so frequently observed, has not struck the Parisian professor in the course of the epidemic which prevailed under his inspection.

There is also a point on which I think I ought to insist, in order to prove, if necessary, the perfect identity existing between pellicular inflammation of the mucous membranes and cutaneous Diphthérite. It is the fact that during our epidemic period, under the influence of the same cause and a similar predisposition, I have seen Diphthérite raging simultaneously on several members of the same family, attacking in one the pharyngeal mucous membrane, in another, the cutaneous tissue, in another, the respiratory passages, and, lastly, in another, all those organs at once or successively, and presenting no other modifications than the symptomatic differences peculiar to each region. The following are a few examples :—

In the household of Ch—., composed of twelve persons, the disease exhibited itself on the pharynx in three; in the air-passages in only one; on the skin in another. Let me here remark, in order to prove the influence of idiosyncrasies on the invasion or the mode of propagation of the epidemic, that in this household one portion only of the family was attacked by it, and that it did not extend to the others, although all the conditions favouring the contagion existed among them, such as want of cleanliness, permanent contact with one another, confined dwellings, &c.

In the family of B—., three patients out of five suffered from pharyngeal Diphthérite, the fourth from croupal Diphthérite; in the fifth case, the disease attacked the air-passages and the skin.

In the household of T—., consisting of thirteen persons, four experienced attacks of pharyngeal Diphthérite, another suffered from

croupal Diphthérite, and the last from cutaneous Diphthérite. I must remark that the eldest brother and his children alone suffered from the epidemic which spared the other branch. I ask if this fact is not conclusive in proving the non-contagious character of Diphthérite?

In the family of M—., four persons fell victims to Malignant Angina; the father suffered from an attack of pleuro-pneumonia, and in him a blister, applied to the thorax, assumed the diphtheritic character.

The four children of M—., suffered from the epidemic; two presented the symptoms of pharyngeal Diphthérite; the third, those of buccal Diphtherite, and, lastly, the fourth exhibited the signs of pellicular inflammation, seated in the pharynx and on the skin.

In the house of J—., containing twelve persons, five contracted Membranous Angina; and a little girl, after several relapses of the disease, was attacked with Croup, and died of it without having presented any trace of membranous exudation in the pharynx.

In the family of F—., five children became ill; in one of them Diphthérite showed itself on the skin; in two others, it attacked the pharynx; in the fourth, it attacked the pharyngeal mucous membrane and the skin at the same time; and the last child was attacked successively, and at rather distant intervals, with Diphthérite on the back of the throat, on the skin, and then in the air-passages. The epidemic element was therefore able, under the control of a determinate organization, to cause the production in the same subjects of the diphtheritic inflammation on different tissues. Ought not the same cause to produce the same effects and the same pathological lesions, modified only by the anatomical structure of the parts and the varying irritability of the organs?

Let me be allowed once more to enter upon the question of contagion in reference to cutaneous Diphthérite, considered by Professor Trousseau as a variety of the disease possessing, in the most eminent degree, the property of being transmitted from a patient to a healthy subject. Far from adopting this opinion, I shall apply to the cutaneous affection the principles which I have laid down in treating of Membranous Angina, and I must refer to that portion of my work for an explanation of my views. There is, however, one point on which I may dilate for a short time.

In establishing the proof of immediate transmission, it has been asserted that in the affected persons, the diphtheritic product propagated the disease by contact from one part which was affected, to

another part which was unaffected. I reply, that the same fact is observed in infantile impetigo, which has certainly never been regarded as contagious. In my opinion, the diphtheritic diathesis is sufficient to explain this successive encroachment of the disease. It would be difficult indeed to understand the propagation of the disease by simple contact, since, in the experiment performed by M. Trousseau on himself, the morbid fluid introduced by inoculation into the tissues, produced no pathological phenomenon.

For a long time the treatment of cutaneous Diphthérite partook of the incomplete views which were entertained as to its nature. Although S. Bard seems to have perceived the true character of the disease, yet he does not point out any definite methods for its treatment. M. Bretonneau himself, in his excellent monograph, gives only here and there a few therapeutical rules in reference to this affection. The only well-considered precepts which science possesses have been laid down by M. Trousseau. But being founded on facts collected during the course of a single epidemic, these precepts required the sanction of experience, and required confirmation by the study of fresh epidemics. Having been called upon to treat a great number of persons attacked with cutaneous Diphthérite, I have been enabled to make frequent use of the different agents proposed by M. Trousseau, and to judge of their relative efficacy.

General Treatment.

Antiphlogistics.—Depletion of blood.—These are forbidden by M. Bretonneau; and the Parisian professor (M. Trousseau) declares them to be altogether useless; and here let me remark upon the important fact that cutaneous Diphthérite shows itself only on subjects who are either cachectic, or who are already suffering under pellicular inflammation of the mucous membranes, and consequently weakened by antiphlogistic treatment, often too energetically employed. The disease usually assumes an adynamic form, which might induce us to believe, *à priori*, that depletion of blood can have only a negative, if not a positively injurious influence. As for myself, experience has enabled me to form a positive opinion, for I treated a few of the most vigorous patients, in whom the general reaction was very well marked, and found that in some, bleeding produced no other effect than to weaken them without improving the local affection; while in others, in whom leeches were applied in the vicinity of the diphtheritic

ulcerations, the results were still more unsatisfactory. Indeed, in the latter case, besides the fact that the inflammatory complication was never subdued, I always found the leech-bites become themselves the seats of the pellicular exudation. The result of all the facts which I have been able to collect, is to induce me to reject in all circumstances, depletion of blood in the treatment of Diphthérite when it attacks the skin.

Local Treatment.

Emollients.—With a view of subduing the inflammatory element, I have had recourse, at the commencement of the epidemic, to emollient applications; but far from obtaining the slightest favourable result from their use, they have, on the contrary, appeared to me singularly to promote the spread of the disease. I therefore think that local applications of this kind ought to be proscribed like the fatty substances, already considered by S. Bard and M. Bretonneau as being essentially injurious in cutaneous Diphthérite.

Caustics.—I have employed successively, and sometimes concurrently, the hydrochloric and hydrosulphuric acids, the nitrates of mercury and silver, &c., &c. Liquid substances have generally been inefficacious, but the caustic which has been most serviceable has undoubtedly been the *lapis infernalis.*

Catheretics (*mild caustics.*)—Alum, the chlorides of potash, lime, and especially soda, have been employed by me. The action of alum has been negative, and the hope which I entertained as to that of the chlorides has not been realized. The mercurial preparations, calomel among others, have perfectly answered my expectations.

I have also made use of the white oxide of zinc, which has been extolled in the treatment of certain herpetic maladies, impetigo, for example, but I have found no good result from its application.

To sum up my experience, I may state that the rejection of emollient applications, which, by the relaxation they occasion, favour the spread of the disease;—the modification of the membranous inflammation by the employment of mercurials;—and, lastly, the promotion, by means of the *lapis infernalis,* of the detachment of the pseudo-membranes, and the substitution of a simple phlegmasia for one of an unhealthy character;—are the therapeutical rules which experience has taught me to follow in cases of Diphthérite of the skin.

AN ACCOUNT

OF THE

BIBLIOGRAPHY OF DIPHTHERIA,

FROM THE DATE OF

BRETONNEAU'S FIRST ESSAY,

TO THE PRESENT TIME.

COMPILED BY

JOHN CHATTO,

LIBRARIAN TO THE ROYAL COLLEGE OF SURGEONS.

AN ACCOUNT

OF THE

BIBLIOGRAPHY OF DIPHTHERIA, &c.

In constructing this bibliographical appendix, it has been deemed desirable to take the subject up only from the time when M. Bretonneau's investigations gave to Diphtheria somewhat the characteristics of a substantive affection. To have comprised the older literature of the various forms of sore-throat, which by various writers have been considered as either allied to, or identical with it, would have required an amount of space not at the disposal of the compiler, and would have been to enter upon a debatable territory. Those, however, who wish to follow up this investigation, will find ample means of doing so presented them in M. Bretonneau's Treatise, and in the bibliography appended by M. Dezeimeris to the article "Angine Couenneuse," in the 3rd vol. p. 135, of the 2nd edition of the *Dictionnaire de Médecine*. Other references are furnished by M. Deslandes, Dr. Geddings, and Dr. Fuchs, the titles of whose contributions will be found in the following pages. The distinctive characters of Croup are so well established in this country, that it has only been thought necessary to refer to it in illustration of its occasional origin in faucial Diphtheria,—a circumstance that possibly may be more commonly observed in future, should Diphtheria become naturalized in this country to the extent in which it has so long prevailed in France.—J. C.

1821-3. Guersant. *Dictionnaire de Médecine*, Article "Angine Couenneuse" t. ii. "Croup," t. vi. and "Stomatite Couenneuse," t. xix. [This is the first announcement of Bretonneau's views as contained in his Memoirs read before the Academy, but not yet published. M. Guersant agrees with him in regarding epidemic Malignant Angina as a non-gangrenous disease, identical with Croup in its pathological characters, and found combined with it in most epidemics.]

1823. Bourgeoise. *Observation d'une Angine Couenneuse, tendant à prouver que cette affection est contagieuse*, Nouv. Bibliothéque Méd. t. iii. p. 129. [A paper read at the Acad. de Med., with the report on it.]

„ Brunet. *Note sur quelques cas d'Angine Grave (Couenneuse) qui semblént s'être transmis par la contagion*, Archives Gén. t. iii. p. 536.

„ Gosmer. *Essai sur la Diphthérite, souvenir des leçons cliniques de l'hospice général de Tours*, Thèse de Paris, No. 231. [A general description of the disease as observed at Tours, with three cases.]

1824. Desruelles. *Observations et réflexions sur l'Angine Couenneuse*, Bulletin de la Soc. Méd. d'Emulation, p. 161. [Two cases of the sporadic form related and contrasted with the epidemic Angina, the peculiarities of which are referred to cerebral complications.]

„ Louis. *Du Croup considéré chez l'adulte*, Arch. Gén. t. iv. pp. 1 and 369; and Mem. et Rech. Anat. Pathol. 1826, p. 203. [In most of the cases here related the disease commenced in a diphtheritis of the fauces.]

„ Tabanon. *Sur l'Angine Couenneuse Tonsillaire et Pharyngée*, Thèse de Paris, No. 118. [Four cases confirmatory of the views of Bretonneau, as stated by Guersant.]

1825. Gendron. *Observations sur une Angine Couenneuse*. Journal complementaire du Diction. des Sciences Méd. t. xxiii. p. 346. [Account of an epidemic in Tours. Nitrate of silver and scarification of the tonsils recommended as curative and preventive treatment.]

„ Mackenzie. *On the symptoms and cure of Croup*, Ed. Med. and Surg. Journ. vol. xxiii. p. 294. [This paper has been frequently referred to by continental writers in proof of croup spreading from the tonsils, and as the first recommendation of the use of nitrate of silver in diphtheritis.]

1826. Billard. *De l'état actuel de nos connaissances sur le Croup*, Arch. Gén. t. xii. p. 544. [In this article M. Billard submits Bretonneau's views to criticism; and while he admits that he has established that diphtheritic deposit has been mistaken for gangrene, he does not admit the specific character of the pellicular inflammation.]

„ Bretonneau. *Des Inflammations spéciales du tissu muqueux, et en particulier de la Diphthérite, ou inflammation pelliculaire, connue sous le nom de Croup, d'Angine Maligne, d'Angine Gangréneuse, &c.* 8vo. *Paris.* [Although only published in 1826, the first two of these Memoirs were read before the Academy of Medicine in 1821, and noticed by Guersant in the same year.]

„ Bricheteau. *Précis analytique du Croup et de l'Angine Couenneuse*, 8vo. *Paris*, 1826. [While admitting that the two affections may be distinguished, the author adopts most of Bretonneau's views.]

„ Conolly. *Review of Bretonneau on Diphtheritis*, Lond. Med. Repository, vol. xxvi. p. 499. [In an excellent review of M. Bretonneau's work, an account is given of the disease as observed by Dr. Conolly at Tours, and of his practice in treating it by calomel.]

„ Hamilton. *On a peculiar modification of Sore-throat which occasionally affects children*, Edin. Journal of Med. Science, vol. ii. p. 325. [The sore-throat here described commenced with diphtheritic deposits on the tonsils, soon followed by ulceration—this last, in the author's opinion, distinguishing the disease from the affection described by Bretonneau. Two terminations were observed, viz. through the production of croup or, secondly, a sinking of the animal powers—the latter attributed by the author to the paralyzing effect produced by the absorbed morbid secretions upon the respiratory nerves.]

„ Pretty. *Observations on various forms of Croup*, London Med. and Phys. Journ. vol. lv. p. 9. [Refers to cases of croup commencing in the fauces as not of uncommon occurrence; and believes that these are the cases which furnish examples of the contagion of the disease.]

„ Sym. *Cases intended to illustrate the contagious nature of Croup*, Lond. Med. and Phys. Journ. vol. lv. p. 14. [Refers to an epidemic of scarlatina not of a fatal character, except when, as in a number of cases, croup supervened, and seemed contagious. The affection of the fauces was sometimes very trifling, but the croup was attributed to inflammatory action extending from them.]

1827. Blaud. *De la Diphthérite et de la Laryngo-Tracheite comparées entre elles*, Nouv. Bibliothéque Méd. t. ii. p. 5. [An elaborate demonstration of the essential differences between diphtheritis and croup.]

1827. Bretonneau. *Notice sur l'emploi d'Alum dans la Diphthérite*, Archives Gén. t. xiii. p. 5. [In this paper Bretonneau defends the nomenclature of the disease, gives further details on the employment of alum, and enters into a comparison between diphtheritis and the malignant angina of scarlatina.]

„ Deslandes. *L'Angine Couenneuse et le Croup, considérés sous le rapport de l'état local qui les constitues, sont-ils identiques?* Journ. des Progrès des Sc. Méd. t. i. p. 152. [Answered affirmatively. A minute historical review of the subject of epidemic sore-throat given.]

„ Emangard. *Examen critique du Traité de la D. par M. Bretonneau*, 8vo. 1827, and *Mémoire sur l'Angine Epidémique, ou Diphthérite.* 8vo. Paris, 1829. [A sharp criticism on M. Bretonneau's views, by one of the "physiological" school, who maintains that the disease is of malarial origin, allied in nature to typhus, operating through the gastro-enteric membrane—a "*gastro-enteritic angina.*"]

„ Ferrand. *De l'Angine Membraneuse*, Thèse de Paris. No. 234. [Describes a fatal epidemic, in which the whole 60 cases, almost all being male children, died as early as the fourth or fifth day. Four narrated in detail.]

„ Lelut. *De la Fausse Membrane dans le Muguet*, Arch. Gén. t. xiii. p. 335. [Contains some interesting researches on false membranes.]

1828. Abercrombie. *Diseases of the Stomach*, p. 53. [Reference is here made to an epidemic of diphtheritis, which prevailed in Edinburgh in 1826, in which the danger arose from the extension of the disease to the larynx. Dr. Abercrombie protests against confounding the disease with croup.]

„ Bianquin. *Sur une Angine Maligne Epidémique*, Ann. de la Méd. Physiol. t. xiii. p. 277. [The prompt use of bleeding is here declared to have saved all out of three hundred patients attacked, with the exception of fourteen.]

„ Belden. *Application of the Nitrate of Silver in Cynanche Maligna.* American Med. Recorder, January. [This has been referred to by some of the French writers as an early account of the benefit of nitrate of silver in diphtheritis.]

„ Fuchs. *Historische Untersuchungen über Angina Maligna und ihr Verhältniss zu Scarlach und Croup.* 8vo. Würzburg, 1828. [A historical review of the epidemics of angina maligna, which he considers as essentially different from scarlatina maligna, being a typhus identical with the pulpous form of hospital gangrene. He regards croup as a true angina maligna trachealis, prevented running through all its stages.]

„ Gendrin. *Note sur les différénces de l'Angine Couenneuse et du Croup*, Journ. Gén. Méd. t. civ. p. 176, et t. cix. p. 41.

„ Gendron (E.) *Notes sur l'Angine Couenneuse, et sur les agens therapeutiques employés dans cette maladie*, Journ. Gén. de Méd. t. cv. p. 76; and Journ. Complém. du Dict. des Sciences Méd. t. xxx. p. 269. [States that he first employed nitrate of silver in France at the same time as Mackenzie did in Scotland. He treats the disease by early antiphlogistics, scarifications, and nitrate of silver.]

„ Girouard. *Observations sur les inflammations plastiques de la membrane muqueuse des fosses nasales, de la bouche, et de l'arrière-bouche*, Jour. Gén. de Méd. t. ciii. p. 305. [Narrative derived from observation of epidemics. Nitrate of silver recommended as an application.]

„ Guimier. *Mémoire sur une épidémie d'Angine Maligne, ou Diphthéritique.* Jour. Gén. de Méd. t. civ. p. 165. [Angina terminating in croup is said to give the best idea of the disease. Nitrate of silver was the chief application.]

„ Horteloup. *Observations du Croup chez l'adulte*, Thèse de Paris, *No.* 53. [Four interesting cases of croup in the adult, preceded or accompanied by pharyngeal false membranes.]

„ Lormel. *Observations de Diphthérite et de Stomacace Gangréneuse.* Annales de la Méd. Physiol. t. xiv. p. 145. [Case related exhibiting the preferability of antiphlogistic and derivative as compared with topical treatment.]

1828. Ranque. *Nouveau Traitement des Angines, ou moyen de Pyrothonide*, Ann. de la Méd. Physiolog. t. xiii. p. 162. [In epidemics, gargles of pyrothonide are stated to have exerted a remarkable solvent power upon the false membranes.]

„ Ribes. *D'une Angine Couenneuse observée à Paris en* 1818, Rev. Méd. t. v. p. 43. [Narrative of the disease which attacked nine members of one family. The author believes that croup rarely occurs without being preceded by this angina; and he calls attention to the necessity of a more regular examination of the throats of children.]

1829. Baron. *Rapports.* Gaz. des Hôp. t. ii. pp. 139 and 168. [Reports to the Acad. de Méd. on accounts given of epidemics by MM. Trousseau, Ramon, and Gendron, with discussion.]

„ Billard. *Mém. sur l'emploi du Calomélas dans le traitement du Croup et des Angines Pelliculeuses.* Arch. Gén. t. xx. p. 491.

„ Broussais (C.). *Observations d'Angines Suffocatives guéries par les antiphlogistiques et la laryngotomie*, Annal. de la Méd. Physiol. t. xx. p. 140. [Disputes Bretonneau's statement of the identity of diphtheritis and gangrenous angina.]

„ Delcambre, Bertrand, de l'Hosdiniere, and Toursaint, Thèses de Paris, Nos. 95, 192, and 208. [Mere recapitulations of Bretonneau's views.]

„ Gendron (A.). *Mém. sur les Angines Couenneuses Epidémiques*, Journ. Gén. de Méd. cix. p. 32. [Regards the disease as synonymous with gangrenous angina, and employs antiphlogistics and the nitrate of silver in preference to muriatic acid.]

„ Menou. *Réflexions pratiques sur la Diphthérite, ou Angine Membraneuse observée en Touraine*, Rev. Méd. 1829, t. iii. p. 262, and 1830, t. i. p. 179. [Witnessed several epidemics of the disease, and was himself the subject of it. Strongly recommends mustard poultices externally, and the administration of purgatives and antimony; but has no faith in local applications.]

„ Roche. *Dictionnaire de Méd. et Chirurgie pratiques*, t. ii. Article Angine Couenneuse. [He regards the disease as rather of a hæmorrhagic than of an inflammatory character, the pseudo-membrane consisting of decolored fibrine, the result of circumscribed exudations of blood, deprived of its coloring matter.]

„ Trousseau. *Mém. sur une épidémie d'Angine Couenneuse Scarlatineuse*, Arch. Gén. t. xxi. p. 541. [Gives an account of scarlatinal angina mistaken for diphtheritis, and endeavours to lay down the distinctive characters of the two.]

1830. Alison. *Clinical Lecture*, Lancet, Feb. p. 734, and June, p. 450. [Delivered on a fatal case occurring in an adult at Edinburgh.]

„ Archambault-Reverdy. *Observations d'Angines*, Jour. Univ. des Sciences Méd. t. lvii. p. 257. [A well-argued paper objecting to Bretonneau's statements as too indiscriminate both in respect to pathology and treatment, and protesting against the abuse of local treatment.]

„ Collineau. *Note sur une Angine Membraneuse qui parait avoir été communiquée d'un enfant à un adulte par le moyen de la respiration*, Jour. Gén. de Méd. t. cx. p. 334.]

„ Dugès. *Dictionnaire de Méd. et de Chir. pratiques.* t. v. Article Croup. [Points out the analogies between croup and diphtheritis, without admitting their identity, with Guersant and Bretonneau.]

„ Guersant. *Des Inflammations avec Exsudations Pseudo-membraneuses*, Gaz. des Hôp. Nos. 75 et 81.] Clinical Lecture at the Hôp. des Enfants.]

„ Lespine. *Precis historique de l'épid. d'Angine Maligne, Plastique, Gangréneus. (Diphthérite) qui a régné à l'Ecole royale militaire de la Flèche*, Arch. Gén. t. xxiii. p. 519.]

„ Regnier. *Angines Couenneuses.* Gaz. des Hôp. No. 48. [Five cases related illustrating the insufficiency of antiphlogistic treatment.]

1830. Trousseau. *De la Diphthérite Cutanée*, Arch. Gén. t. xxiii. p. 383. [Details of several cases observed during an epidemic, and usually supervening on the application of blisters. The identity of the disease shewn by pellicular angina, having been propagated from cutaneous diphtheritis, and *vice versâ*.]

„ Velpeau. *De la Diphthérite, et du traitement de cette affection au moyen des topiques*, Gaz. Méd. p. 11. [A few cases related to shew the superiority of local treatment by alum or nitrate of silver.]

1831. Broussais. *Cours de Pathologie*, t. i. Leçon 7, p. 325, &c. [Criticism of Bretonneau's views.]

„ Gendron. (A.). *Histoire d'une épidémie d'Angine Couenneuse, avec Rapport par Kergaradec*, Transactions Méd. t. iii. pp. 281, 293, 303. [Account of an epidemic in the Dep. of Loire-et-Cher, which converted the author to the doctrine of contagion. Report to Paris Medical Society, and discussion.]

„ Hoffmann (J. F.). *Angina tonsillaris, &c., mit nachfolgender Lahmung einiger Sinnesorgane.* Rust's Magazin, b. xxxiii. s. 341. [A severe case of diphtheritis, followed by paralysis of the nerves of the senses, but eventually recovering.]

„ Patureau. *Dissertation sur la Diphthérite Pharyngo-laryngienne*, Thèse de Paris, No. 167. [A *résumé* of the chief writings on the subject.]

1832. Bricheteau. *Rapport*, Gaz. des Hôp. d. 427. [Report to the Academy on M. Miguel's account of an epidemic, with short discussion.]

„ Girouard. *Observations sur les Inflammations Plastiques*, Transactions Méd. t. x. p. 173. [Regards the nitrate of silver as one of the best applications. A communication by M. Authenac in the same volume in confirmation.]

1833. Cheyne. *Cyclop. of Pract. Med.* vol. i. p. 499, article Croup. [Protests against confounding croup and cynanche maligna together, under the name of diphtheritis.]

„ Collineau. *Mém. sur la Diphthérite*, Rev. Méd. t. ii. p. 328. [Believes that general remedies have been too much neglected for topical ones. The paper led to a discussion at the Academy, principally on the question of tracheotomy.]

„ Constant. *Angine Couenneuse et Angine Pseudo-membraneuse Grave*, Gaz. Méd. 1833, p. 416; 1834, p. 101. [Some cases which occurred under Baudelocque at the Hôp. des Enfants.]

„ Gendron (E.). *Mém. sur l'Angine Couenneuse*, Arch. Gén. ser. 2. t. iii. p. 393 (1833), and Nouvelles Obs. ser. 3, t. vi. p. 328 (1839). [Several cases related confirmatory of the efficacy of nitrate of silver, as an application. Two cases of tracheotomy, both fatal.].

„ Guersant. *Dictionnaire de Médecine*, 2de édition, t. iii. (1833), article Angine Couenneuse ou Pseudo-membraneuse, and t. ix. (1835), article Croup. [M. Guersant states, that all his additional observations made during sixteen years are confirmatory of Bretonneau's views.]

„ Lemercier. *Note sur une affection catarrhale épidémique avec Angine Couenneuse*, Bulletin de Thérap. t. v. p. 261. [During the prevalence of influenza in the Dep. of Mayenne, a considerable number of persons of both sexes, and various ages, became the subjects of diphtheritis. Active bleeding, with oxide of sodium and nitrate of silver as local applications, was adopted.]

„ Naumann. *Ueber die Diphthéritis, Hecker's Annalen*, 1833, *und Analekten fur Kinderkrank.* Heft ii. s. 142, und Handbnch der Med. Klin, 1834, b. iv. s. 61. [A good general and critical account of the disease, but entirely derived from the French writers.]

1834. David. *Epidémie de Scarlatine compliqée d'Angine Couenneuse*, Gaz. Méd. p. 90.

„ Ridard. *Mém. sur une Epidémie d'Angine Couenneuse*, Gaz. Méd. p. 273. [An epidemic occurring in Maine-et-Loire, treated by antiphlogistics and cauterization.]

1834. Sauvé. *Essai sur la Diphthérite*, Thèse de Paris, No. 37. [A *résumé;* and some cases added. observed during an epidemic in Dep. of Mayenne]

,, Stokes. *Clinical Lecture*, Lond. Med. and Surg. Jour. vol. iv. p. 197.

1835. Allè. *Zwei Fälle von Angina Pseudo-membranacea Pharyngea mit todtlichem Ausgange Oesterr*, Med. Jahrb. N. F. b. ix. s. 570.

,, Bourgeois. *De l'Angine Plastique dite Maligne ou Gangréneuse, considerée d'après l'épidémie qui a régné dans la Maison Royale de la Legion d'Honneur*, Mém. de l'Acad. Roy. de Méd. t. iv. p. 1. [Epidemic broke out after one of mumps in a population of 700 females, mostly children. Hydrochloric acid highly spoken of.]

,, Fricout and Boreau-Deroince, *Thèses de Paris*, Nos. 10 and 191. [M. Fricout relates the circumstances of an epidemic he witnessed favouring the views of the contagionists. The other thesis contains nothing original.]

,, Trousseau. *Dictionnaire de Médecine*, 2*de édition*, t. x; Article Diphthérite. [In this article M. Trousseau chiefly dwells upon the cutaneous form of diphtheritis.]

,, Tweedie. *Cyclop. Pract. Med.* vol. iv. p. 176, Article, Diseases of the Throat. [A good account of the disease given, and the differences between it and croup pointed out.]

1836. Bewley. *Cases of Malignant Diphtheritis*, Dublin Journal of Med. Science, vol. viii. p. 401. [Three fatal cases are related; one terminating in gangrene; the disease believed to be communicated by contagion.]

,, Bouillaud. *Dictionnaire de Méd. et de Chir. Prat.* t. xv. Article, "Stomatite." [The author objects to the specific nature assigned to diphtheritic angina and stomatitis, as preventing the active and repeated depletion which he has found useful.]

,, Ragueneau. *Angine Couennueuse, ou Diphthérite observée à Montfaucon.* Journ. de Méd. et de Chir. Prat. Mars.

1837. Meyer. *Rachencroup*, Berlin Med. Zeit. p. s. 31, and Dublin Journ. Med. Sc. vol. xii. p. 126. [Four cases of diphtheritis.]

,, Ryland. *Treatise on Diseases and Injuries of the Larynx and Trachea*, p. 161. [An interesting chapter on diphthérite, detailing some personal experience in the disease.]

,, Stokes. *Diseases of the Chest*, part i. p. 206. [Croup is here distinguished into primary and secondary, according as the air-passages are primarily or secondarily engaged, and the distinctive signs are tabulated.]

1838. Baumgaertner. *Einige Bemerkungen über den Rachencroup*, Ammon's Zeitschrift, b. i. s. 50. [Proposes extirpation of a portion of the tonsils.]

,, Ruppius. *Bemerkungen über Rachencroup*, Oppenheims's Zeitschrift, b. vii. and Schmidt's Jahrb. b. xx. s. 211. [The author states that he described diphtheritis in 1815. He treats it with bleeding and calomel.]

1839. Asmus. *Ein Wort über Rachencroup*, Berlin Med. Zeit. p. 175. [Relates a bad case occurring in the person of his own wife, who recovered.]

,, Bretonneau. *Procédé cathérétique pour le traitement des Diphthérites*, Journal des Connoissances. Juin. [Describes his mode of applying caustic.]

,, Bright and Addison. *Practice of Medicine*, Article Cynanche Membranacea. [Treat of diphtheritis chiefly as it is observed in scarlatina.]

,, Geddings. *On Pseudo-membranous Inflammation of the Throat*, Amer. Journ. of Med. Sci. vol. xxiv. p. 73. [A good historical compilation, with references to the older authors. The author witnessed an epidemic at Charleston, U.S., but furnishes no details of it. He found nitrate of silver and muriatic acid very useful.]

1839. Heyfelder. *Studien.* Article Angina exsudatoria, band ii. [Describes the few sporadic cases which have occurred in his practice.]

,, Medicenisch—Chir—Therapeutisches Worterbuch, band i. (1839), und suppl.-band (1856). Articles Stoma-typhus und Rachencroup. [A good summary of the various means of treatment that have been resorted to.]

1840. Benson. *Lecture at the College of Surgeons*, Dublin Med. Press, vol. iv. p. 387. [A good general account. Calomel, with nitrate of silver and mineral acids as local applications, recommended.]

,, Berndt. *Klinische Mittheilungen*, and Schmidt's Jahrb. b. xxxvii. s. 251. [An epidemic occurring at Greisswald, described.]

,, Fabre. *Dictionnaire des Dictionnaires.* Articles Angine Couenneuse, Diphthérite, and Stomatite: and supplement Article Diphthérite des Veillards. [This last is met with in a slight degree as a complication of various diseases, and is easily relieved by borax.]

,, Symonds. *Article Angina Membranacea*, in Library of Med. vol. iv. p. 48. [A short *résumé.*]

1841. Duplau. *Angine Couenneuse guérie chez un sujet agé* 59 *ans.* L'Expérience, t. viii. p. 1. [A very acute sporadic case treated by bleeding and emetics.]

,, Kessler. *Contagiosität der pseudo-membranösen Entzunduugen der Schleimhaut des Mundes, des Rachens, &c.*, Berlin Med. Zeit. p. 92. [Relates six cases in proof of the operation of contagion.]

,, Marié. *Observation de Diphthérie chez un adulte*, Arch. Gén, 3 ser. t. x. p. 342. [The patient, a vigorous subject in robust health, died on the sixth day.]

,, Rilliet and Barthez. *Mém. sur quelques points de l'histoire des Angines et des Gangrènes du Pharynx chez l'enfant*, Arch. Gén. 3 ser. t. xii. p. 438. [Cases related in proof of ulceration and gangrene occurring in diphtheritis.]

,, Taupin. *Note sur une épidémie de Maux de Gorge* in *Vanier's Clinique des Hôp. des Enfants*, t. i. p. 86. [Cases observed during an epidemic that prevailed extensively in Paris, 1841. The author insists upon the importance of examining the throats of children during an epidemic, whatever may be the affections they are suffering under.]

1842. Adams. Dublin Journ. Med. Sci. vol. xxi. p. 157. [Some account of an epidemic prevailing in the Richmond Hospital.]

,, Barrier. *Maladies de l'enfance*, t. ii. p. 62.

,, Berton. *Maladies des Enfants*, edit. ii. chap. 3.

,, Boudet. *Hist. de l'épidémie de Croup qui a régné à l'Hôpital des Enfants de Paris*, Arch. Gén. 3. ser. t. xiii. p. 133. [The author denies the correctness of Bretonneau's statement that croup is always an extension of diphtheritic inflammation of the pharynx, and that gangrenous angina is in fact only diphtheritis.]

,, Evanson and Maunsell. *Treatise on Diseases of Children*, 4th ed. [A brief account founded on no personal experience.]

,, Gueretin. *Mém. sur une épidémie d'Angine Scarlatineuse. Rapport par* M. Desportes. Bulletin de l'Acad. de Méd. t. vii. p. 567. [The Reporter expresses his conviction that this epidemic was an example of the caseiform variety of pseudo-membranous angina complicated with scarlatina, and in some cases with typhus.]

1843. Arnal. *Diphthérite Vaginale.* Gaz. des Hôp. p. 307. [A case related.]

,, Becquerel. *Relation d'une épidémie d'Affections Pseudo-membraneuses et Gangréneuses qui à régné a l'Hôpital des Enfants*, Gaz. Méd. Nos. 43, 44, 45. and 46. [An elaborate history of the epidemic of 1841, comprising cases of gangrenous angina, of croup following angina, and gangrene of blistered surfaces. In the diphtheritis, local cauterization and tonics were employed.]

1843. Durand. *Quelques réflexions sur les Angines*, Thèse de Paris, No. 3. [Disputes Bretonneau's views as to the identity of diphtheritis and gangrene, as also his statement that the sole danger consists in its involving the air-passages, while the general condition of the patient really constitutes the true peril. Relates some fatal cases observed at the Hôpital des Enfants.]

„ Guepratte. *De la Diphthérite Buccale.* Clinique de Montpellier. December.

„ Medical Times, vol. vii. p. 165. [Anonymous article "Cynanche Maligna," containing some interesting observations.]

„ Rilliet and Barthez. *Maladies des Enfants*, 1er edit. t. i. pp. 285, 316, Article Pharyngite Pseudo-membraneuse, or 2de édit. (1853) t. i. p. 242, Article Angine Pseudo-membraneuse. [They treat ordinary croup and the form which follows pseudo-membranous angina as identical; but dispute Bretonneau's accuracy in confounding diphthérite with gangrenous affections. There is scarcely any additional matter upon the subject in the second edition.]

„ Simon (Max). *Considérations sur l'Angine Gangréneuse et de son traitement*, Bull. dé Thérap. t. xxiv. p. 401. [The author agrees with Bretonneau, that diphtheritis has often presented a false appearance of gangrene, and that several epidemics of angina maligna have been really examples of diphtheritis. But he is certain that all authors have not fallen into this error; and that angina maligna, Fothergill's angina, and angina gangrenosa, are different affections from diphtheritis. Cases are related in proof of the reality of the gangrenous affection.]

„ Trousseau. *De la Diphthérite Gingivale et de ses rapports avec le Croup*, Gaz. des Hôp. p. 109. [Clinical lecture on the relations of this to other forms of diphtheritis, and on its transmission.]

1844. Guersant and Blache. Dictionnaire de Méd. 2de édit. t. xxviii. Article Stomatite Couenneuse ou Pseudo-membraneuse. [Under this title the authors comprehend, canker of the mouth, noma, stomacace, the terminations in ulceration or gangrene being regarded as quite exceptional, and the affection, in fact, being one of the forms of Bretonneau's diphthérite.]

„ Haller. *Arztlicher Bericht über das Strafhaus in Wien*, Med. Jahrb. des Oesterr Staates, b. 50, p. 311. [A remarkable case occurring in an adult.]

„ Hanmann. *Uber Rachencroup*, Walther und Ammon's Journal N. F. band 3, s. 429. [On the occasion of relating a case that occurred in his own practice, the author presents a very able critical account of what has appeared in France and Germany upon the subject.]

„ Hauck. *Fall von tödtlichem Rachencroup. Casper's Wochensch.* p. 817. [Fatal case in a boy aged thirteen—autopsy.]

„ Jadelot. *Angine Psuedo-membraneuse ou Diphthérite.* (*Leçon Clinique*) Gaz. des Hôp. p. 5.

„ Jousset. *De la Trachéotomie dans le traitement du Croup*, Arch. Gén. s. iv. t. 5, p. 401. [Advocates the operation in extreme cases after trying in vain to overcome the diphtheritis, which he regards as always preceding croup. Comments on Bretonneau having neglected to notice Bard's recognition of the identity of the two affections.]

„ Landsberg. *Rachencroup oder nicht?* Hufeland's Journ. b. xcvii. s. 3. [Remarks upon the diagnosis. Question asked, whether the inflamed condition of the nerves found in a case was an accidental or essential feature—the diphtheritis being in the latter case a neurophlogosis, as it is considered to be by Schönlein.]

1845. Duncan. *Ulceration of the Gums occurring in an epidemic form*, Dublin Journ. of Med. Science, vol. xxviii. p. 3. [This epidemic was observed at the Dublin Union Workhouse; and one of the cases related is an example of diphtheritis.]

„ Morand. Mém. et Obs. Cliniques, 8vo. Tours, 1845, and Brit. and For. Med. Chir. Rev. vol. xxiii. (1847) p. 376. [Eleven cases related. The author speaks highly of nitrate of silver, and recommends tracheotomy when other means fail.]

1845. Trousseau. *Diphthérite Gangréneuse Vulvaire*, Gaz. des Hôp. p. 406. [Clinical lecture on a case occurring in a child three months old.]

1846. Coley; *Treatise on Diseases of Children*, p. 153. [No personal experience stated.]

„ Daviot. *Relation d'une épidémie de Diphthéropathie*, Gaz. Méd. p. 178. [Describes an epidemic at Autun, being the fifth since 1782, occurring without any local assignable causes. He found bleeding useful in patients older than ten, and prefers the nitrate of silver as a local application.]

1847. Bouisson. *Ophthalmie suraigue avec formation de Pseudo-membranes à la surface de la Conjonctive*, Annales d'oculistique, t. xvii. p. 100. [The author relates an interesting case of diphtheritis attacking the conjunctiva, which he believes to be analogous to diphtheritis affecting other parts. The eye was lost.]

„ Coley. Lancet, November, 1847, p. 576. [Fatal case related at the Westminster Society, with discussion upon the administration of large doses of calomel.]

„ Melion. *Ein binnen 30 Stunde tödtlich verlaufener Rachencroup.* Oesterr. Méd. Wochens, p. 259. [This rapidly terminating sporadic case, occurred in a girl eleven years of age.]

„ Memoires de l'Academie de Medecine, t. xiv. p. 167 (1847); t. xviii. p. 168 (1854); t. xix. p. 184 (1855); t. xx. p. 154 (1856); t. xxi. p. 103 (1857); t. xxii. p. 90 (1858). [References to the epidemics of diphtheritis contained in the Academical Reports on Epidemics; but these are meagre in the extreme, considering the reputed prevalence of the disease, and the organization existing in France for furnishing accounts of epidemics. The last referred to is by M. Trousseau, and contains some account of the Boulogne epidemic.]

„ Munike. Casper's Wochenschrift, s. 143. [Fatal case, with autopsy.]

„ Robert. *Considérations nouvelles sur l'étiologie et le traitement de la Diphthérite des Plaies*, Bul. de Thérap. t. xxxiii. p. 26. [Here M. Robert describes a diphtheritic condition of ulcerated surfaces, met with sometimes during epidemics of diphtheritis, but oftener independently of these, and chiefly due to vitiation of the air from overcrowding. In fact, it is identical in its origin, its characteristics, and the treatment it requires, with Delpech's pulpous form of *hospital gangrene*. Eisenmann, and other of the German writers, also describe this form of hospital gangrene as diphtheritis.]

„ Virchow. *Ueber die Reform der pathologischen und therapeutischen Anschauungen durch die mikroskopischen Untersuchungen*, Arch. für pathol. Anat. b. i. s. 253. [The microscopical distinctions laid down of the three varieties of inflammation of the mucous membranes, the catarrhal, the croupal, and the diphtheritic.]

1848. Barot and Montalier. *De l'Angine Couenneuse*, Thèses de Paris, Nos. 34 and 205. [No original observations.]

„ Dunglison. *Practice of Medicine*, 3rd Edit. vol. i. Article Diphtheritic Inflammation of the Pharynx. [A short description of the disease, but the author does not speak of it as if seen in America.]

1849. Hein. *Luftröhrenschnitt bei Typhus*, Henle und Pfeüfer Zeits. b. 7, s. 332. [Two fatal cases of diphtheritis, in one of which tracheotomy was performed.]

„ Miquel. *De la Diphthérite*, 8vo. Paris, 1849, and Arch. Gén. s. iv. t. xxi. p. 502. [Especially recommends calomel and alum in the croupal variety. Favourable report on this treatment by Guersant, *Gaz. des Hôp.* 1849, p. 533.]

„ Walshe. *Diphtheritic Deposit*, Cyclop. of Anat. and Phys., vol. iv., p. 118.

1850. Beck. *Epidemie von Croup und Angina Faucium Exsuditiva*, Oppenheim's Zeitschrift, b. xliv. s. 200. [It occurred at Lagstor in Denmark. Emetics found of use, but cauterization in several cases did more harm than good.]

„ Bennett (J. R.). Med. Times and Gaz. vol. xxii. p. 418. [A good paper on the pathology and treatment of the disease, read at the London Med. Soc., and followed by a short discussion.]

1850. Bourgeois. Gazette Méd. p. 243. [Report on an account of an epidemic in the department of the Cher, in which calomel and nitrate of silver were the means employed.]

„ Brown (J. D.) on *Diphthéritis*, Med. Times and Gaz. vol. xxii. p. 670. [The first notice of this disease as an epidemic in England. Mercurial treatment and the application of nitrate of silver recommended.]

„ Empis. *Etude de la Diphthérite d'après une épidémie de cette maladie observée a l'hôpital Necker*, Arch. Gén. s. iv. t. xxii. pp. 129 et 281.

„ Flour. *De la Diphthérite*, Thèse de Paris. [A good description of the disease, illustrated by several cases observed in M. Trousseau's wards.]

„ Ramsay. *Diphtheritic Inflammation of the Pharynx and Tonsils*, Dub. Med. Press, Aug. 1850, p. 137 (from Phil. Med. Exam.). [General observations; but source of experience not stated.]

„ Roll. *Ueber eine Epidemie der Angina Diphtherea in Drontheim*, Oppenheim Zeitsch. b. xlv. s. 33. [Between 700 and 800 cases occurred, with about fifty deaths. At pp. 41 and 309 of the same vol. short accounts are given of epidemics in other parts of Norway.]

„ Welsh. *Diphtheritic Inflammation as it prevailed epidemically in Ohio, in the years* 1847-9, Amer. Jour. of Med. Sci. N.S. vol. xx. p. 276. [A strong solution of nitrate of silver was found preferable to alum, sulphate of copper, or diluted muriatic acid.]

„ Wistrand. *Diphtheritis Cutanea*, Hygiea, vol. xi. No. 5; and Schmidt's Jahrb. lxx. s. 309. [Cutaneous diphtheritis appearing during the progress of a case of diphtheritis in an adult.]

1851. Baron. *De l'emploi de l'eau de Vichy dans le traitement des Affections Diphtheritiques*, Gaz. Méd. p. 524. [The first recommendation of alkaline treatment, since much resorted to in France.]

„ Chavanne. *Epidémie de Diphthérite Gangréneuse des parties genitales observées chez les nouvelles accouchées*, Thèse de Paris, No. 130. [Twenty-six women were attacked at the Lyons Hospital (where a similar epidemic prevailed in 1815, nineteen of the number recovering by the aid of tonic treatment and cauterization.]

„ Lindeboon. *Dissert. de Diphtheritide.* Groningen.

„ Morisseau. *Paralysie du voile du palais comme cause de nasonnement*, L'Union. Méd. No. 126. [Of five cases of paralysis of the velum, following diphtheritis, four occurred in adults and yielded to galvanism. The other case lasted many years.]

„ Trousseau and Lasegue. *De la nasonnement et de la paralysie du voile du palais*, L'Union Méd. No. 119. [Paralysis of the soft palate as it occurs in children, as a sequence of diphthérite.]

1852. Bonnet. *Etudes cliniques sur la Diphthérite Laryngo-bronchique chez l'Adulte.* L'Union Méd. No. 51. [Two cases of croup in the adult, one being preceded by false membranes in the fauces.]

1853. Behrend. *Einige Beobachtungen über die entzundlichen, geschwürzen und brandigen Affectionen des Mundes bei Kindern*, Jour. für Kinder. b. xx. s. 344. [A review of the distinctive signs of the various affections of the fauces.]

„ Copland. *Dictionary of Practical Medicine*, Article, Inflammation of the Throat, with plastic exudation, vol. iii. p. 1059. [A critical epitome of the views of the French writers.]

„ Guillot. *Considérations générales sur l'Affection Diphthéritique*, L'Union Méd. No. 45. [Clinical lecture. M. G. regards the disease as a general one, analogous in its operation to morbid poisons; and distinct in its nature from ordinary croup.]

„ Lemaire. *De l'emploi du Bicarb. de Soude comme antiphlogistique.* Monit. des Hôp. Nos. 83, 84, 85. [Some cases are given, showing the advantages of this agent in diphtheritis.]

1853. MARCHANT. *Du Croup, nature et diagnostic*, L'Union Méd. Nos. 114, 115, 116, 117. [The author seeks to show that Bretonneau has done much harm by confounding croup with diphtheritic angina, and that the latter affection is really a gangrene.]

„ MAZIER. *Epidémie d'Angine Membraneuse et Gangréneuse*, Gaz. Méd. p. 535. [Giving an account of a severe epidemic at l'Aigle in the Dept. of the Orme.]

„ THOMAS. *Diphthérite chez une enfant de 11 ans*, Gaz. des. Hôp. p. 191. [Death suddenly took place from the false membranes, becoming detached from the velum, obstructing the isthmus faucium.]

„ VALLEIX. *Guide du Médécin Pratique*, 3e edition, t. ii. Article, Pharyngite couenneuse pultacée et gangréneuse. [The subject is here very ably treated. He believes that Bretonneau, though right in denying the supposed frequency of gangrene, went into the other extreme.]

1854. DAGA. *De l'Angine Pseudo-membraneuse et de l'Angine Gangréneuse*, Récueil de Mémoires de Méd., &c., Militaires, s. 2, t. xiv., p. 141. [An account of the two varieties of the disease as observed in the military hospitals, and regarded as blood-diseases. Strong muriatic acid much preferred to nitrate of silver as a local application.]

„ DUCLOS. *Réflexions pratiques sur l'Angine Couenneuse*, Bulletin de Thérap. t. xlvii. p. 39. [Two cases related which were solely treated by application of solid nitrate of silver.]

„ GRAEFE (A. VON.) *Uber die Diphtheritische Conjunctivitis*, Archiv, für Ophthal. band. i. s. 168. [This affection has been observed to occur epidemically at Berlin. The author regards it as a general, rather than as a local disease; and it is frequently accompanied by diphtheritic inflammation of the skin, nares, angles of the mouth and blistered surfaces.]

„ LESPIAU. *Relation d'une Epidémie Diphthéritique, qui a sevi sur le 75e regiment d'infanterie à Avignon*, Récueil de Mémoires Méd. &c., Militaires, s. 2, t. xiii. p. 169 [The attack was confined to one regiment of the garrison, consisting of 1686 persons. These furnishes 200 cases, with twelve deaths. The author attributes it in some measure to the bad condition of the barracks, but believes the disease was spread by infection. The prompt use of nitrate of silver formed the best means of treatment.]

„ MAINGAULT. *De la Paralysie du voile du Palais à la suite d'Angine*, Thèse de Paris, No. 194. [A general account of paralysis of the velum after throat affections, adducing two instances of its following diphtheritis.]

„ MARCHANT. *Diagnostic du Croup et d'Angine Gangréneuse*, Gaz. de Hôp. p. 331. [Indicates the points of difference between diphtheritis and croup. A report on the paper by M. Guersant, Gaz. des Hôp. 1855, p. 144.]

„ PROSCH UND PLOSS. *Medicinische-Chir. Encylop.* Articles Die Diphtherische und Croupose Angina, Stomatitis and Pharyngitis Diphtheritica. [They admit two varieties of the ordinary angina, the *croupal*, in which false membranes are formed, the subjacent surface not being ulcerated, and the *diphtheritic*, chiefly distinguished from the croupal by the tendency to ulceration or gangrene. They do not confound either with ordinary croup.]

„ RENOUARD. *De l'Angine Maligne*, Revue Méd. t. ii. 1854, p. 592. [In this case the pharynx, but not the tonsil or velum, was the seat of the false membranes.]

„ SANTLUS. *Zur Lehre von den Krup*, Journal für Kinderk, b. xxiii. s. 49. [Two epidemics of not a very fatal form of diphthérite, which prevailed in Nassau, one being accompanied by a military rash.]

„ TROUSSEAU. *De l'Angine Maligne, Lettre à Pierre Bretonneau*, L'Union Méd. No. 70. [Written on the occasion of the death of M. Blache's son from diphthérite. While still maintaining, that as a general rule, the danger of diphtheritis consists in its extension to the air-passages, and that the immense majority of cases of croup commence with it; he states, that he has of late years

met with instances of an ataxo-adynamic form of the disease, in which the patient is carried off independently of any such extension.]

1854. West. *On Diseases of Children*, 3rd edit. Lect. 23. [Has never met with the severe idiopathic affection as described by the French authors; but has generally observed it as a dangerous complication of measles.]

„ Wunderlich. *Handbuch der Pathologie und Therapie*, 3 Auflage, band 3a. s. 716, Article, Pseudo-membranöse Stomatopharyngiten. [An able article, but not derived from German sources. The author considers stomato-pharyngitis :—1, as simple primary; 2, common secondary, following affections of the mouth, jaw, &c.; 3. croupal; 4, accompanying scarlatina, variola, or mercurialism; 5, epidemic stomato-pharyngitis; 6, aphthous, or cachectic secondary aphtha.]

1855. Bamberger. *in Virchow's Handbuch der Pathologie*, band vi. abt. 1, s. 1-22. [Bamberger considers inflammation of the mouth and pharynx under the heads catarrhal and croupal, dividing the latter into croup of the mouth and pharynx, and diphtheritis—these being different degrees of the same disease. He gives a good account of the disease as described by the French, but does not refer to it as prevailing in Germany.]

„ Besnard. *Deux observations de trachéotmie pratiquées avec succès dans deux cas de Croup, ou plutôt d'Angine Couenneuse ayant gagné le laryné et le trachée* Gaz. des Hôp. p. 175.

„ Bretonneau. *Sur les moyens de prévenir le développement et le progrès de la Diphthérite*, Archives Gén. s. 5. t. v. p. 1. and t. vi. p. 257. [Details instances of the transmission of the disease by contact. Recommends nitrate of silver, not only as a means of treatment, but of prevention during the prevalence of epidemics.]

„ Bulletin de Therapeutique. t. 48, p. 273. *Un mot sur la constitution médicale, et en particulier sur une épidémie d'Angines Couenneuses et de Fièvres Typhoides actuellement regnante.*

„ Danvin. *Sur le traitement de la Diphthérite par le cautère-Mayor*, L'Union Méd. Nos. 135, 136, and 140. [Application of Mayor's hammer heated by boiling water with success in fourteen out of seventeen cases, and with less pain than is caused by Bretonneau's treatment.]

„ Fievèe. *Mémoire sur l'Angine Couenneuse*, 8vo. Paris, 1855. [This Memoir was produced on the occasion of the epidemic which commenced at Paris in 1855, and which was remarkable for the number of older persons it attacked. The Memoir is noticed by M. Bousquet, in *Gaz. de Hôp.* 1856, p. 29.]

„ Gazette des Hôpitaux, 1855, Nos. 44 and 64, and 1856, No. 47. [Observations on the epidemic of 1855.]

„ Grisolle. *Pathologie Interne*, 6e edit. t. i. Article, Angine Pseudo-membraneuse. [A short summary only given, the author maintaining the distinction between diphtheritis and gangrene of the same parts.]

„ Haspel. *Observations sur les Maladies qui ont sevi sur l'Armée d'Orient pendant* 1855, Gaz. Med. p. 829. [Many cases occurred during the Crimean campaign, but without assuming an epidemic or devastating form.]

„ Homolle. *De l'emploi du Bicarb. de Soude à haute dose dans la Laryngite Pseudo-membraneuse*, L'Union Med. 1855, pp. 346 & 350; 1856, p. 281. [Some observations upon the distinction between croup and diphtheritis; and on the general principles which should guide treatment.]

„ Latour. *Note sur le traitement de l'Angine Diphthéritique.* L'Union Méd. No. 74. [Tried alkalies in a case without effect, and strongly advocates free cauterization with nitrate of silver. In the same No., M. Ferrand relates some cases in proof of the utility of the caustic.]

„ Marchal de Calvi. *Mémoire sur la nature et le traitement de l'Angine Couenneuse*, L'Union Méd. Nos. 56, 57, 58, 62, & 65. [The author objects to cauterization as tending rather to prolong the disease, and maintains the importance of the general treatment by alkalies, of what may be considered a general disease.]

1855. MARCUEL. *Observations des Angines Couenneuses traitées sans succès par le Bicarb. de Soude*, L'Union Méd. p. 433. [Relates some cases to show the inefficiency of soda. He directs attention to the great swelling of the submaxillary glands which often takes place.]

,, OULMONT. *De l'Angine Couenneuse considerée comme complication de la èvre typhoide*, Rev. Médico-Chir. de Paris, t. xviii. p. 5. [Of six patients who exhibited this complication, five died. Two of these cases are detailed. M. Trousseau has not met with this complication, which appears at the middle period or towards the decline of the disease. Report on the paper by M. ARAN, L'Union Méd. 1856, p. 100.]

,, RAMON. *Observation de Diphthérite, suivie de considerations pratiques*, Gaz. des Hôp. p. 445. [Fatal case in a child at 10. The author agrees with Bretonneau as to the identity of croup, and the nonexistence of gangrenous angina.]

,, SMITH. (A.) *Case of Diphtheritis successfully treated by chlorate of Potash*, Dub. Hosp. Gaz. vol ii. p. 149.

,, TROUSSEAU. *Leçons Cliniques sur les Angines*, Gaz. des Hôp. Nos. 86, 89, 100, 104, 109, 115, 119. [A series of Lectures commenced on the occasion of M. Valleix' death by diphtheritis, in which the whole subject is reviewed in a masterly manner.]

,, VALENTIN. *De l'Angine épidémique et de son traitement par le Fer Rouge*, L'Union Méd. 1855, p. 419, 1857, p. 606, and 1858, p. 258. [Many cases treated during epidemics with the best effect by the actual cautery.]

,, WOOD. *Practice of Medicine*, 4th edit. vol. 1, Article Pseudo-membranous inflammation of the fauces. [A short article with no statement as to the prevalence of the disease in America.]

1856. BARON. *Note sur le traitement de la Diphthérite par l'Eau de Vichy et par le Bicarb. de Soude*, Gaz. Méd. Feb. p. 63. [Observations confirmatory of the advantages he had in 1841, anticipated would be derived from the employment of alkalies.]

,, CHASSAIGNAC. *Sur l'Ophthalmie Pseudo-membraneuse des nouveau-nés Annales d'Oculistique*, t. xxxv. p. 34. [A general account is here given of M. Chassaignac's views on the purulent ophthalmia of infants, which he regards as a pseudo-membranous affection, but which, in fact, is an entirely different disease to the diphtheritic conjunctivitis of Graefe.]

,, EBERT. *Zwei Falle Von Diphtheritis Vulvæ*, Deutsche Klinik, p. 220. [Two cases observed at the Children's Clinic, at the Berlin Charité, one proving fatal.]

,, GUBLER. *Angine Gangréneuse observée chez une femme*, Comptes Rendus de la Soc. de Biologie, s. ii. t. ii. p. 60. [A specimen exhibited in proof that primary gangrenous angina may exist independently of diphtheritis or scarlatina, and unexplained by excess of inflammation.]

,, ISAMBERT. *Etudes sur l'emploi thérapeutique du Chlorate de Potasse, spécialment dans les Affections Diphthéritiques*, Bull. de Thérap. t. 1. p. 488. [The cases are few in number, and the chlorate was only useful in those of medium intensity.]

,, LAIGNIEZ. *Emploi du Bicarb. de Soude dans l'Angine Couenneuse*, Thèse de Paris, 1856. [The author, a pupil of M. Baron, recommends the alkaline treatment before the disease has extended to the larynx, when it is no longer of avail. The cases he relates are not very conclusive.]

,, LECOINTE. *De la teinture d'Iode dans l'Angine Couenneuse*, Bullet. de Thérap. t. 1. p. 70. [Three cases are related which were successfully treated by application of iodine to the fauces, and of iodized ointment externally.]

,, OULMONT. *Relation d'une épidémie d'Angine Couenneuse qui a régné à l'hôpital St. Antoine, en* 1855, Arch. Gén. s. 5. t. vii. p. 385. [This epidemic was especially remarkable by being confined to one ward of the hospital, and by its complicating some other grave affections, especially typhoid fever, a conjunction scarcely hitherto noticed.]

1856. Ozanam. *De l'efficacité de Brome dans le traitement des Affections Pseudo-membraneuses*, Comptes Rendus de l'Acad. des Sci. t. xlii. p. 102, and Mon. des Hôp. p. 551. [Based on its successful administration in fourteen cases. The author recommends bromine or bromide of potassium as almost a specific in pseudo-membranous affections.]

„ Perron, Zuskouszki and Boinet. *Sur le traitement de Diphthérite par les applications de teinture d'Iode*, L'Union Méd. Nos. 53, 70, and 72.

„ Propo. *Notes sur la Diphthérite*, Récueil de Mém. de Méd. &c., Militaires, s. 2, t. xvii. p. 392. [Describes the disease as observed among the troops at Bona, in Algeria, and relates eight cases. He found the bicarb. of soda to possess little of its reputed antiplastic power, and prefers the free use of muriatic acid as the best local application. Bleeding was found admissable only in intercurrent inflammatory affections.]

„ Roux. *Angine Couenneuse guerie par le Chlorate de Potass*, Gaz. des Hôp. p. 586. [The nitrate of silver was also used.]

„ Tarassenkoff. *Diphtheritis Epidemica*, Med. Zeit. Russlands, p. 92. [An account of an epidemic observed at Moscow, in 1855.]

1857. Adkins. *On Diphtheritis*, Lancet, Dec. p. 653. [As observed in Devon.]

„ Bierbaum. *Erlebnisse aus der Kinderpraxis*, Journal für Kinderkrank, b. xxix. s. 52. [Describes diphtheritis as a primary and as a secondary affection, the former very seldom extending, in Westphalia, to the respiratory passages or nares. He places most dependence in cauterization, emetics, and mustard cataplasms.]

„ Blaschko. *Mittheilung über eine am hiesige Orte im Jabre*, 1854, *stattgehabte Scarlachepidemie mit Diphtheritische Braune*, Journal für Kinderk. b. xxviii. p. 155. [Account of a fatal epidemic of diphtheritic gangrenous scarlatina at Freywalden.]

„ Blomfield. *On the Diphthéritic epidemic*, Lancet, Nov. p. 562. [As observed in Suffolk.]

„ Bonnet. *Sur une épidémie d'Angine Diphthéritique, Cas curieux de transmission et d'importation de la maladie*, L'Union Méd. p. 624. [In evidence of contagion. Some of the statements controverted by Dupuis, L'Union, 1858, p. 36.]

„ Dehaenne. *Nouvelle observation pour servir à l'histoire des accidents consecutifs de l'Angine Couenneuse*, L'Union Méd. No. 41. [Relates his own case, in which the diphtheritis was followed by partial paralysis of the muscles of deglutition.]

„ Faure. *Des accidents consecutifs de la Diphthérie*, L'Union Méd. Nos. 15 and 16. [Treats especially of the paralytic symptoms remaining after the diphtheritis is cured.]

„ Gazette des Hopitaux. *Du Chlorate de Potasse dans l'Angine Pseudo-membraneuse*, pp. 21, 50, 98, 170, 198, 334, 411, 456. [The somewhat conflicting experience of various practitioners stated.]

„ Gigot. *Etudes cliniques sur le traitement de l'Angine Couenneuse et du Croup*, 8vo. Paris, 1857, reviewed in L'Union Méd. 1859, No. 22. [These observations are founded upon one hundred and thirty cases, thirty-three of which were cases of croup, a disease the author has never seen unpreceded by angina. He speaks highly of alkaline treatment, and believes that more harm than good is done by caustics.]

„ Godfrey. *Report on cases of Diphtheria or Malignant Sore-throat*, Lancet, Nov. p. 542. [Four cases, occurring in the same house, three proving fatal. The author recommends iron in the treatment of the disease.]

„ Gubler. *Mémoire sur l'Angine Maligne Gangréneuse*, Arch. Gén. s. 5, t. ix. p. 513. [Although Bretonneau has shown that former writers had comprised under the term gangrenous, affections really diphtheritic, yet the conclusion which he and his followers have come to, that primary gangrenous affections do not occur, is quite unjustifiable. Three cases are related in proof.]

1857. Isambert. *Des Affections Diphthéritiques, et spécialment de l'Angine Maligne observées à Paris en* 1855; Archives Gén. t. ix. pp. 325, 432. [In this epidemic, breach of the mucous surface was often observed. The author divides the cases that occurred into common *angine couenneuse*, scarlatinal *angine couenneuse*, and diphtheritic *angine couenneuse*. This last exhibited two very different types, viz., the *croupal diphtheritic angina*, in which croup was present and *malignant angina*, properly so called, in which death took place from adynamia, or a peculiar intoxication, without laryngeal affection. This last type has been observed of late years more frequently in Paris, and especially in 1855, one of its pathognomic signs being enormous tumefaction of the glands. The croupal variety has not been seen so often as stated by Bretonneau and his followers; and croup occurs more frequently unpreceded by angina than they allow.]

„ James. *On Epidemic Diphthéritis*, Med. Times and Gaz. vol. xxxvi. p. 587. [As occurring in Suffolk.]

„ Mahieux. *Diphthérite Gangréneuse chez une nouvelle accouchée, transmission de la mère à l'enfant*, Mon. des Hôp. p. 1031. [Slight diphtheritis of tonsil, diphtheritic ulceration of the nipple, and gangrenous vulvar ulceration. Gangrenous ulceration of the infant's mouth. Both died.]

„ Mestivier, Aran, and Charrier. Bullet. de Thérap. t. lii. pp. 12,105, and 503. [Articles on opening the ranine veins, a practice found useful in ordinary angina, but spoken of as of doubtful advantage in the diphtheritic and malignant form.]

„ Millart. *Coryza Couenneux et Angine Couenneuse avec Gangrene des Amygdales &c.*, L'Union Méd. p. 464. [An interesting case, with the autopsy.]

„ Moore. *Scarlatina Faucium and Pseudo-membranous Pharyngitis*, Med. Times and Gaz. vol. xxxvi. p. 546. [Draws attention to a diphtheritic condition of the throat, met with during epidemics of scarlatina unaccompanied by rash; and suggests that this may prove prophylactic of future attacks of scarlatina.]

„ Prichard. *Diphtheritic Conjunctivitis*, British Medical Journal, p. 981. [Mr. Prichard has met with nine or ten examples of this affection, occurring about the period of the first dentition. Only of late years has he seen the disease in connexion with scarlatinal diphtheritis. He seems unaware of Graefe's observations.]

„ Rigby. Med. Times and Gaz. vol. xxxvi. p. 582. [Case of diphtheritis.]

„ Warlomont and Testelin. *Ophthalmie Diphthéritique*, Traduction du Traité des Maladies de l'Oeil par Mackenzie, t. i. p. 778, and Annales d'Oculistique, t. xxxvi. p. 218. [An account of the disease as described by Graefe, of Berlin.]

„ Watson. *Lectures on the Principles and Practice of Medicine*, 4th edit. vol. i. p. 864. [Has only met with two or three cases, and refers to a fatal one in which tracheotomy was performed.]

Woodward. *On Diphtheritis*, Lancet, December, p. 654. [Utility of chlorate of potash in.]

1858. Barry. *Diphtheria or Diphtheritis*, Brit. Med. Journ. pp. 599 and 623. [Question of nomenclature considered. Some cases detailed. For treatment, iron and chlorate of potass, counter-irritation, and application of nitrate of silver recommended.]

„ Beale. *On the Structure of the False Membrane in some cases of Diphtheria*, Archives of Méd. No. 3, p. 242. [The microscopical structure detailed. The author has not met with vegetable parasites.]

„ Bellysen. Lancet, November, p. 513. [A case or two, with some general remarks.]

„ Blount. Lancet, November, p. 486. [Some account of the disease as observed at Bagshot.]

1858. Boston Medical Journal, vol. lix. p. 252. *Diphtheria in Providence.* [It is stated that diphtheritis has manifested itself at Providence, U.S., with the same symptoms as in England, the patients dying from exhaustion and fever, rather than asphyxia.]

„ Bouchut. *D'une Nouvelle Méthode de Traitement de l'Angine Couenneuse.* Comptes Rendus de l'Acad. des Scien. t. xlvii. p. 610, Gaz. des Hôp. p. 506, and L'Union Méd. p. 507. [This consists in amputation of the tonsils, which the author has performed four times with success. The operation is especially indicated when the tonsils are enlarged, and will often prevent the extension of the diphtheritis to the air-passages. False membranes do not form on the wounded surfaces.]

„ Bouchut. *De l'Angine Couenneuse et de l'Angine Gangréneuse*, Gaz. des Hôp. pp. 170 and 186. [A clinical lecture, in which the confounding together diphtheritis, croup, and gangrenous angina, is protested against. General rules for treatment are laid down, and glycerine recommended as a local application in diphtheritis.]

„ Bouchut and Empis. *Resumé d'un Mémoire sur l'Albuminarie dans le Croup et dans les Maladies Couenneuses*, L'Union Méd. No. 132. [Attention is here called to the frequency with which albuminaria occurs in diphtheritic diseases, it being a symptom of great danger.]

„ Braund. Lancet, November, p. 566. [Observations on treatment.]

„ Browne (B.). *Report on two cases of Diphthérite*, Lancet, February, p. 188 [Observed at Kew, but very superficially detailed.]

„ Bryden. *Treatment of Diphthéria*, British Med. Journal, p. 927. [Great success is said to have attended the administration of guaiacum and the local application of the chloride of sodium.]

„ Cammack. Lancet, October, p. 461. [The author has witnessed an epidemic, and believes the disease to be herpetic.]

„ Camps. *Pathology and Treatment of Diphthéritis*, Lancet, March, p. 250, and Med. Times and Gaz. vol. xxxvii. p. 565. [Papers read at the London Medical and the Epidemeiological Societies. The author believes that three varieties of sore-throat have prevailed, Bretonneau's disease, Fothergill's sore-throat, and scarlatinal angina.]

„ Cazin. *Bons effets du Suc de Citron et du Suc d'Ail dans l'Angine Couenneuse*, Bull. de Therap. t. lv. pp. 327 and 368. [The author states that he has used a mixture of these substances, both locally and inwardly, during the Boulogne epidemic, with great advantage.]

„ Churchill. *Diseases of Children*, 2nd edit. p. 498. [A good *résumé* of the opinions of the French writers on the disease, as observed in its primary and secondary forms; but no original observations on the affection.]

„ Condie. *Diseases of Children*, 5th edit. p. 172. Article Pseudo-membranous, or Diphtheritic inflammation of the throat. [Refers to the disease chiefly as it is met with in the sore-throat of scarlatina; and does not seem to have had any personal experience of it as an independent affection. He regards putrid malignant gangrenous sore-throat only as the aggravated form of pseudo-membranous inflammation, unattended, for the most part, with sloughing or ulceration.]

„ Cowdell. *On the epidemic Sore-throat*, British Med. Journal, pp. 967 and 983. [A classified description of the various forms of this affection met with of late.]

„ Domerc. *Note sur le Traitement préventif de l'Angine Couenneuse*, Moniteur des Hôp. No. 138. [A case of amputation of the tonsil.]

„ Duché. *Traitement préventif de l'Angine Couenneuse*, Gaz. des Hôp. Nos. 125 and 133. [This consists in the administration of sulphur, in the belief that the disease is caused by the oidium.]

1858. Farr. Quarterly Report of Registrar General, No. 37. [Observations on the name Diphtheria, and on the relations of the disease to bad drainage.]

„ Féron. *De l'Angine Herpetique et de son Traitement*, Bull. de Thérap. t. lv. p. 481. [M. Féron describes a form of herpetic angina attended with the formation of false membranes, and which corresponds to Bretonneau's *angine couenneuse commune*. It is sometimes mistaken for severe diphtheritis, while it is usually amenable to very mild means.]

„ Fourgeaud. *Diphtheria, a concise Historical and Critical Essay on the late Pseudo-membranous Sore-throat of California*, 1856-7, 8vo. Sacramento, 1858. [Describes a malignant epidemic which prevailed around the Bay of St. Francisco, and speaks highly of muriatic acid as an application.]

„ Fuller. Trans. of Pathol. Soc. vol. ix. p. 206. [Fibrinous cast of pharynx ejected.]

„ Gay. *Membranous Croup*, Boston Medical Journal, vol. lix. p. 413. [Two cases of successful tracheotomy, one of these being an example of well-marked diphtheritis.]

„ Gazette des Hôpitaux, Nos. 36, 39, 42, and 48. [Observations on the malignant epidemic prevailing in the departments of the Yonne and Côte d'Or, &c., in 1858.]

„ George. Lancet, November, p. 619. [Some general observations.]

„ Gigot and Jodin. Gazette des Hôp. pp. 359 and 486. [Observations on the prochloride of iron given under the idea of the fungous origin of the disease.]

„ Godfray on *Diphthérite*. Med. Circular, vol. xii. p. 8. [General description of the disease, as observed in Jersey, where it is rare.]

„ Greenhow. *Case of Diphtheria*. Lancet, March, p. 324. [The post-mortem appearances given.]

„ Gubler. *Mémoire sur l'Herpes Guttural (Angine Couenneuse commune)*. L'Union Méd. Nos. 2, 3, 5, 6, and 7. [The distinction laid down strongly between malignant angina of septic origin, and common *angine couenneuse*, which admits of more active treatment. This last the author believes to be really herpes of the mucous membrane; its frequent coincidence with *herpes labialis* having already been noticed by others. This herpes may be either primary or may succeed tonsillitis.]

„ Guillon. *De la guérison de l'Angine Couenneuse et du Croup par l'insufflation du Nitrate d'Argent pulverisé*, Moniteur des Hôp. No. 138. [Two cases briefly related.]

„ Gull. *Lesion of the nerves of the Neck, and of the cervical segments of the Cord after Faucial Diphthérite*, Lancet, July, p. 4. [In this form of the disease, Dr. Gull believes that death may be produced by asthenia, induced by the injury done to the nerves through inflammation of the areolar tissue of the neck.]

„ Harley. Med. Times and Gaz. vol. xxxviii. p. 641. [Details to the Pathological Society—some ineffectual attempts to inoculate animals with diphtheritic exudation.]

„ Heslop on *Diphtheria, and its Treatment*, Med. Times and Gaz. vol. xxxvii. p. 552. [The author believes it to be the same disease as that described by Fothergill and others, and points out its differences from croup. He has derived great benefit from the application of muriatic acid, and the internal use of muriated tincture of iron.]

„ Hildige on *Diphtheritic Conjunctivitis*. Dublin Hosp. Gazette, vol. v. p. 278. [Description of the disease as observed by the author at Graefe's Clinic, Berlin. He regards it as contagious.]

„ Kingsford. Lancet, Nov. p. 484. [An excellent paper. The author refers to the local paralysis which sometimes follows the disease. He recommends highly supporting and tonic treatment, together with iron and chlorate of potass, enemata being resorted to as soon as insufficient food is taken.]

1858. Lambden. Lancet, Nov. p. 539. [Recommends the use of chlorate of potash with hydrochloric acid, and nitrate of silver as a local application.]

,, Laycock. Med. Times and Gaz. vol. xxxvii. p. 548, and Lancet, January, 1851, p. 120. [A clinical lecture on diphtheria, with observations on its supposed origin in *oidium albicans*.]

,, Litchfield. *An epidemic of Diphtheritis, sixteen years ago.* Lancet, December, p. 595. [Believes diphtheritis to be a "masked" scarlet fever, similar to one before observed at Twickenham.]

,, McDonald. *On Diphtheria and Scarlatina.* Lancet, Nov. p. 538. [Observations on the relationships of the two diseases. Recommends Bass' ale and quinine, with muriatic acid as a local application.]

,, Mackenzie. *On Diphtheritic Ophthalmia.* Annales d'Oculistique, t. xl. p. 30. [While he has observed as one of the consequences of ophthalmitis (Med. Gaz. vol. xxxv., p. 594) the production of false membranes on the conjunctiva the author denies that there is any special form of ophthalmia which can with propriety be termed diphtheritic. In the cases related by Mr. Prichard he believes the ophthalmia was the result of scarlatina poisoning. Mr. Wharton Jones also refers to the occasional production of pseudo-membranous inflammation of the conjunctiva. Brit. and For. Med. Rev. vol. xx. p. 276.]

,, Magne. *Mémoire sur le Croup des Paupières ou Diphthérite Conjonctivale.* Moniteur des Hôp. No. 74. [M. Magne states, that in the large practice of himself and M. Sichel, this affection has only been met with in seven instances during thirty years. He regards it as a general affection, which is not contagious; and he believes, the cases said to be of frequent occurrence by Chassaignac and Graefe, are not examples of pseudo-membrane at all, but consist in mere muco-purulent concretions. However this may be, with regard to M. Chassaignac's pseudo-membranous ophthalmia of new-born infants, it certainly does not apply to Graefe's cases.]

,, Maugin. *Des Eruptions qui compliquent la Diphthérie et de l'Albuminarie considerée comme symptome de cette Maladie.* Moniteur des Hôp. Nos. 130, 131, 132. [The author does not agree with those who believe that there are eruptions peculiar to this affection. One remarkable contrast between it and scarlatina, is that while in the former, albuminaria may be observed from the commencement, in scarlatina it is found usually only at the period of desquamation, and to a much less extent. He relates fourteen cases of diphtheritis, and believes that the disease may show itself in two forms, one wherein true poisoning of the economy takes place, and the other, in which it either remains localized in the pharynx, or spreads to the respiratory organs, and kills by asphyxia.]

,, Millard. *Note sur l'Angine Gangréneuse,* Bulletins de la Soc. Anatomique, s. 2, t. iii. pp. 138 and 165. [A fatal case is related, in which faucial diphtheritis was complicated with well-marked gangrene—a circumstance already noted by various authors: and also another fatal case of much rarer occurrence, viz., of primary gangrenous angina. M. Millard, and M. Axenfeld, the reporter upon this paper, give an interesting critical account of the views entertained by those who have opposed Bretonneau's too exclusive conclusions upon this subject.]

,, Millard. *Sur la Diphthérite généraliseé,* Bull. de la Soc. Anatom. s. 2, t. iii. p. 216. [A case and autopsy related, in which the false membranes occupied the skin, mouth, pharynx, œsophagus, trachea, bronchi, and vulva.]

,, Odriozola. *Epidemic of Diphtheritic Angina at Lima.* Amer. Journ. of Med. Sci. vol. xxxvi. p. 528. [Several epidemics have been observed at Lima since 1851; the black race resisting the influence, as they do that of yellow fever.]

1858. Pound. *On the varieties of Diphtheritis.* Brit. Med. Journ. pp. 251 and 750.

,, Prowse. *Fatal case of Diphtheritic exudation in Scarlatinal Anginosa.* Lancet, April, p. 343.

,, Rogers. *Cases.* Brit. Med. Journ. p. 625. [Two cases of diphtheria, in one of which tracheotomy was performed without success.]

,, Sanderson. *On Diphtheritis.* Lancet, March, p. 324. [Paper read at the Harveian Society, and followed by a short discussion. The author believes that the disease now prevailing is identical with the malignant sore-throat of the older authors, and differs somewhat from the affection described by Bretonneau.]

,, Sellerier. *Paralysie suite d'Angine Couenneuse.* Gaz. Hebdomad. t. v. p. 107. [In a communication made to the Med. Soc. of the Dep. of the Seine (and followed by a short discussion) the author states, that during the last two years he has met with 160 cases of diphthérite, thirty-three of which proved fatal. He gives brief notes of three cases of consequent paralysis occurring in adults.]

,, Semple. Lancet, Oct. p. 424. [Paper read at the London Medical Society, founded on fatal cases observed at Bagshot.]

,, Stephens. Lancet, Nov. p. 512. [Proofs of the infectious nature of diphtheritis adduced.]

,, Stiles. *On Diphtheria, with the results of* 350 *cases.* Brit. Med. Journ. p. 628. [Speaks well of a concentrated solution of chloride of sodium, as a local application, and of the use of the sesqui-chloride of iron.]

,, Thompson. *Diphtheria or Diphthérite.* Brit. Med. Journal, p. 449. [Describes an epidemic at Launceston; and refers to the relationship of the disease to scarlatina.]

,, L'Union Medicale, pp. 395, 407, 447, and 526. [Discussion on the treatment of diphtheritis at the Paris Hospital Medical Society.]

,, Wade. *Observations on Diphtheritis,* 8vo. 1856. [History and symptomatology of the disease treated of only, but ably. Albuminaria especially remarked upon.]

,, Ward. *Cases of Diphthérite.* Trans. Pathol. Soc. vol. ix. p. 217. [Six in number, two being fatal, and one of these complicated with purpura.]

,, Whitehead. *On Angine Couenneuse (Diphthérite)* or the *Epidemic at Boulogne.* Med. Times and Gaz. vol. xxxvii. p. 560. [Very insufficient details given.]

,, Wilks. *On Diphtheria, and its connexion with a parasitic vegetable fungus.* Med. Times and Gaz. vol. xxxviii. p. 354. [Dr. Wilks has met with the identical fungus, sometimes found in diphtheria, in various other diseases, during the course of which films are formed in the mouth.]

,, Witten. *On the treatment of Diphtheria.* Med. Times and Gaz. vol. xxxviii. p. 646. [Treatment as adopted in several cases; but no details given.]

1859. Banks. *Clinical Lecture on a fatal case of Diphtheritis.* Dublin Hosp. Gaz. vol. vi. p. 63.

,, Bernard. *On Diphtherite, its Nature and Treatment,* Brit. Med. Journ. p. 81. [A general review of the various modes of treatment that have been adopted.]

, Borland. *Case of Diphtheritis rapidly terminating in Croup.* Bost. Med. and Surg. Journ. vol. lx. p. 39. [In a child eight years of age. One of the tonsils was amputated. The croup proved fatal on the third day.]

,, Bouchut et Gaux. *Observations d'Angine Couenneuse et de Croup avec Albuminarie.* Gaz. Méd. p. 165. [A fatal case of diphthérite and one of croup attended with albuminaria.]

,, Bradley. *On the Treatment of Diphtheritis.* Med. Circular, vol. xiv. p. 14. [Caustics and good diet the chief means recommended.]

1859. Bulley. *Observations on the Nature and Treatment of Diphtheria.* Med. Times and Gaz. vol. xxxix. p. 337. [An interesting paper. The author considers that nitrate of silver has been too indiscriminately applied, and he prefers treating the disease by exciting diaphoresis by means of hot packing, and by the application of stimulating liniments.]

,, Clark. Med. Times and Gaz. vol. xxxix. p. 169. [Two cases very briefly detailed.]

,, Copeman. *Essay on the History, Pathology, and Treatment of Diphtheritis.* 8vo. 1859. [An account of the disease, chiefly derived from Rilliét and Barthez; no personal experience stated.]

,, Corrigan. Dublin Hosp. Gaz. vol. vi. p. 49. [A clinical lecture on a fatal case occurring in an adult.]

,, Croft. Lancet, Jan. p. 121. [A case of diphtheria in the adult. The inhalation of the vapour of strong acetic acid, and external fomentation recommended.]

,, Harley. Lancet, Feb. p. 173. [Observations on the supposed parasitic origin of diphtheritis.]

,, Hillier. Med. Times and Gaz. vol. xxxix. pp. 107 and 159. [A historical sketch of the disease, and observations on its relationship to scarlatina, and the confusion between the two diseases that has taken place.]

,, Hodson. *Chlorine inhalation in Diphtheria.* British Med. Jour. p. 22. [A case related in which the vapour of water mingled with that of solution of chloride of lime proved of service.]

,, Houghton. Dublin Quarterly Journ. vol. xxvii. p. 94. [Four cases of diphtheritis related, confirmatory of the value of the treatment by iron, muriatic acid and stimulant diet, as advocated by Dr. Heslop.]

,, Hughes. *Cases of Diphtheria.* Brit. Med. Journ. p. 80. [Two cases related, the autopsy stated in one.]

,, Hutchinson. *On the Diphtheritic Nature of so-called Ulcerative Stomatitis.* Medical Times and Gazette, p. 290. [The report contains the details of a carefully noted case, proving, in the first place, that the ulcers of this form of stomatitis are covered by diphtheritic pellicles; and, secondly, that the local use of chlorate of potash is efficient to their rapid cure. Mr. Hutchinson suggests that the chlorate should be tried locally in diphtheria of the fauces, &c.]

,, Jodin. *De la Nature et du Traitment du Croup et des Angines Couenneuses.* Revue Méd. t. i. pp. 22 and 134. [Advocates the fungoid origin of the disease, and its treatment by the perchloride of iron.]

,, Lancet. *Report on the History, Progress, Symptoms, and Treatment of Diphtheria,* pp. 65—169. [A very good *resumé*, and contains the only general account of the recent progress of the disease in England.]

,, Lowe. Lancet, March, p. 250. [Observations on the supposed fungoid origin of the disease.]

,, Mackinder. *Epidemic throat affection, or Diphtheria as it appeared at Gainsborough in* 1857-58. Med. Times and Gaz. vol. xxxix. p. 44. [A paper read at the Epidemeiological Society, and followed by a discussion; professes to be based on 400 cases, one only of which was fatal. See also Sanitary Rev. vol. iv. pp. 104, 197, 402.]

,, Medical Times, vol. xxxix. p. 113. [A case of tracheotomy in diphtheria, with autopsy.]

,, Monckton. Med. Times and Gaz. vol. xxxix. pp. 93 and 222. [Some account of an epidemic at Brenchley, with observations on the nature of the disease. The author recommends treating it by early and effectual cauterization and purgatives, giving supporting remedies later]

,, Perry. *Turpentine in Diphtheria,* Med. Times and Gaz. vol. xxxix. p. 245. [Turpentine and carbonate of ammonia recommended to be given alternately.]

1859. Ramskill. *On Local Treatment in a particular form and stage of Diphtheria*, Lancet, February, p. 182. [The author believes that cauterization may do harm sometimes by inducing swelling of the glands, and should not then be persevered in, a solution of chloride of lime and infusion of camomile being substituted.]

„ Ranking. *Lecture on Diphtheria*, Lancet, pp. 27 and 51. [A good description of the disease, but not stated to be founded on much personal observation.]

„ Rogers. Lancet, January, pp. 92 and 98. [Paper read at the London Medical Society, the discussion turning chiefly on the fungous origin of the disease.]

„ Silva. *Angines Couenneuses et Croup traités avec succès par le perchloruse de fer intus et extra*, Gaz. des. Hôp. No. 18. [States that at Boulogne he found the internal use and external application of the perchloride of iron highly useful.]

„ Simyan. *Ablation des amygdales dans l'Angine Couenneuse*, Gaz. des Hôp. No. 3. [A successful case of amputation of the tonsils narrated.]

„ Wade. Lancet, February, p. 147. [Observations in relation to the occurrence of albuminaria in diphtheritis.]

„ Willard. *Epidemic Diphtheritis in Albany, N. Y.* Boston Med. and Surg. Journ. vol. lx. p. 88. [A short account of the epidemic which prevailed in the City of Albany, in 1858, giving rise to one hundred and sixty-seven deaths.]

INDEX.

Alum, local employment of 168, 341, 371
Anatomical characters of tracheal diphthérite - - - 73
Angina, specific characters of different kinds of - - - 134
„ maligna, same form of phlegmasia as croup and scorbutic gangrene of the gums 6, 14, 22, 37
Aretæus, on diphthéritic phlegmasia 28
Bibliographical appendix - - 383
Blisters, employment of - 102, 369
Blood-letting, inefficacy of - 49, 97
„ general and local, value of - 366
Bouchut on croup (diphthérite of Bretonneau) - - 271
Cantharides, phenomena of poisoning by in animals - - 186
Carnevale, *de epidemico strangulatorio affectu* - - - 32
Cases.
1.—Malignant angina, with *post-mortem* appearances - - 10
2.—Ditto, ditto - - 11
3.—Ditto, ditto - - 12
4, 5, 6. — Croup, with *post-mortem* appearances - - 18
7.—Croup, tracheotomy, autopsy 44
8.—Croup, successful employment of mercury - - - 48
9.—Croup, inefficacy of blood-letting, autopsy - - - 49
10.—Tracheal Diphthérite, tracheotomy, recovery - - 59
11.—Pharyngeal D., successful treatment by hydrochloric acid - 71
Cases, *continued.*
12, 13, 14, 15, 16. — Tracheal D., death, autopsy - - 73
17, 18, 19, 20, 21.—Tracheal D., treatment by mercury - 77
22, 23, 24.—Tracheal D., treated by mercury, all fatal - - 89
25. — Tracheal D., tracheotomy, autopsy - - - 96
26.—Complication with pneumonia, autopsy - - - 98
27, 28.—Tracheal D., autopsy - 100
29, 30, 31.—Tracheitis - - 121
32.—Tracheal D. - - 130
33, 34, 35, 36, 37, 38, 39, 40, 41, 42, (autopsy) 43, (tracheotomy, autopsy) 44, (tracheotomy, autopsy) 45, (autopsy), diphthéritic angina 141
Causes of diphthérite 233, 271, 331, 355
Chenusson, epidemic at, in 1826, 139
Chiara, epidemic at, in 1618 - 32
Common membranous angina - 114
Contagion, question of, 38, 127, 174 332, 358
Cremona, epidemic at, in 1747 - 35
Croup (see also Diphthérite).
Guersant on (tracheal diphthérite of Bretonneau) - - 207
Stages of ditto ditto - 213, 273
Terminations of - - 215
Varieties of, 219—complications of, 220, 277 — diagnosis of, 222—treatment of, 223, 281—tracheotomy, 227—prophylaxis - 230
Cutaneous diphthérite, 17, 26, 235, 255, 307, 378

Daviot on diphthérite - - 345
Diphthérite (see also croup).
Diagnosis of, 15, 23, 37, 107, 211, 222, 278, 321, 375
Inoculation, the only mode of transmission - - - 477
,, not the mode of transmission 210
Post-mortem appearances, 15, 23, 37, 272
(See Cases also.)
Phenomena of - - 19, 273, 303
Etymology of - - 20, 178
Specific characters of, - - 24
Contagion of, 38, 127, 174, 332, 358
Treatment of, 40, 167, 223, 241, 339, 364
Epidemic - - - 58
Sporadic tracheal - 59, 123
Pharyngeal - - 71, 345
Duration and mode of termination of inflammation in - - 138
Means of preventing its development and progress - - - 173
Nasal - - - 196, 201
Cutaneous, 17, 26, 235, 255, 307, 378
Buccal - - - - 237
Causes of - 238, 271, 331, 355
Danger of - - - 240
Stages of - 213, 273, 303, 345
Complications of - 220, 277
Progress of - - 276, 318
Prognosis of - - - 280
General pathology of - - 311
Mortality from - - - 363
Diseases resembling diphthéritic angina 107
Scarlatinal angina - - 109
Common membranous angina - 114
Stridulous angina, (pseudo-croup of Guersant) - - - 115
Tracheitis - - - 121
Membranous or polypus sporadic angina - - - 123
Sporadic diphthérite - 59, 123
Dogs, effects of mercury on - 86
,, ,, cantharides on - 186
Ecthyma luridum during convalescence 349
Egyptian disease, (see Diphthérite)
Emetics, employment of - - 377
Empis on diphthérite - - 301
Epidemic diphthérite - 58, 345
Epidemics.
At Chenusson in 1826 - - 139
,, Chiaia in 1618 - - 32
,, Cremona in 1647 - - 35
,, La Ferrière in 1824 - 126
,, Hôpital Necker in 1848, 301, 333
,, in department of Saone-et-Loire, 1841-4 - - - 345
At Tours 1818-20 - 6, 25, 54
Fégarite - - - 9
Garotillo - - - 31
Ghisi,
On pseudo-membranous exudation of air-passages - - 4
Guersant on Croup, (tracheal diphthérite of Bretonneau) - 204
Habit, influence of - - 189
Herpes labialis - - 114
Herpin, M. inoculated with nasal diphthéria - - - 181
Historical evidence, analysis of 27, 173
Home (Francis) "Treatise on Croup" 4
Hydrochloric acid, topical use of, 9, 15, 42, 105, 374
Inflammatory lesions, alterations of tissue - - - 19
Influence of habit - - 189
Inoculation the only mode of transmission of diphthérite - 176
Not the mode of transmission (Trousseau) - - 240
La Ferrière, epidemic at 1824 - 126
Laennec.
Anatomical characters of diseases 3
Local treatment, 105, 167, 192, 284, 339, 371
Hydrochloric acid, 9, 15, 42, 105, 374
Alum - - 168, 341, 371
Nitrate of silver 192, 284, 372
Calomel - - - 373
Nitrate of mercury - - 374
Malignant angina - - 10
Same form of phlegmasia as croup and scorbutic gangrene of the gums 6, 14, 22, 37
Membranous or polypous sporadic angina - - - 123

Mercury, employment of 43, 170
Efficacy in a case of croup - 48
Cases of tracheal diphthérite treated by - - - - 77
Poisonous action of - 84, 89
Effects of, on dogs - 86, 170
Microscopic characters of muguet and other false membranes - 326
Mortality from diphthérite - 363
Mucous tissue.
Many inflammatory lesions of, confounded together - - 5
Exudation which accompanies them presents, in itself, remarkable varieties - - - 5
Muguet - - - - 321
Microscopic characters of - 326
Nasal diphthéria - - - 196
Case of in detail - - 201
Necker (Hôpital) epidemic of diphthérite in 1848 - - 301, 333
Nitrate of silver, local employment of 192, 284, 372
Poisonous action of mercury 84, 89
Post-mortem appearances 15, 23, 37
(See Cases also.)
Practical observations on tracheotomy 94
Prophylaxis against diseases designated as croup - - - 230
Revulsives - - - 369
Saone-et-Loire, epidemic in the department of - - - 345
Scarlatinal angina - 109, 323
Scorbutic gangrene of the gums, same form of phlegmasia as croup and
Scorbutic Gangrene, *continued.*
malignant angina 6, 14, 22, 37
Phenomena of - - - 7
Has nothing in common with scurvy 8
Hydrochloric acid, topical treatment by - - - 9, 15
Senega, action of - - - 105
Skin, membranous affection of, accompanying angina maligna 17, 26, 235, 255, 307, 378
Specific characters of diphthérite - 24
Specific characters of different kinds of angina - - - 134
Sporadic tracheal diphthérite 59, 123
Stages of diphthérite 213, 273, 303, 345
Stomacace - - - 9
Stridulous angina (pseudo-croup of Guersant) - - - 115
Temperature, value of, in mercurial treatment - - - 170
Tonsils, removal of - - 374
Tours, epidemic at, from 1818 till 1820 6, 25, 54
Toxæmia - - - - 173
Tracheitis - - - 121
Tracheotomy 44, 59, 170, 199, 227, 242, 286
Practical observations on 94, 242
Treatment - 40, 167, 223, 241 281, 364
(See "Cases" also.)
Trousseau on diphthérite - 235
Van Swieten, opinions of - 9
Variola, contagion of, compared with that of diphthérite - - 174

THE END.

Printed by J. W. Rocke, 5, Kirby Street, Hatton Garden.

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WESTLEYS
& Co
LONDON