Diphtheritis : a concise historical and critical essay on the late epidemic pseudo-membranous sore throat of California (1856-7), with a few remarks illustrating the diagnosis, pathology, and treatment of the disease / by V.J. Fourgeaud.

Fourgeaud (V. J.)

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A CONCISE

HISTORICAL AND CRITICAL ESSAY

ON THE

LATE EPIDEMIC PSEUDO-MEMBRANOUS SORE THROAT OF CALIFORNIA,

(1856-7,)

WITH A FEW REMARKS ILLUSTRATING THE DIAGNOSIS, PATHOLOGY

AND

TREATMENT OF THE DISEASE;

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DIPHTHERITIS.

"*There are for the mucous membranes, as well as for the skin, special inflammations, which yield to special treatments. The issue of the treatment proves the disease.*"—[Therapeutique, vol. ii, p. 755. TROUSSEAU.

DURING the autumn of 1856, the mortality among children in several counties around the Bay of San Francisco assumed an appalling character. It was attributed to an affection of the throat, and few children attacked by it recovered. Some considered the disease a variety of Scarlatina Anginosa, others, a new form of Croup, etc., etc., and the manner in which it terminated, (by an offensive discharge from the mouth and nostrils,) caused it to be denominated Putrid Sore Throat by the community at large. Among the districts which suffered most from it was that of Sonoma. A friend of mine had lost three of his daughters within a few days. A letter from him, informing me of his misfortune, stated also that his two remaining daughters were lying ill with the dreadful scourge. Although I was not at that time practising my profession, I determined at once to hasten to the assistance of the afflicted family. I arrived too late, however, for one of the still surviving daughters, whom I found in *articulo mortis*, and beyond the resources of our science. I at once diagnosticated the disease to be well characterized Pharyngeal Diphtheritis, such as it had been described by the eminent French pathologist, Bretonneau, of Tours, and, since then, generally recognized by the medi-

cal world as a distinct disease. Subsequent observations have fully confirmed the opinion I then promulgated.

I must confess that I have been not a little surprised to find that a disease so well characterized, so distinct from all others, should have led to so many differences of opinion among members of the profession in California.

Satisfied, however, that my diagnosis was correct, and encouraged by the wonderful success with which Bretonneau's treatment had been attended in similar epidemics, I did not hesitate to place my main reliance on local cauterization, and, like him, I selected muriatic acid as the agent. The result proved even more satisfactory than I could reasonably have anticipated: Of all the cases that have come under my observation from that time until now, (there are still some sporadic cases among us,) with the exception of the one mentioned, which had passed the period of possible recovery, *not one* has terminated fatally. Indeed, so successful has been this treatment in California, when resorted to early, that I now consider Pharyngeal Diphtheritis, such as it has been observed in this State, amongst the most manageable, and, when properly attended to, least fatal of diseases. But this prognosis depends on the early correctness of the diagnosis and treatment. I feel that I cannot too urgently insist upon this point, which is, indeed, of vital importance. So thoroughly was I already convinced of this, after having observed the disease in the Valley of Sonoma, that I deemed it a duty to give immediate publicity to my views. The following article, written in Sonoma, during the prevalence of the epidemic, appeared in the *Alta California*, of December 6th, 1856, immediately after my return to San Francisco:

THE PREVAILING EPIDEMIC—DIPHTHERITIS, OR MEMBRANOUS SORE THROAT.

GENERAL REMARKS.

As much diversity of opinion seems to be entertained in regard to the true character of the Malignant Sore Throat, which has been, and still is, prevailing throughout the country around the Bay of San Francisco, and as I have had a

good opportunity for observing it, in its various stages, in the Valley of Sonoma, where it has been exceedingly fatal, I deem it a duty to give publicity to my views in relation to it, through the daily press. I can do so, I think, without impropriety, and without violating the principles of medical ethics, inasmuch as I am not, at present, a practising physician.

The epidemic which has fallen under my observation is Diphtheritis, (from a Greek word signifying membrane,) or the Membranous Sore Throat of Bretonneau, a disease which, though not of recent origin, has not been well and distinctly described until a late date.

Diphtheritis is a disease of comparatively rare occurrence, appearing either in the sporadic or the epidemic form. It has made its invasions several times, and at long intervals, in different parts of the world. Aretœus was the earliest writer on the subject. The disease appeared as an epidemic in Holland, in the year 1337. Three centuries after it reappeared in Spain, and in the year 1618 in Italy. The city of Naples suffered severely from it. Seventeen years after this period the same epidemic raged in Kingston, Canada, and was extremely fatal among children. Some years afterwards it made its appearance in England, and in France, and great mortality was produced by it in the school of the Legion d'Honneur, at St. Dennis, near Paris. Dr. Bell (Stokes and Bell's Practice) mentions having witnessed an epidemic somewhat similar in the United States, from the year 1813 to 1816. This disease, which has great analogy with the Putrid Sore Throat that often accompanies Malignant Scarlet Fever, is not, however, the same malady; and it is important to make the distinction. It has been observed in countries where not a single case of Scarlatina occurred during the epidemic. I have heard of no cases of Scarlatina in Sonoma during my stay there. Diphtheritis, or Membranous Sore Throat, differs essentially from the Gangrenous Sore Throat attending Scarlatina, of which Fothergill has given a good description. In the pseudo Membranous Sore Throat true gangrene is of uncommon occur-

rence, attending only the fatal cases, and is seldom present in these. Ulceration of the Throat is very rarely observed in this disease. Membranous Sore Throat seldom terminates fatally without the previous attendance of all the symptoms of Croup; in Pultaceous Sore Throat, following Scarlatina, Croup is not often an attending symptom. Diphtheritis has also been mistaken for severe cases of Croup, which, as will be seen, is only a symptom attending the disease when it reaches the larynx. In the formation of the false membrane, however, it has great analogy with the latter; and, in its general character, it partakes of many of the most striking symptoms of both Croup and Pultaceous Sore Throat of Scarlatina.

In Membranous Sore Throat the brain is remarkably free from all unfavorable symptoms, the patients being generally perfectly conscious until a few hours, or even minutes, before death. A case has come under my observation where the patient preserved the full and perfect faculties of the brain until within a few minutes before death, notwithstanding the disease had reached its greatest extension in the cavities of the throat, and the whole right side of the face, from the lower part of the neck to the forehead, was affected with an erysipelatous swelling. The disease may attack persons of all ages, but children of feeble constitution and of lymphatic temperament, are most predisposed to it. Girls are more frequently affected with it than boys.* In a family consisting of five girls and two boys, in Sonoma, all living in the same house, and under the same influences, all the girls were taken with it, (resulting fatally with four,) the boys escaping without the slightest symptoms of the malady. When Scarlatina and Diphtheritis appear at the same time in a locality, the patients affected with the first are predisposed to the latter.

Epidemic Membranous Sore Throat is in some degree contagious. Many well attested cases are cited which seem to leave but little doubt on this score. When the epidemic

* This was the case in Sonoma, but it is not always so; the contrary having been observed elsewhere, in other epidemics.—V. J. F.

is at its height I have observed a great tendency to other affections of the throat, which must not be confounded with the disease I am describing. In Sonoma, these affections were exceedingly common, consisting of slight inflammation of the throat, and swelling of the glands, coated tongue, and excited pulse. Attended to early, by the administration of an emetic, followed with small doses of ipecac and calomel, keeping the throat covered with flannel, and the extremities warm, I found them easily subdued.

SYMPTOMS.

The disease begins in a very insidious manner, by a little engorgement or inflammation of the soft palate, pharynx, and one of the tonsils. (The attack seldom commences on both at the same time, but soon extends to both, if not arrested.) At this period of the malady the patient complains but little; there is often no fever, or it is very moderate. The pain in the throat is much slighter than in the usual forms of common sore throat, so slight, indeed, that the little patients go about playing, as if nothing was the matter. In some exceptional cases, however, the fever and inflammation about the pharynx are considerable from the beginning. The characteristic signs of the affection soon follow this invasion. They consist in small patches of white or yellowish lymph, deposited on the soft palate, the tonsils, and the posterior part of the pharynx. The cervical and submaxillary glands become inflamed and swollen, and the pain in swallowing and in opening the mouth is occasioned more by the engorged state of the glands than by the internal secretion of lymph. These deposits go on increasing in size, more or less rapidly, and, in violent cases, in a few hours the whole cavity of the throat is covered by them. Generally one side is more affected than the other, and, upon examination, the glands corresponding with the parts affected will be found more swollen than those of the opposite side.

The disease, therefore, begins with the inflammation of the mucous membrane of the soft palate, tonsils, and phar-

ynx, terminating in the secretion of a false membrane, without ulceration or destruction of true skin.

As the local affection goes on progressing, a discharge of matter and blood exudes from the borders of the false membrane, and, mixed with an offensive saliva, flows from the corners of the mouth. A similar discharge is often observed coming from the nostrils, being a sure indication that the disease has made its invasion in the nasal cavities. Bleeding from the nose is then an attending symptom. As the extension of the false membrane progresses, the larynx becomes affected, and all the symptoms and fatal results of Croup are observed. At this period of the disease the swelling of the glands is considerable. At length, after a period varying from eight to ten days, the false membrane either falls in mass, and is ejected through the mouth, or is separated in fragments, and is discharged by degrees. But it is often reproduced. The appetite is but little affected until the disease has reached its second stage. There is no vomiting, nor diarrhœa, unless the mucous coat of the stomach and intestines become the seat of the disease. The tongue is generally heavily coated. After the period of invasion more or less fever is observed, which, however, when the progress of the affection is arrested, is sometimes totally absent, the pulse becoming regular, and the surface of the skin moist and comfortable long before the false membranes become entirely detached from the surface of the mucous membrane of the throat.

In favorable cases recovery generally commences before the disease reaches the larynx, trachea, and bronchiæ; when the false membranes are produced on these parts the patients seldom recover. The portions of the mucous coat, by which the false membranes had been secreted, present a red surface, sometimes appearing excoriated, but without any degree of actual excoriation. The swelling of the cervical glands subsides, and at the end of a week or ten days recovery follows. In these favorable cases the duration of the disease, from the date of the invasion to that of the total

expulsion of the false membranes, is generally from two to three weeks.*

But when the disease assumes a more serious form, the inflammation and false membranes extend into the air passages, producing hoarseness, aphonia more or less complete, then the harsh, suffocating cough peculiar to Croup. The expression of the face is extremely anxious, the countenance cadaverous, the skin cold, the pulse feeble and hurried; the face, lips, and extremities become purple, and death closes the scene after a very short period of stupor.

According to Guersent, and other pathologists who have made post mortem examinations in this disease, the morbid appearances observed after death are not always confined to the pharynx, larynx, and trachea, but false membranes are sometimes discovered in the œsophagus, stomach, and intestines. In the latter case vomiting and diarrhœa are attending symptoms.†

TREATMENT.

This disease being, as we have seen, originally local, confined to the mucous membrane of the soft palate, tonsils, and pharynx, the treatment must be principally local. Some French practitioners have been so much impressed with this that the treatment they recommend is merely topical. For this, acids and caustics are used. Although sufficient in many cases, I am convinced that by a wise administration of a general treatment the disease is more manageable, and with it many cases which would otherwise prove fatal may be saved. I shall, therefore, say a few words on the general treatment which I have adopted with success, before entering into the details of the more important local applications.

Whenever there is no contra indication, I have found the early adminstration of an emetic of great value in cleansing the stomach, throat, and tongue, and in creating action on the surface of the skin; and I have repeated it in the course

* The duration of the disease is of course altogether shorter when the local treatment is at once resorted to. In its earliest stage, the patches often disappear entirely after the first cauterization.—V. J. F.

† These gastro-intestinal complications are of rare occurrence.—V. J. F.

of the malady, when judged necessary. The treatment should be continued by small doses of calomel and ipecac, the latter in barely sufficient doses to create slight moisture on the skin. At a later period, when the progress of the inflammation has been mastered, I have found quinine, given alone or in combination with the above, of great service. Flannel should be placed around the throat, and the extremities kept warm by hot applications, foot baths, and sinapisms.

During the period of irritation, mucilaginous drinks will be found most serviceable; after the inflammation has been subdued, lemonade and other acid drinks. Blisters should be discarded, as they are productive of more harm than good in this disease.

As I have observed before, the most important and effectual treatment is the local application of acids. Of these, experience shows that hydrochloric acid is attended by the best results. I have used it in the cases that have come under my care, with the most satisfactory effect. The acid may be conveyed to the diseased parts by means of a camel's hair pencil, or by a piece of sponge, or linen rag, fastened to a small wooden stick or a piece of whalebone. The strength of the acid must depend upon the age of the child, on the extent of the false membrane, and the rapidity with which the secretion of lymph is developed. I have used, successfully, pure hydrochloric acid twice a day, in the case of a child twelve years old, in which the tonsils, the soft palate, and a considerable portion of the pharynx, were covered with the false membrane. It acted at once in arresting the further progress of the affection, by circumscribing it, as it were, in the limits it occupied. From that moment the general symptoms gradually improved. I continued the application of acid, together with the general treatment, until the entire disappearance of the false membranes, which, when occupying a considerable portion of the throat, require several days treatment before disappearing entirely. The acid should be pressed or rubbed firmly on the parts affected, so as to insure its contact with the vital parts.

The acid acts principally as a powerful stimulant on the congested and inflamed surface, in producing contraction and restoring the natural action of the minute vessels. Gargles, emollient during the period of inflammation, and subsequently astringent and acid, will be found useful.

The chamber of the patient should be often and carefully ventilated.

V. J. FOURGEAUD, M. D.

San Francisco, Dec. 5th, 1856.

A short time (December 23d, 1856,) after the appearance of my article, Dr. Hardy, of Monte Cristo, published an account of an epidemic Sore Throat which had prevailed in that locality, the description of which differed materially, in some important points, from the disease I had observed. He says:

"For convenience of description, the disease may be divided into three stages: first, the disease is ushered in with slight chills and rigors, followed by febrile reaction; almost simultaneous with the febrile reaction appeared an *exanthematous rash*, closely resembling the rash of Scarlatina Anginosa, and from which it was almost impossible to discriminate it in the first onset of the disease, but which continued to come and go as the disease progressed—not attended by desquamation, seeming to have no settled or definite course. Soon after the eruption appeared the patient would complain of soreness of the throat, slight difficulty in deglutition, followed by swelling of the submaxillary and parotid glands, with slight ulceration of tonsils and soft palate. In some cases the patient was attacked with erysipelas inflammation of the face, with no rash; in others both appeared in the subject. The tongue slightly furred; bowels inclined to constipation; pulse frequent, but not indicating the lancet—these symptoms continued to increase in violence in well marked cases, until about the seventh day, when we had the disease fully developed.

"The second stage was characterized by a profuse discharge of offensive viscid matter from the mouth and nose,

in some cases filling the nasal cavities so as to entirely obstruct respiration through them; increased swelling of the tonsils, submaxillary and parotid glands; continued tendency to constipation of the bowels; fever assuming a typhoid type; pulse frequent; deglutition becoming both frequent and difficult; breath extremely offensive; skin dry and husky; urine scanty and high colored; rash coming and going, with a tendency to erysipelatous inflammation of the face. This stage continued from five to seven days, when the closing scene of the drama presented itself—characterized by extreme swelling, inflammation and induration of the submaxillary and parotid glands; discharge from mouth and nose profuse and slightly irritating; tongue covered with a brown or dark coat; sordes forming on the teeth, and, in the fatal cases, subsultus tendinum, extreme prostration; tremulous tongue, pinching at the bedclothes; deglutition becoming more difficult, and, in some cases, almost impossible; respiration difficult on account of the accumulated mucous on nasal cavities and throat. These symptoms continued until death relieved the little sufferer, or they gradually gave way, and the patient became convalescent."

After reading the remarks of Dr. Hardy, I felt satisfied that the disease which had come under his observation was not primitive or true Diphtheritis, but one of the secondary forms of Angina, such as usually accompanies Scarlatina, and other eruptive diseases.

Most of the cases on which my remarks were based had occurred in the Valley of Sonoma, which is situated in a county on the extreme western limits of our State, bordering on the Pacific Coast, and being only a few feet above the level of the sea. Monte Cristo, on the other hand, is located on the opposite eastern border, high up in the mountains. The two places are separated from each other by the following counties, viz.: Napa, Solano, Yolo, Placer, and Nevada, the distance between the two being about two hundred miles. It is not, therefore, very remarkable that different diseases of the throat should have appeared at that time,

at places so widely separated, and so different in many other respects. But I will go further, and say that even had the cases mentioned by Dr. Hardy occurred in the Valley of Sonoma and its vicinity, simultaneously with those I observed, such a coincidence would not invalidate the position taken by me. I will remind the reader that I had noted, before the appearance of Dr. Hardy's article, a fact which had already been several times observed by eminent pathological authorities, (see Rilliet, Barthez, Fabre, etc.,) viz.: that an epidemic of primitive pharyngeal Diphtheritis and one of Scarlatina, or of any other secondary Angina, may occur simultaneously in the same locality.

Dr. Hubbard, of San Francisco, in an article on the diseases of the Pacific coast, published in the January number (1857) of the *California State Medical Journal*, gives a lengthy review of my article on Diphtheritis, in which he revives some obsolete arguments to show that Cynanche Maligna, Scarlatina Anginosa and Diphtheritis are identical diseases. He says:

"Diphtheritis is not considered by the majority of writers on the subject a distinct disease [!] as assumed by Dr. Fourgeaud, but the same characteristics which have induced some authors to make such distinction are only symptoms or sequelæ of other diseases." [!!]

How Dr. Hubbard, if he really took the trouble to investigate the subject, arrived at such a conclusion I am at a loss to understand. I can only attribute it to the supposition that his views were taken from the writings of a few English authors, who probably never had an opportunity of witnessing a similar epidemic. It is a well known fact that the principal pathological researches and monographs on Diphtheritis, since the appearance of Bretonneau's work, owe their origin especially to France,* where, since that epoch

* To an American citizen, Samuel Bard, of New York (1771), undoubtedly belongs the honor of having given the first distinctive characteristics of Membranous Sore Throat. He distinguished it perfectly from Angina Gangrenosa, and considered the pseudo Membranous patches the result of a concretion. But his judicious observations were soon forgotten, and physicians continued, as before, to confound *pseudo Membranous* with *Ulcerated and*

physicians have had repeated opportunities of observing extensive epidemics of the disease. Tours, Blois, Orleans and Paris, have, at different periods, furnished ample opportunities. The following distinguished physicians, Bretonneau, Guersent, Moreau, Boisseau, Menac, Trousseau, Ramon, Gendron, Chomel, Bourgeois, Andral, Despine, Rilliet and Barthez, etc., have given us most accurate descriptions of these epidemics. They, as well as the immense majority of modern pathologists who have investigated the subject, have not only shown by abundant and unanswerable pathological observations, that Diphtheritis is a primary disease, *sui generis*, perfectly well characterized from all other forms of secondary Angina, whether of typhoid, scarlatinous, or other exanthematous origin, but have placed the correctness of the fact beyond dispute by proving that in primitive Pharyngeal Diphtheritis a simple *local treatment*, when resorted to early, will, in the large majority of cases, arrest the disease at once, without any important general or constitutional disturbances following. Is it so with true gangrenous, typhoid, scarlatinous and other secondary forms of Angina? Certainly not.

Speaking of Angina Maligna, a distinguished American physician, Dr. R. Dunglison, fully sustains my position.† He says:

"This variety of Pharyngitis has been esteemed by some to be essentially the same as the one just described, [Diphtheritis] but *the generality of modern pathologists class them as congenerous yet distinct affections.* It certainly differs essentially from simple Pharyngitis, for, although the latter may terminate in Gangrene, it is an accidental event, whilst Gangrenous Pharyngitis is marked, from the first, by its characteristic symptoms. These are eminently typhous, and the decided difference between Gangrenous and Diphtheritic Pharyngitis, after all, consists in this circumstance."

Gangrenous Pharyngitis. To M. Bretonneau, however, the profession is indebted for having demonstrated the distinctive characteristics of these diseases in so clear a manner as to place the question of their identity altogether beyond dispute. (See Rilliet and Barthez, vol. 1, p. 267.)

† *Practice of Medicine*, vol. 1, p. 52, ed. 1848.

These distinctive characteristics, as I have before stated, were not well understood by ancient writers. It is not improbable, therefore, as has been suggested by Bretonneau, that many of the epidemics described by our ancestors as Angina Maligna, Angina Putrida, Cynanche Maligna, etc., were, in reality, Pharyngeal Diphtheritis. I deem it almost unnecessary to add that Bretonneau, Trousseau and others, in alluding to this probable error of diagnosis in the writers of former days, are far from pretending that Diphtheritis and Gangrenous Sore Throat are identical diseases. They merely maintain that many cases attributed to the last, evidently belonged to the first—which is very different and very probable; indeed, have we not seen the same error committed amongst us?

Fabre remarks: *

"Since Bretonneau has proven that the Angina Gangrenosa of ancient authors was often nothing more than Diphtheritis, many physicians, and Bretonneau himself, have attempted to call into question the existence of Angina Gangrenosa. However, most rigorous observations have since then demonstrated that Gangrenous Angina had a separate and well characterized existence."

M. Becquerel has since then observed an epidemic of unquestionable gangrenous character, at the hospital for children in Paris, an account of which is given by him in the *Gazette Medicale*. Rilliet and Barthez observe: †

"Some facts seem to demonstrate that Pharyngeal Diphtheritis may make its appearance during the occurrence of other maladies, and *vice versa*, but these are only exceptions, which cannot warrant one in confounding diseases otherwise perfectly distinct, as we have already shown."

They add further: ‡

"The researches of M. Becquerel do not controvert the conclusions arrived at by Bretonneau from observations of

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* *Bibliotheque du Medecin*—Vol. 5, p. 560.

† *Maladies des Enfants*—Vol. 1, p. 260.

‡ *Op. cit.*—Vol. 1, p. 260.

his own; they only prove that, under certain circumstances, there may be some coincidence between Diphtheritis and Gangrene, which fact has nothing astonishing, since the two diseases may prevail epidemically."

However, I deem it but just to repeat that there are many symptoms in both diseases resembling one another closely enough to cause some embarrassment, and difficulty of diagnosis; especially when an epidemic of Diphtheritis and Gangrenous Angina occur simultaneously in the same locality. Rilliet and Barthez remark, when referring to such an epidemic:*

"Diphtheritis and gangrene of the Pharynx appeared at the same time, and in the cases where, on the same child, the second disease (Angina Gangrenosa) succeeded to the first (Diphtheritis), it became difficult to distinguish one from the other."

True Gangrenous Pharyngitis, even in the so called epidemics, has seldom if ever occurred primitively—but has supervened as a *secondary* affection. As to the distinctive pathological anatomy of Diphtheritis, Scarlatina Anginosa, and Pharyngeal Gangrene, I shall endeavor before I conclude, to point them out, and show that the weight of facts as well as that of authority, fully sustains the position I have taken. I will take this opportunity, however, to state a fact which I have repeatedly observed, and which gives additional proof respecting the distinctive character of Scarlatina Anginosa and Pharyngeal Diphtheritis. It is this: Scarlatina Anginosa, like Variola, Rubiola, etc., seldom attacks the same persons more than once. An attack of Pharyngeal Diphtheritis, on the contrary, like one of Croup, is no security against subsequent ones. Of this I have abundant proof. I have an illustration of it in my own family. Well characterized pseudo membranous spots having made their appearance on the tonsils of my young daughter, during the prevailing epidemic, I immediately cauterized them three or four times, and they disappeared entirely. Nearly two

* *Op. cit.*—Vol. 2, p. 398.

months afterwards she again informed me that she felt some uneasiness about the throat, and, upon examination, I again found several well marked diphtheritic spots. I cauterized them, as before with the same success. During the whole time her general health continued good. Several friends, among whom was a physician, witnessed this case. A number of practitioners have since informed me of similar observations made by themselves during the prevalence of the epidemic.

Dr. Hubbard expresses by a point of exclamation (!) his surprise at my assertion that "epidemic Membranous Sore Throat is, in some degree, contagious." Besides the facts cited in my article of December, 1856, in support of this assertion, others have since come under my personal observation. But it is unnecessary to dwell on a point almost unanimously admitted by all observers of epidemics of Pharyngeal Diphtheritis. Almost every author I have cited in these pages corroborates my statement respecting the contagious character of epidemic Diphtheritis. Valleix, after quoting numerous instances from different authors, concludes:

"We cannot, therefore, do otherwise than accede to the opinion of the authors we have cited, also of Guersent, Trousseau, Ramon, Bourgeois, etc., who have many times seen in this affection the manifest action of contagion, and by whom, consequently. the existence of that specific cause is admitted." *

M. Trousseau, the worthy pupil of Bretonneau, who has had repeated opportunities of observing epidemics of Diphtheritis, says: †

"It is evident, to me, that contagion plays the principal part in the propagation of Diphtheritis. I have, I think, sufficiently demonstrated this in my article published in the *Archives.* ‡ Thus it was sufficient for a patient afflicted with Diphtheritis to take lodgings with a family, for the disease to spread amongst them."

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* *Guide du Medecin*—Vol. 2, p. 388.

† *Dictionnaire de Med.*—Vol. 30, p. 541.

‡ *Archives Gen. de Med.*—Vol. 30, p. 541.

M. Trousseau also mentions the case of a sucking child who had Pharyngeal Diphtheritis during the epidemic of Sologne, and who communicated the disease to both of the nipples of the mother. Bourgeois contracted the affection while exploring the throat of a patient.

The denuded surface of the skin, after a blister, or any sores, either on the patient or on his attendants, are apt to become affected with pseudo membranous concretions. At the college of La Fleche, during the epidemic of Diphtheritis, a child who was suffering from chilblains had his toes affected with diphtheritic concretions after walking with naked feet on the floor of the infirmary, over which another child, who had pseudo Membranous Pharyngitis, had expectorated.

Dr. Hubbard seems astonished that I could, without an autopsy, diagnosticate the absence of ulceration of the trachea, or of false membranes in the larynx, because these, and "other distant parts cannot be observed through the mouth." He says:

"We are not certain that the doctor intends to say that he observed all the symptoms given below, which are extracted from his article on the epidemic at Sonoma, and, in fact, we are at a loss to know how he arrived at all of his conclusions, and determined some of the facts there stated, without an autopsy. We are not told that a post mortem was had; how is it ascertained that the mucous membrane of the larynx and trachea suffer no destruction by ulceration, or other distant parts which cannot be observed through the mouth? What certainty is there that the false membrane which lined the trachea and bronchia has fallen and been ejected, or that any membrane existed at all, beyond the patches of coagulable lymph which can be seen attached to the tonsils and fauces? And may not the same symptoms occur in Scarlatina and Angina Maligna?"

My answer is: In the immense majority of cases I would really feel much need of studying the characteristic symp-

toms of these affections, if I could not diagnose them without a post mortem examination.

I now come to the recently published article of Dr. James Blake ‡ on Diphtheritis. My remarks in the preceding pages render it unnecessary for me to dwell on the hypothetical views expressed by him. It is evident that in assuming that Pharyngeal Diphtheritis is "a systemic disease, as much as Typhoid Fever," he erroneously attributes pathological facts and symptoms belonging to several other varieties of secondary Angina to the primary Diphtheritis of authors. I do not dispute that concretions or exudations of a pseudo membranous nature may appear secondarily in the pharynx, larynx and trachea as well as on the skin, etc., of patients afflicted with other diseases—seldom, however, in Typhoid Fever. But when these occur under such circumstances pathologists designate them as *secondary symptoms*, or, if you please, *secondary* Diphtheritis. It is remarkable that Dr. Blake, while maintaining the *sui generis* character of Diphtheritis proper, should have fallen into so inexplicable an error. Notwithstanding the unanimous testimony of writers that the etiology of Diphtheritis is not known, that its efficient causes are enveloped in obscurity, and that in the cases where contagion cannot be admitted, no specific cause can be assigned for the appearance of the disease, Dr. Blake does not hesitate to base a theory on the hypothesis that the cause of the disease is "a peculiar poison generated in the atmosphere." (!) But this was necessary in order to establish some connection between Typhoid Fever and true Diphtheritis, when, in reality, none exists.

A superficial observation of primitive Diphtheritis, such as it appeared amongst us, or such as it has been described by authors, and a reference to the symptoms of Typhoid Fever must satisfy the profession that the two diseases are so widely different as scarcely to admit of a point of comparison. Bretonneau, who has distinguished himself as much

‡ *Pacific Med. and Sur. Jour.*—Vol. 1, Nos. 8 and 9.

for his remarkable researches on typhoid as on diphtheritic diseases, indicates no analogy between the two. We have already seen that Dr. Dunglison considers the *absence* of typhoid symptoms in Diphtheritis the true and most important pathological characteristic of that disease. Valliex observes: "The termination of Diphtheritis is often fatal, but writers on the subject are unanimous in asserting that it is *not from the disease itself* that so great a danger exists, but from the subsequent extension of the specific inflammation to the air passages." *

Although Diphtheritis sometimes takes from the beginning a decided inflammatory type, with considerable swelling of the glands and febrile action, in the majority of epidemics as well as of individual cases, the invasion of the disease (as observed by all writers) is remarkably insidious. Frequently the false membranes appear in the pharyngeal cavity while the child is still playing as usual, without notable general or even local premonitory warning, with little or no fever, without much nervous disorder or other remarkable symptoms. "During the whole course of the affection the appetite is not much disturbed; there is no vomiting, no diarrhœa, and the febrile action is moderately intense. The nervous system gives no indication of suffering and but little prostration." (Rilliet and Barthez, vol. 1, pp. 252, 253.) If, however, the local affection is not checked, if it is allowed to progress, the strength of the little patients will gradually diminish, not only from the want of nourishment, but from imperfect Hematosis resulting from the local disturbances and obstacles preventing the free inhalation of the usual and necessary quantity of pure atmospheric air, (which indeed may become vitiated by the muco-purulent exudations oozing from the edges of the false membranes in the affected parts of the air passages), and not improbably, also, from the ingestion of particles of decomposed false membranes and abnormal secretions resulting therefrom and swallowed. Symptoms secondary to the primary diphtheritic affection, more or less

* *Guide du Praticien*—Vol. 2, p. 392.

fever, more or less excitement or prostration, as well as croup, etc., etc., will sooner or later make their appearance, and are naturally and correctly attributed to the presence, continuance and extension of the local affection. Such are some of the plausible circumstances under which the fever will, in primary Diphtheritis, generally indicate, a posteriori, rather an asthenic than sthenic condition.

But this is far from showing that Diphtheritis is "*a systemic disease deriving its origin from a peculiar poison generated in the atmosphere*," as assumed by Dr. Blake. His assertion, unsupported as it is by proof, or even plausible arguments, must, to say the least, be deemed an insufficient warrant for the medical world to follow his suggestion, and classify Diphtheritis with Typhoid Fever, and change the appropriate name given to it by Bretonneau, for that of *Diphtheroid Fever*, proposed by Dr. Blake. Were it possible to do this on such slight grounds, we might as well retrograde for more than a century and then going even further than Brown, reconsider at once the whole uosological arrangement of diseases and classify a long list of "ills that flesh is heir to" under the head of typhoid affections, since in most serious maladies asthenic fever is sooner or later among the attending and characteristic symptoms. *

Exceptionally, however, individual cases of Diphtheritis assume a more serious form, varying more or less from the uncomplicated type. Some of these complications are of the nature of the local affection (pseudo membranes in the œsophagus, stomach, intestines, etc., cutaneous Diphtheritis, etc.). Others depend on a general state of the economy, resulting from bad hygienic conditions, or individual idiosyncracies, in which the blood is evidently impoverished (in certain scorbutic and scrofulous diatheses principally). These are often attended with serious nasal, mucous and sometimes cutaneous hemorrhage and extreme prostration. I shall, presently,

* The distinctive symptoms and morbid anatomy of that peculiar affection known as true Typhoid Fever, too generally established and too well understood, in our day, to warrant us in confounding it with other very different diseases, when they happen to be attended with asthenia. Unfortunately, however, this is still by far too often the case.

say something more of this last complication, and endeavor not only to indicate its distinctive character but to show that it is of comparatively rare occurrence. According to Guersent, broncho pneumonia may supervene in Diphtheritis between the third and seventh days, and is apt to be masked by the symptoms of the Angina. A case of this kind has recently fallen under my observation. "Eruptive fevers, inflammatory affections of various nature, enteritis, erysipelas, etc., as well as other diseases of children, may complicate pharyngeal Diphtheritis; but we repeat it, one must look upon these facts as simple coincidences." *

Besides these complications, different epidemics of Diphtheritis assume a more or less serious character. But in this Diphtheritis does not differ from other epidemic diseases, and especially from the pseudo membranous affection—croup, which under certain circumstances, not yet well understood, takes a form more or less serious, more or less complicated, more or less manageable.

Diphtheritis, wherever it has come under my observation in this State, has been, with very few exceptions, of a mild type, unaccompanied by remarkable general symptoms, either of an inflammatory or adynamic character. A mere local treatment, when timely and properly resorted to, almost invariably and immediately mastered the disease. When the local affection had reached a later stage, the symptoms present were such as are generally observed at that period in primary uncomplicated Diphtheritis.

Rilliet and Barthez,† when alluding to the complications occasionally attending Diphtheritis, express themselves thus: "Lastly, *but rarely*, for Bretonneau does not seem to have observed it, the disease may assume a typhoid or adynamic aspect. M. Bourgeois,‡ who has given a good description of this form, thinks that it is the result of poisoning, *caused by the ingestion into the stomach of putrified secretions from*

* Rilliet and Barthez—Vol. 1, p. 257.

† *Maladies des Enfants*—Vol. 1, p. 254.

‡ *Journal General*—Vol. 109, p. 441.

the mucous membrane. M. Lespine seems to have observed analogous cases, and as well as we can judge from the very incomplete description he gives of the condition of the digestive tube, the lesions had spread throughout its internal surface."

"The following observation, borrowed from M. Bourgeois, will give an idea of this particular form of the disease, which differs widely from Diphtheritis as it is generally observed:

"In a young girl, eleven years old, the disease after having commenced in the nostrils and extended from thence deeply into the guttural and pharyngeal cavities, had appeared at the anus and the vulva. The guttural concretions were diffuse, covered with dark colored sanies, exhibited a putrid odor. A sanguinolent sanies oozed continually from the nostrils; the face was pale and bloated; the strength prostrated; the cough hoarse, frequent, but little sonorous; the dyspnœa, which came on at intervals, was light; somnolence. For more than fifteen days the symptoms continued to increase. The posterior part of the throat was filled with a pultaceous detritus, and had the appearance of being deeply effected with gangrene. The whole economy seemed to be under the influence of putridity; the skin was livid, copper colored (terreuse), and, as it were, soiled by sanious matter exuding from all the pores; the breath and all the excretions were extremely fetid; portions of putrified false membranes were expelled with the fæces, augmenting every day in quantity and volume. Long fainting spells seemed to indicate at every moment that the fatal hour was at hand. She remained in this condition for five weeks. Gradually and spontaneously the symptoms diminished in intensity; the milk diet, prudently resorted to, insensibly repaired the strength. The convalescence was long and very tedious."

How different is this remarkable case from what is generally observed in Diphtheritis? Let us take, for comparison, cases as they occurred either in Sonoma or other localities during the epidemic, or more recently in Sacramento City. The following two cases, showing the character of

the disease in the latter place, as observed by Dr. F. W. Hatch, have been kindly placed at my disposal by that gentleman:

"February 19th, 1858.—H. P., aged ten years, had complained of slight pain and soreness in the throat, since the 14th inst., but was able to be about the house as usual; had little cough during this time; submaxillary glands swollen, for which some stimulating liniment was used by its mother. During the night of the 18th she was observed to be worse, and a homœpathic physician was called in the following morning. This gentleman is said to have pronounced the disease Congestion of the Lungs. The case becoming rapidly alarming, I was requested to see it in the evening of the 19th. Found her with a hot skin; rapid, full, yet not hard pulse; respiration labored, difficult, of a decidedly *croupy* character; patient restless, inclined to sleep for a few moments, and then quickly sitting up in bed to facilitate the access of air to the lungs; submaxillary glands enormously swollen; abundant sanious discharge from the nasal passages; the whole expression of the child being indicative of extreme anxiety and distress. Upon depressing the tongue, a lardaceous, yellowish, or greyish yellow membrane was revealed, situated upon the tonsils, uvula, pharynx, and even around the epiglottis, evidently extending to the larynx. In fact, the phenomena of Croup had supervened by extension of the disease. Emetic doses of sulph. zinci were given until free emesis had been provoked, and afterwards the pulverized nitrat. argenti applied freely to the affected parts. A warm bath was ordered, and a purgative dose of calomel administered. The application of the nitrate of silver was repeated twice during the night, and the chlorate of potassa given in doses of five grains every second hour. The case was one in which any treatment gave but little encouragement. The pulse rapidly failed; the respiration became more oppressed; the voice more feeble and hoarse; the general anxiety more disturbed; and an accession of suffocation terminated her suffering early on the following morning.

"This case was evidently one of Diphtheritis, and would probably, if we may judge from the rather slow progress made in the early stages, have been perfectly manageable under judicious local treatment, applied at a seasonable time. Insidious in its progress, it had attained, imperceptibly to the friends of the child, a fatal extension."

"O. P., aged seven years, sister to the subject of case just detailed, complained, on the 14th March, 1858, of slight soreness in the throat, attended with a little pain in deglutition, but continued her usual sports in the house and yard. Her mother states that there appeared to be a moderate fever during the night of the 14th. This condition of things continued, with no alteration appreciable to the parents, during the 15th, though the child's mother states that she saw two or three small white spots on the tonsils, and near the uvula, on the afternoon of this day. A cathartic of senna and manna was given. Seen on the 16th, there was a well marked febrile movement, pulse 120 per minute, only moderately firm; tongue slightly coated; respiration 20, without pain or difficulty, though attended with a slight laryngeal rale. On depressing the tongue, a patch of yellowish grey membrane, of the size of a ten cent piece, was discovered upon the left tonsil, and several small ones upon and around the velum palati and posterior superior portion of the pharynx; surrounding these the mucous membrane presented a deeper hue than in other portions. The submaxillary ganglions were much enlarged, and the cellular tissue around the throat infiltrated. Complains of little pain during deglutition; sensorial functions somewhat depressed, and expresses a desire to be allowed to sleep—without special tendency to adynamia. Recognizing the disease as of the same character as that which had but so recently proved fatal to the little patient's sister, I was impressed with the necessity of an active treatment, and, until other means could be obtained, cauterized the pseudo membranous spots freely with the solid nitrat. argenti, and ordered the following: R., Pulv. Ipecac gr. xx., Fiat chart. iv., S. Cap. unam omni quadrante hora donec vomitio excitetur. R.,

Hydrarg. Sub. Mur.; Sacch. Albae aa gr. iij, M. ft. ch. j. S. Cap. per. op. emet. A warm mustard pediluvium to be applied.

Returning in two hours, I learned that the emetic had operated well. Patient otherwise unchanged. Assisted by Dr. Blake, I applied the strong muriatic acid to the diseased parts. Ordered, to be given after the operation of the medicine, Potass. Chlorat. grs. vj., tertia quaque hora sumenda.; a saturated solution of the same to be used as a gargle.

17th.—Tumefaction of the submaxillary glands unchanged; skin moist; pulse soft; throat presented the characteristic appearance of cauterization, wherever the acid had touched; indications of an extension of disease upon right tonsil, and in the pharynx; touched these points together with the parts previously cauterized, with a mixture of equal parts of mur. acid and honey. This was repeated at noon, and in the evening.

At the evening visit, the swelling of the throat externally was evidently less; the pulse soft, 120 per minute; skin moist; complains but little of the acid applications, and only for a short time. Ordered animal broths.

18th.—Tumefaction of the submaxillary glands rapidly subsiding; pulse 120, soft; skin moist and of a natural temperature; bowels soluble; the progress of disease in the throat appears to be checked. I considered it prudent to reapply the acid mixture to-day; and, in consequence of a manifest weakness of the circulation, ordered Quin. Sulph. in doses of gr. ij. every five hours. Animal broth, and eggs lightly boiled.

After this, the only application to the throat was a solution of nitrat. argenti, gr. xl. to the ounce of water.

On the 21st instant the sloughs formed by the acid had fully separated, and the patient was considered convalescent.

These cases are interesting in several respects. The first, as showing the insidious progress of the disease, and its rapid fatality when extended to the aerial passages, and the importance of an early recognition of its true character.

The second, as illustrating the success attendant upon a prompt and active local treatment. In both these cases the early symptoms, as related by the mother, were substantially the same; in both, the characteristic pseudo membranous patches were present. There is no apparent reason why the result might not have been similar under timely medication."

The following was one of my first cases, in Sonoma, November, 1856:

Miss * * *, thirteen years old, of a delicate lymphatic temperament, had been afflicted with Diphtheritis for more than a week, when I first saw her. The disease had made its appearance in the usual insidious manner. She had felt some uneasiness, and afterwards a slight pain about the throat, which was soon followed by a moderate fever and swelling of the submaxillary glands. Upon examining her throat several small pseudo membranous spots were discovered on the right tonsil. The local affection continued to increase, without marked difference in the general symptoms, until she came under my charge.

Upon examining her throat, I found that the tonsils, velum palati, uvula, and a considerable portion of the pharynx, especially on the right side, were more or less covered with the characteristic yellowish white pseudo membrane. The uvula was coverrd with it, as a finger may be by a glove; from thence it extended downwards on each side between the pillars of the fauces on the tonsils, and upwards into the pharynx and the posterior nares, as was evident from the peculiar nasal intonation when speaking, and the exudation from the nose of a yellowish muco purulent matter, occasionally mixed with a little blood. Diphtheritic patches could be seen as far down the posterior surface of the cavity of the pharynx as the eye could reach. These were thin and apparently of recent origin. The false membrane on the tonsils appeared to be much thicker than elsewhere, and, on the right side it was of a dirtier color and partly detached around the edges, from which a bloody muco purulent sanies exuded. The submaxillary glands were tumefied, especially

on the right side. The breath was fetid and there was an abnormal discharge of saliva mixed occasionally with a little bloody muco purulent matter. The voice was sensibly altered, and the cough, which had recently supervened, assumed a croupal character, indicating that the disease was rapidly approaching the larynx; a little dyspnœa; the pulse was rather hurried and low, but not remarkably so; the appetite, though diminished, was by no means lost; no great thirst; no vomiting nor diarrhœa; no nervous or other general symptoms present. She took an interest in everything said or done, her mental faculties being altogether normal. Indeed, to one unacquainted with the insidious local extension and danger of the affection, there was nothing, as yet, *in the general symptoms* to cause apprehension, or to indicate that the life of the patient was actually in so great and imminent peril. In a few hours she would, in all probability, have been beyond the reach of medical aid. I immediately gave her an emetic, and, half an hour afterwards, commenced cauterizing the diphtheritic patches, wherever I could see or reach them, with pure muriatic acid. This I did at first three times a day, gradually diluting the acid as improvement took place. The progress of the affection was checked at once, but the patches remained in statu quo for a day or two, when they gradually diminished, and the submaxillary swelling disappeared. As adjuvant to the treatment, fractional doses of ipecacuanha and calomel, acid drinks, and an astringent gargle, were given. The extremities were carefully kept warm by sinapisms and hot applications; the head was raised high on the pillows, and the room thoroughly ventilated. A little later, as a tonic, small doses of quinine were administered, and wine and light food were allowed.

In a week after I first saw her, the diphtheritic patches had disappeared, and although a very delicate child, so little was she prostrated by this severe attack that, on the eighth day after my first visit, she took a place beside me in a buggy, and I drove her fifteen miles to the landing place of the steamboat on our way to San Francisco, where we arrived the same day.

I continued to see her for some time afterwards. Her improvement was rapid; the only remaining symptom, proving how far she had been under the local influence of the disease, was the inability to swallow liquids without losing a portion through the nose.

This unpleasant remnant of the affection gave her and her friends much uneasiness, supposing, as they did, that it was owing to an extensive destruction of the soft parts about the posterior nares. But a careful examination immediately after the disappearance of the false membranes, wherever the eye could reach, showed no appreciable ulceration. The parts over which the false membranes had exhibited themselves, were much depressed and shrunk—so much so that the uvula was not more than one-fourth its original size. This, I was aware, was sometimes the case in Diphtheritis, and had been observed before by eminent pathologists. I, therefore, supposed that the same depression existed, from the same cause, in the posterior nares. However, I was not without some apprehension, until consulting writers on the subject, I found that several similar cases had been observed during other epidemics of Diphtheritis, in which, as the result showed, there was mere depression, but no loss of substance, the parts recovering their fulness shortly after the disappearance of the false membranes. So it was with my case. The depressed surfaces and shrunken uvula, a short time after convalescence, gradually recovered their natural size; and the normal condition of the function of deglutition soon afterwards followed.

In the above observations, we see in the first, reported by M. Bourgeois, an exceptional and rare case, where typhoid and gangrene like symptoms were allied with the general diphtheritic condition of the patient. In the others, observed by Dr. Hatch and myself, we see primary Diphtheritis, such as it generally occurs, with only one difference in my case, the passage of liquids through the nose.

Besides the occasional complications and coincidences already alluded to, Diphtheritis may occur *secondarily* to several other affections. There is, also, another distinct form of

pharyngeal exudations properly termed by Valliex, Guersent and others *pultaceous*, which is somewhat analagous to, yet very different from the primary pseudo membranous or true diphtheritic type. Pultaceous Pharyngitis is not a *primary* disease, but always occurs *secondarily*, as in the case of Scarlatina. Valliex says: *

"We have seen pultaceous Pharyngitis appear during Scarlatina; not so with pseudo membranous Pharyngitis. The last, during epidemics, attacks the subject ab initio (d'emblee), and is not preceded by another affection. However, pseudo membranous Pharyngitis may appear secondarily in certain affections—in rubiola sometimes; more seldom in variola, and still more rarely in Typhoid Fever."

In these secondary types, the system has been affected for some time previous, seldom less than three days and usually much longer, with *general symptoms* peculiar to other diseases, such as lassitude, nervous disturbance, fever of either a sthenic or asthenic type; pain in the head, back, limbs; gastro-intestinal disorders; exanthematous eruptions, etc., etc., before the pharyngeal plastic *exudations* supervene. Moreover, the Pharyngitis preceding and afterwards accompanying these secondary concretions will assume the characteristics of the usual Angina peculiar to the primary disease. Thus, for example, if the primary affection be Scarlatina, (though the eruption may be absent, which is altogether exceptional), not only the other general symptoms will have preceded the formation of the pultaceous patches, but these exudations will also be preceded by the *peculiar local inflammation and tumefaction* proper to the Angina of Scarlatina, and will not, as is generally the case in primary Diphtheritis, appear in an insidious manner. Rilliet and Barthez tell us that they have never observed these pharyngeal exudations in Scarlatina before the *second*, and sometimes not before the *tenth* or *eleventh day after the appearance of the Angina proper*, which is distinguished by a more general inflammation of the pharynx, its peculiar bright red

* Valliex, *Guide du Pratricien*—Vol. 2, p. 387.

color and greater tumefaction. The secondary concretions which supervene are of more opaque white color, much softer, more *pulpous*, caseiform, thinner, more easily indented and much less adherent than the pseudo membranous patches or layers of primary or true Diphtheritis. "They disappear sometimes the first day, not to appear again, but they generally remain during three or four days, and sometimes even then disappear and return." (Rilliet and Barthez). "In pharyngeal Angina of Scarlatina the tonsils appear more as if they were merely *coated* by exudation than covered by pseudo membranous layers. The contrary is known to be the case in Diphtheritis." (Bretonneau). In Diphtheritis, as I have already remarked, the false membranes gradually extend from the pharynx to the larynx, trachea and bronchiæ, thus prodncing *secondary Croup*, etc. The secondary Angina of Scarlatina, on the contrary, "has a greater tendency to invade the digestive tube." * The mucous membrane over which these secondary concretions lie, is generally much more inflamed, tumefied, painful and softened than in Diphtheritis. In the pultaceous Angina of Scarlatina the mucous membrane is not unfrequently *ulcerated* and sometimes *gangrened*. Not so in Diphtheritis. Besides, the engorgement of the submaxillary glands terminates much oftener by supuration in the pultaceous Angina of Scarlatina than in Diphtheritis.

Such are the principal local distinctions, besides the systemic, between Diphtheritis proper and the secondary pharyngeal exudations which sometimes supervene in the Angina of Scarlatina, as pointed out by Bretonneau, Guersent, Valliex, Rilliet, Barthez and other distinguished modern pathologists.

If the primary disease be Typhoid Fever, and a secondary Pharyngitis supervenes, the latter seldom assumes the diphtheritic form. In such cases the exudations which appear in the pharyngeal cavity are concrete puriform infiltrations in the cellular sub-mucous tissue, and not superficial pseudo membranes. They are generally imbedded on an ulcerated

* Valliex, *Guide du Medecin*—Vol. 2, p. 383.

surface, which, as before remarked, is not the case in Diphtheritis. Moreover, these concretions have a more gangrenous than diphtheritic appearance. Louis and Littre * consider them as the result of the continued fever, because they only appear during the latter periods of the primary typhoid affection. They soon assume a dark gangrenous color, and their surface becomes ridged and divided by furrows more or less deep, like so many eschars on ulcerated tissues.

Rilliet and Barthez, notwithstanding their unsurpassed opportunities, have observed only four cases of diphtheritic Pharyngitis in Typhoid Fever, and even these they regarded as coincidences and not as secondary to the primary typhoid affection. The angina and pseudo membranes appeared from fifteen to twenty-two days after the invasion of the Typhoid Fever, and only when an epidemic of primary Diphtheritis had just commenced, which gives good reason to suppose that in these cases the pseudo membranous Pharyngitis was rather a coincidence than a secondary disease.

Pharyngeal Gangrene, pathologically distinguished by the presence of *characteristic eschars*, occupying a more or less deep seated portion of the tissues, is an uncommon affection, seldom if ever occurring primitively. The English authors who still seem to regard it as a primary disease, in certain epidemics, generally base their opinions less on their own experience and observation, than on the descriptions of ancient writers. Thus, Dr. Churchill, in his excellent work on diseases of children,† alludes only to one solitary case as having occurred in his own practice, but seems to rely principally on the description of the epidemic published in 1748, by Fothergill, to sustain that opinion. However, the character of that epidemic, judging from Fothergill's own description, far from proving this, leaves, on the contrary, little or no doubt on my mind that it was one of Scarlatina Anginosa Maligna. I give the following quotations, selected from Fothergill, by Dr. Churchill himself, that my readers may form their own conclusions.

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* *Diction. de Med.*—Vol. 10, p. 448.

† Philadelphia edition of 1856, pp. 475 to 478.

"According to Dr. Fothergill, the disease comes on with such a giddiness of the head as commonly precedes fainting, and a chilliness or shivering like that of an ague fit; and these interchangeably succeed each other during some hours, till at length the heat becomes constant and intense. The patient then complains of an acute pain in the head, of heat and soreness rather than pain in the throat, stiffness in the neck, commonly of great sickness, with vomiting and purging, or both. The face soon after looks red and swelled, the eyes inflamed and watery, as in measles, with restlessness, anxiety, and fainting. The disease frequently seizes the patient in the fore part of the day. As night approaches the heat and restlessness increase, and continue till towards morning, when, after a short, disturbed slumber, (the only repose they often have during several nights,) a sweat breaks out, which mitigates the heat and restlessness, and gives the disease sometimes the appearance of an intermittent. If the mouth and throat be examined soon after the first attack, the uvula and the tonsils appear swelled, and these parts, together with the velum pendulum palati, the cheeks on each side, near the entrance into the fauces, and as much of them and the pharynx behind as can be seen, appear of a *florid red color*. This color is commonly most observable on the posterior edge of the palate, in the angles above the tonsils, and upon the tonsils themselves. Instead of this redness, a broad spot or patch, of an angular figure, and of a pale white color, is sometimes to be seen, *surrounded with florid red*, which whiteness commonly appears like that of the gums immediately after having been pressed with the finger, or as if matter ready to be discharged were contained underneath." "The appearance in the fauces continues to be the same, except that the white places become more ash-colored; and it is now discernible that what at first might have been taken for the superficial covering of a suppurated tumor, is really a slough concealing an ulcer of the same dimensions."

Dr. Churchill continues: "Dr. Fothergill mentions *other symptoms worthy of notice. The first is an erythematous*

eruption on the face, neck, hands, and breast, with some tumefaction, and occurring generally on the second day. Another phenomenon is a swollen, hard, and painful condition of the parotid glands on each side; and if the disease be violent, the neck and throat are surrounded with a large œdematous tumor, sometimes extending to the breast, and, by straightening the fauces, increasing the danger. Delirium was a frequent symptom in those cases; occurring the first night, bearing a direct relation to the feverish exacerbations, and equally relieved by the perspiration which broke out towards morning. The pulse was very quick for some days, but although the uvula and tonsils were inflamed, the difficulty of swallowing was less than might have been expected. The offensive putrid smell was not only evident to those around, but even to the patient himself. In severe cases, the disease extended to the inside of the nostrils, which was of deep red or livid color, and a putrid sanies was discharged, so corrosive as to excoriate the parts over which it flowed. The lips, also, and the margin of the anus, occasionally exhibited the same appearance. Dr. Fothergill thinks it probable that the diarrhœa may be owing to this discharge being swallowed. Hemorrhages from the nose, mouth, and ears sometimes occurred, in general to a moderate amount; but in some cases proving suddenly fatal. They seemed to result from the injury of some arterial branch by the ulceration. The duration of the disease was variable; some seemed to mend after the second day; others continued three, four, or six days, even when favorable, *and the decline of the disease was marked by the disappearance of the eruption*, the subsidence of the pulse and fever, and the throwing off of the sloughs, and the more healthly appearance of the ulcer. In unfavorable cases the diarrhœa persists; they generally spit very little, the fauces appear dry, glossy, and livid; the external tumor grows large; they void their excrements without perceiving it, and fall into profuse sweats; respiration becomes difficult and laborious; the pulse sinks; the extreme parts grow cold, and death in a few hours closes the scene."

If we compare this description with the more recent accounts of epidemics of Scarlatina Anginosa Maligna, there cannot be, it seems to me, much doubt that the epidemic observed by Fothergill was of that character, viz.: secondary Pultaceous Angina of Scarlatina, of a malignant type, terminating, in many cases, with gangrene. In 1748, (the date of Fothergill's observations,) the pathology of Scarlatina was far from being well understood; indeed, it was then a disease of very recent origin, having appeared in England for the first time towards the end of the seventeenth century.

Pharyngeal Gangrene is essentially a secondary disease, supervening principally during exanthematous fevers, or the last stages of acute febrile affections, always indicating serious systemic cachexia, and abnormal fluidity of the blood.

Too much care cannot be taken in the diagnosis of this exceedingly fatal affection, for unless the distinctive characteristics between pseudo membranous purulent elimination and true gangrenous eschars are kept in mind, grave mistakes are sure to occur.

Pharyngeal gangrenous eschars are depressed, black, or dark greyish colored, with yellowish edges, clear cut, and distinct from the surrounding mucous membrane. They have an exceedingly fetid, sui generis odor; they are formed at the expense and by the mortification of the tissues, and therefore their subjacent bed is always ulcerated.

The diagnosis of Pharyngeal Gangrene is sometimes still more difficult, on account of the situation occupied by the affection, especially when it assumes a *circumscribed* form, as is generally the case when it is seated in the lower portion of the pharynx, either on its anterior or posterior surface, near its junction with the œsophagus, and is, therefore, inaccessible to the sight. Under these circumstances, the previous history of the case, the present general condition of the patient, gangrenous eschars in other parts of the body, and the sui generis odor of the buccal cavity may aid us.

However, the most common form of Pharyngeal Gangrene is the *diffuse*, which, as its name indicates, has a

greater tendency to spread, especially over the tonsils, velum palati, and pharynx. In this form of the disease the diagnosis is much easier; but should any doubt exist, Rilliet and Barthez indicate a good method to clear it, viz.: stimulate the vitality of the tissues to a new action, and cause the apparent eschars to fall, by cauterizing the affected parts. The condition of the mucous membrane and subjacent tissue will then solve the question. Of course, if the parts have been affected with gangrene, a corresponding loss of subjacent tissue, and an ulcerated surface will be observed. In certain doubtful cases of Diphtheritis, when the putrified false membranes take a gangrenous appearance and odor, this suggestion should not be forgotten. The examination of the subjacent mucous membrane should be as thorough as possible, and the depressed, shrunken, and ecchymosed surface occasionally left by the pseudo membranous affection, should not be mistaken for loss of substance, which is clearly shown by *well marked ulceration*. In protracted cases of Diphtheritis, when the termination of the disease is not by exfoliation of the patches, it is generally by muco-purulent elimination and decomposition of the false membranes, but not by gangrene. There is, however, a possible, but very rare complication of the two diseases, in which the diagnosis is exceedingly difficult; it is when a false membrane occurs, a posteriori, on the ulcerated surface, resulting from gangrenous destruction. I have already alluded to the circumstances under which Diphtheritis is very apt to appear, a posteriori, by contagion, on ulcerated mucous and cutaneous surfaces.

Pathological Anatomy of Diphtheritis.—The morbid anatomy of the mucous, as well as of the false membrane, in Pharyngeal Diphtheritis, does not differ materially from that which is observed in pseudo Membranous Laryngitis.

The mucous membrane, immediately beneath the false membrane, is generally found intact and smooth, more or less dry, injected, and, in exceptional cases, covered with small ecchymosed spots. It is sometimes depressed and shrunk, but almost always free from actual ulceration. Ril-

liet and Barthez, however, cite two cases which fell under their personal observation, in which they found the subjacent tissue ulcerated. But they mention them *as exceptions*, to show that the conclusions of Bretonneau and others after him, should not be considered absolute. If these cases had been given by less accurate pathologists than Rilliet and Barthez, I should feel inclined to believe, considering the anomally of the occurrence, that the ulcerations observed had occurred a priori to the pseudo membranes, or were coincidences of *secondary* pseudo membranous or pultaceous Pharyngitis. M. Bretonneau gives the result of fifty-five post mortem examinations of subjects of all ages, who, in the space of two years had fallen victims to the epidemic of Diphtheritis observed by him, and in no case, even of the most severe nature, was there ulceration or gangrene of the subjacent mucous surface. He says: (Loc. Cit., p. 33) "small spots of ecchymosis and, also, a slight erosion of the mucous surfaces, on which the false membranes had been seated, were the most serious alterations I found." M. Bretonneau avers also, that the immediate cause of death in all, appeared to be the local mechanical obstruction of the breathing. Subsequent observations have confirmed these statements. Thus, Bouchut, in his recently published work on *General Pathology*, says: (Paris Ed., 1857, p. 521,) "Diphtheritic inflammation produces neither ulceration nor gangrene." Guersent expresses himself thus: "I have never found the subjacent mucous membrane in Diphtheritis thoroughly softened, black or grey, and presenting the exact aspect and odor of gangrene. In this respect my observations are exactly in accordance with those of M. M. Bretonneau, Delandes, and all those who have recently examined these pathological alterations without prejudice. In a few cases only have I found the mucous membrane a little softened, and, as it were, slightly eroded on the surface. I have never seen true eschars." *

The false membranes do not emit any fetid odor after death. They are of a whitish or greyish yellow, and are found on different points, in irregular patches of various

* *Diction. de Med.*—Vol. 3, p. 121.

sizes, covering more or less the tonsils, uvula, pharyngeal cavity, etc., and adhering strongly, especially to the mucous membrane of the pharynx. They are sometimes, when recent, thin and semi-transparent, but soon become opaque and of considerable consistency, and are composed of one or more layers, the whole varying in thickness from the fourth of a line to a line or more. At a later period, when these false membranes are undergoing purulent decomposition, they become mixed with blood and acquire a dirty grey or brown color, which has been, as I have already stated, mistaken for gangrene. They are not covered by epithelium, but are, by their under surfaces, in direct contact with the mucous membrane.

Pathological researches have not yet furnished anything definite and conclusive towards elucidating the primary cause of the special inflammation which produces these concretions.

Dr. Copland, in an elaborate and excellent resume, concludes that the mucous membrane itself is the seat of the inflammation producing pharyngeal as well as laryngeal false membranes. "Its vessels," he remarks, "exude the albuminous or characteristic discharge, which, from its plasticity and the effects of the temperature, and the continual passage of air over it, becomes converted into a false membrane." *

According to Dr. Seitz, (Ranking's Abstract, vol. 4., p. 334) the microscopic examination of a pseudo membrane from the larynx showed it to be composed almost entirely of pus globules, mixed with inflammation corpuscles, and a species of cell double the size of the pus globule, but otherwise similar to it.

Dr. Bretonneau thus alludes to their chemical composition: "I have endeavored by means of different chemical re-

* Dr. Copland observes also: "It may be of importance to know that Croup—identical in its phenomena and organic changes with the disease in the human subject—occurs also in several of the lower animals, especially before they are fully grown. Its occurrence in chickens is well known by the name of 'Pip.' Dupuy, Rush, Valentin, Youatt and others have observed it in horses and dogs; Double, in lambs and cats, and Ghisi and Gohier in cows. In some of these animals it has even occurred as an epidemic."

agents, to establish the differential character of the pseudo membranous concretions, the albuminous concretions, which are the consequence of inflammation of the serous membranes and the fibrin of the blood, and I have not been able to discover any. Sulphuric, nitric and hydrochloric acids coagulate all; acetic acid, liquid ammonia and alkaline solutions, dissolve all, and convert them into a diffluent and transparent mucous, exactly at the same temperature, and in the same vessel." *

They are insoluble in cold or even in warm water, but they become softer and dissolve in a strong solution of nitrate of potassa. Dr. Ozanam † writes of having recently placed pieces of false membrane in a solution of bromine of potassium, which caused them to dissolve and disappear entirely, after being three days in the solution.

I have searched in vain for an analysis of the blood in primary pharyngeal Diphtheritis. It is to be regretted that modern pathologists have not yet directed their attention to this important subject in relation to this affection. The analysis, to be satisfactory, should be made during different epidemics and different stages of the disease. From the mechanical obstruction preventing free inhalation of the air, and, consequently, perfect hematosis, as well as from other causes already pointed out, the blood will doubtless be found in an abnormal defibrinized condition, if examined during the latter stages of the malady. The most important point, however, in such an analysis, would be to determine the state of the blood in the incipiency of the attack, and during an epidemic assuming an uncomplicated type. The subjects of the experiments should, of course, be carefully selected amongst those possessing, until then, a healthy constitution free from all pathological diatheses.

The maxillary glands are found more or less enlarged, tumefied, and of a pale red color. Occasionally the adjoining cellular tissue is also affected with phlegmonous or œdema-

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* *Traite de la Diphtherite*—p. 293.

† *Gazette Medicale*, of Paris—1856, p. 354.

tous swelling, but the inflammation of the glands seldom terminates by suppuration. *

Besides the morbid appearances observed in the pharynx, and generally, also, in the larynx and trachea, plastic concretions are sometimes found on the mucous surface of the œsophagus, stomach and intestines, also on the skin. But these exceptional occurrences, as well as other pathological conditions, occasionally present in other parts, are complications and coincidences, and are not pathognomonic.

Treatment.—I have but little to add to what I have already said, relating to the treatment of Pharyngeal Diphtheritis. I have, I think, sufficiently insisted on the importance of local cauterization, to show that I consider it the anchora salutis in this affection. "The success of the topical medication is, in our day, too authentic to be contested." (Rilliet and Barthez.) My experience, as well as that of others, confirms this in the strongest manner. I have in many cases, when called in during the incipient stage, relied upon it alone, without the aid of any general treatment, and always, as extraordinary as it may appear, with unfailing success. In this, I am ready to admit, I must have been not a little aided by the character of the epidemic, which generally assumed an uncomplicated form. Following Bretonneau's method, I also selected the agent, amongst the caustics, which his experience led him to recommend. He used muriatic acid in the following manner: when the false membranes occupied a considerable surface, he brought the pure, or nearly pure acid in contact with the diphtheritic patches, by means of a camel's hair pencil, or probang, after expressing the surplus liquid, so that the parts containing the caustic were merely moistened with it. He advises two applications per day, extending the caustic a little beyond the diseased edges, in order to substitute a new local phlegmasiæ for the specific inflammation. The acid should be weakened as the case progresses. If, as occasionally happens, new patches reappear on the old spots, the same treatment should again be resorted to.

* Rilliet and Barthez—Vol. 1, p. 251.

The first effect of the caustic is sometimes to detach the loose portions of the false membranes, which adhere to the brush or sponge. Generally, however, when the pseudo membranes are not of recent origin, the application must be continued for several days, sometimes over a week, before the patches disappear entirely. The subjacent mucous membrane, after the removal of the plastic layers, appears red, and sometimes a few drops of blood will ooze through.

With some children it is exceedingly difficult to perform the operation with care and exactitude. In such cases the muriatic caustic should be made weaker, by the addition of an equal part of honey. A solution of nitrate of silver (from two to four scruples to the ounce of distilled water) may be substituted for the acid, for swabbing the affected parts. In mild and recent cases the application of powdered alum, or chloride of lime, according to Velpeau's plan, may be sufficient. To apply these, it is simply neccessary to moisten the finger with a solution of gum arabic, and, after dipping it in the caustic powder, carry it into the cavity, and smear the affected parts.

But, should these milder measures fail to arrest and master the local affection, no time should be lost, and the more energetic means should at once be resorted to. Should the child be so intractable as not to allow this, and should the means usually resorted to fail to conquer the obstinacy of the little patient, considering the urgency of the case, it would, I think, be proper to have recourse to anæsthetic agents.

When the pseudo membranes have reached the larynx, thus producing secondary Croup, the prognosis is generally altogether unfavorable, and the treatment should be that of the last named affection. Unfornately, under these circumstances, tracheotomy is much less advisable than in primary Croup, and, in my opinion, should seldom, if ever, be attempted. The low condition of the patient at this stage of the disease, the extensive surface occupied by the false membranes, the uncertainty whether the affection has not already reached a lower portion of the respiratory tubes, the

ifornia epidemic, I had myself been the witness of a case in which death was caused, not by the pseudo Membranous Laryngitis, against which a blister had been applied on the sternal surface of the chest of a child three years old, but by the cutaneous diphtheritic concretions which followed the application. Trousseau, Guersent, Dunglison, and other practitioners, have observed similar results, produced by the use of blisters in pseudo Membranous Pharyngitis.

In the secondary types of Diphtheritis the topical medication, although of no less importance, is adjuvant to the general treatment indicated by the nature of the primary affection.

V. J. FOURGEAUD, M. D.

Sacramento City, November 1st, 1858.

ERRATA.

Page 8, line 20, read *becomes* instead of *become*.
" 8, " 29, read *bronchiæ* instead of *bronchies*.
" 16, " 23, read *sustains* instead of *sustain*.
" 21, " 2, (note), read *are* instead of *is*.
" 31, " 15, read *bronchiæ* instead of *bronchies*.
" 42, " 10, read *Horace* instead of *Thomas*.