DIPHTHERIA

AND ITS TREATMENT,

WITH

STATISTICS OF ONE HUNDRED AND SEVENTY-NINE CASES.

BY

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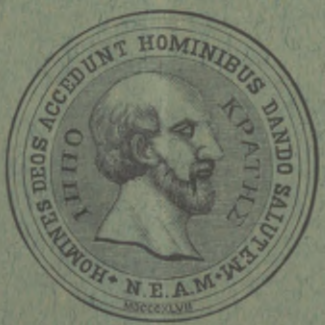

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Read March 16, 1876.

In December, 1753, there was read to a Society of Physicians in London an "Extract of a Letter from Cadwallader Colden, Esq.," a retired eminent physician, of this city, "to Dr. Fothergill, concerning the Throat Distemper," dated "Coldenham, N. Y., October 1, 1753." An original published copy of the work containing this treasure, for such it is from its intrinsic merits, as well as from its antiquity and its local associations, is now in the library of our President, where, through his courtesy, I have seen it.

In the library of this Academy, contributed to it by Dr. Purple, is a very rare and valuable pamphlet, entitled "An Inquiry into the Nature, Cause, and Cure of the Angina Sufocativa, or Sore-Throat Distemper, by Samuel Bard, M. D., Professor of Medicine in King's College, etc., etc. New York, 1771. 8vo, pp. 33." This was translated into French by M. Ruette, and published in Paris in 1810. This was eleven years before the publication of Bretonneau's first paper.

From those early beginnings down to this Centennial year the medical profession of this city have continued to make, from time to time, valuable additions to the sum total of known facts relating to this fearfully interesting disease.

Following, though at a distance, such worthy examples, I shall now have the honor to present a few general remarks based on the personal observation of more than three hun-

dred cases of diphtheria, and an account of my treatment, with its results, in one hundred and fifty-seven cases.

For more than three years diphtheria has been continuously and increasingly epidemic in this city. In 1873, four hundred and eighty-two deaths were reported from this cause; in 1874, sixteen hundred and sixty-five; in 1875, twenty-three hundred and twenty-nine. Until radical sanitary reforms shall have been effected, it is likely to continue to tax heavily our therapeutical resources.

Great diversity prevails in the views held as to the nature of this disease, and still greater in the methods employed in its treatment.

Of its nature two opposite views are maintained: one, that it is a constitutional disease, with local manifestations; the other, that it is a local disease, with constitutional effects. Mild cases suggest the latter view; severe ones *seem* to uphold the former. In many mild cases we see simply a local inflammation, accompanied with membranous exudation, of moderate intensity, tending to recovery, and throughout its course as free from any accompanying indications of blood-infection as is simple tonsillitis. In severe cases we see overwhelming constitutional disease; but does this necessarily imply a specific primary blood-poison? The result of my own observations has been to make me a convert to the minority who believe that it does not, and that the source of the constitutional disease is in all cases to be found in the local affection. I have been led to this belief mainly by the three following facts:

1. In the great majority of the constitutional cases which I have seen, the local affection has been much more severe and extensive than in the other class. In this remark I am corroborated by writers of various pathological views. Dr. J. Lewis Smith, for instance, says, in his work on the "*Diseases of Children:*" "Whatever may be our opinion on the nature and causes of diphtheria, clinical observations show that the gravity of the malady is, in most instances, proportionate to its local manifestations, at least in the commencement of the

disease. If, by our treatment, we can limit the exudation to a small surface, or can remove it, so that the inflammation, from croupous, becomes catarrhal, at an early stage of the malady, the patient is probably safe." [1]

2. The constitutional disease as I have seen it has been, in order of time, not antecedent to, but consequent upon the local affection. In many cases, it is true, fever has been the first symptom to attract attention; in a few, convulsions have preceded the formation of membrane; but in every case of uncomplicated diphtheria which I have examined at this stage, and the number has not been small, I have found inflammation of the throat present. In numerous instances in which considerable membranous exudation already existed there had been no manifestation of pain or soreness in the throat. This insidiousness of the invasion of the disease has doubtless been a cause of much error as to the order in which its symptoms have actually occurred. It certainly was so in my own case, until experience taught me to examine the throat of every child whose illness was not otherwise plainly accounted for. So unvarying have been the results of my observations since, that I am confident that the more uniformly this rule is put in practice the fewer will be the cases of diphtheria in which the constitutional symptoms will be supposed to have preceded the local ones.

Another common source of error in regard to this point is the fact that diphtheria *often supervenes upon some other disease.* A child, for instance, has taken cold, from the effects of which he is drooping and feverish for several days. Upon the catarrhal sore-throat thus produced diphtheria sets in. The previous symptoms are naturally supposed to have been those of the invasion of the latter disease, when in fact they were nothing of the kind. This mode of origin is very common. Diphtheria also supervenes on aphthæ, on herpetic and common ulcerative tonsillitis, on the sore-throat of scarlatina, of measles, and of influenza, on enlarged relaxed tonsils, etc.,

[1] This is exactly what my treatment accomplishes in the great majority of cases.

etc. No wonder that the minds and the descriptions of those who regard it as a primarily constitutional disease have been hopelessly confused among its various modes of origin. Regarding it as a local disease developing on a soil prepared for it by various prior affections, this confusion vanishes, and the whole subject becomes simple and comprehensible.

3. The results of treatment on the principle of local disinfection, reported from many reliable sources, and embracing a great number of cases, strongly confirm this view. To make a small addition to this mass of facts is the principal object of this paper. Some eminent authorities who hold to the constitutional theory of the disease, unqualifiedly corroborate this testimony. West, for instance, who teaches that diphtheria is a constitutional disease like scarlatina or measles, makes this significant admission: "There is, however, usually a very marked connection between the early arrest of the deposit, however effected, and the speedy recovery of the patient." After quoting from Trousseau to the same purport, he continues, "Local remedies take a very foremost place in the treatment of diphtheria." By what logical relation he could connect his therapeutical facts and his pathological theory, I am at a loss to conceive.

The great majority of the cases of which I shall presently speak, exhibited, under local disinfectant treatment, just so much appearance of general disease[1] as would be produced by the same amount of simple sore-throat, and no more. A very intelligent physician, who has recently watched a number of these cases with me, has told me that, although previously a firm believer in the constitutional theory, so strongly has he been impressed by this circumstance, that he has adopted the opposite view.

These three concurring clinical facts have constituted to

[1] It *should* be unnecessary to point out the distinction between the symptomatic disturbances, often very severe, which may attend any inflammatory attack, and symptoms which indicate constitutional infection, or blood-poisoning. Yet these are often strangely confounded in the arguments of some advocates of the constitutional origin of diphtheria.

my mind strong presumptive evidence that the primary disease and the source of all constitutional infection in diphtheria is the local affection.[1] Rare cases are indeed said to occur that seem difficult of explanation by this hypothesis; but these exceptions, though they certainly do not "prove the rule," are too few to weigh heavily against it. Is it only in diphtheria that we sometimes see rapid and intense septic poisoning from an apparently very inadequate source?

Dr. Samuel Bard wrote as follows in 1771: "This disease I have described appeared evidently to be of an infectious nature. All infection must be owing to something received into the body. This, whatever it is, being drawn in by the breath of a healthy child, irritates the glands of the fauces and trachea, as it passes by them, and brings about a change in their secretions."

Prof. Jacobi, whose contributions to the literature of diphtheria bear the impress of extensive and philosophical study of the disease itself, and, to speak moderately, are second in value to none, sums up what I believe to be the true pathology and treatment of diphtheria—harmonious like all parts of truth, the one with the other—in the following well-chosen language:

"Although finally a constitutional disease, it is at the beginning nearly always local, or, in other words, infection enters the blood at a limited portal, which is the same in the great majority of cases. From this point of view, diphtheria is analogous to the septicæmia of wounded men and of puerperal women, and the local disinfection, which has been accepted as the sheet-anchor in the treatment of these affections, must be also the main reliance in that under consideration. We may congratulate ourselves upon this fact; since we do possess some positive knowledge in regard to the disinfection of accessible putrid fluids, while it is safe to say that as yet we have no proof of our ability to disinfect the blood of the living body."[2]

[1] In taking this view, I do not adopt, nor take at all into consideration, the bacterial theory of Oertel and others.

[2] "Contributions to the Pathology and Therapeutics of Diphtheria," in *The American Journal of Obstetrics*, February, 1875.—There is, in my

I have dwelt thus long upon the question of the primary nature of diphtheria, believing it to be no trivial topic of casual discussion, but a problem the earliest possible right solution of which by systematic clinical and pathological observation and experiment is of the utmost importance, in view of its direct and vital relation to the treatment of a disease which is annually desolating so many homes.

Regarded as a primarily local disease, diphtheria presents three essential elements: first, the contagium, respecting which I know nothing; second, the inflammation, with its destruction of epithelium and its pathognomonic exudation, its accompanying nerve-irritation and symptomatic fever; third, the resulting specific and septic poisons. The indications of treatment are, of course, first, to destroy the contagium; second, to subdue the inflammation. This we shall accomplish, if at all, mainly by removing its cause. Third, to combat the absorption of poison. This we shall do with more or less success by washing away and disinfecting the offensive secretions from the affected surfaces, and by the employment of remedies which locally contract the absorbent vessels—failing in which, constitutional remedies will avail us but little in bad cases. In short, the treatment of diphtheria is local disinfection.

This achievement, so simple in the announcement, presents many practical difficulties, which are, indeed, in some cases quite insurmountable. The problem is to apply to a highly sensitive inflamed surface agents energetic enough to destroy morbific germs, and neutralize putrescent poisons, and yet mild enough not to increase by irritation the inflammation that we would subdue. They must also, in many cases, be conveyed to the inaccessible recesses about the pharynx and

opinion, more essential and valuable truth respecting this disease in this little monograph than can easily be found elsewhere. It should be carefully perused by all students of this much perplexed subject. It is proper to add that while I coincide with Prof. Jacobi's views in almost every particular, I am not his "follower," except in the order of publication. My own pathological conclusions and my present mode of treatment were independently arrived at (as many of my friends know) before his paper was written, or I knew anything of its author's views.

the posterior nares—particularly inaccessible in the case of very young patients, who struggle with wonderful and too often fatal success against the efforts of their would-be preservers. Moreover, in very malignant cases the inflammatory process extends with such rapidity from the surface to the deeper tissues that the sources of blood-contamination are early placed beyond the reach of remedies. Invariable success in the face of such difficulties is doubtless, in the nature of things, impossible. Diphtheria may in time be absolutely erased from the list of death-causes, but it will be by the sanitarian and not by the therapeutist.

Two questions present themselves: 1. What are the best medicinal agents for our purpose? and, 2. What are the best methods of applying them?

The list of disinfectants which have been employed with more or less success in the treatment of diphtheria is very numerous. Among these none has received so general and so authoritative testimonials for practical value as the tincture of the chloride of iron. Some interesting observations on its mode of action are given in Prof. Jacobi's paper from which I have previously quoted. It has seemed to me not only to be a valuable local disinfectant, tonic, and astringent, but also to oppose by some constitutional action the absorption of septic poison.

I think that next to this in order of value stands lime-water, which is disinfectant and solvent to diphtheritic membrane, and is mild and harmless.

Third, I should place glycerine, which is disinfectant and solvent, and valuable for its pleasant taste.

Chlorate of potassa, carbolic and salicylic acid, and the sulphite of soda, are septicides too well known to need remark.

The methods of applying remedies in diphtheria are greatly controlled by the circumstance that it is usually a disease of children. Out of more than three hundred cases, I remember only four in adults of mature years. Perhaps a dozen others were in young persons over fourteen years of age. The great majority were in children under twelve. Although most of these little patients were nursed incessantly by their parents

or other relatives, often in the worst hygienic circumstances, in only one case that I knew of was the disease communicated to an adult. Of 124 cases visited in my dispensary district in 1875 the ages were as follows: 8 of one year (that is, between one and two), 12 of two, 16 of three, 13 of four, 11 of five, 15 of six, 11 of seven, 12 of eight, 7 of nine, 5 of ten, 1 of eleven, 4 of twelve, 3 of thirteen, 1 of fourteen, 1 of fifteen, 1 of sixteen, 1 of eighteen, 1 of nineteen, 1 of thirty-seven. Of the 4,476 deaths from diphtheria in this city in the last three years, 2,916, or 65 per cent., were of children under five. 3,979, or 89 per cent., were of children under ten. Some authorities speak of diphtheria in adults as if it were common; and some irregular practitioners are said to have treated, and of course cured, great numbers of such cases. Their experience has been peculiar.

Being a disease of children, being comparatively short in its duration, and requiring in its treatment no special manipulative skill, diphtheria, unlike most other throat-diseases, falls mainly under the observation of the general practitioner, rather than of the specialist.

Foremost among the methods of throat-disinfection is the internal administration of medicines. I have employed it in every case. I believe it to be greatly preferable to topical application by brush or probang, which is apt to be irritating and unsatisfactory. It is important that medicines thus administered should be agreeable to the taste, especially in the treatment of young children, and also, of course, that they should be harmless when received in considerable quantities in the stomach. As they are given mainly for their action as throat-washes, the necessity of their frequent administration is evident. I present three formulæ of combinations which I have employed in many cases, and which I recommend as simple, pleasant, effective, and innocuous:

℞. Tinct. ferri chloridi, fl. ʒjss.
Glycerinæ,
Aquæ, āā fl. ℥j.
M. S. A teaspoonful every hour.

For children under three years, only one drachm of the tincture of iron in this mixture is sufficient. This combination tastes pleasantly. I have hardly ever known children to object to taking it. Nor have I ever perceived any harm to result from its administration. Where vomiting is present, however, it must sometimes be omitted. Larger or more frequent doses have sometimes seemed to be beneficial in bad cases. I formerly generally accompanied this prescription with the following:

℞.	Potassæ chloratis,	ʒ ss— ʒ j.
	Glycerinæ,	fl. ℥ ss.
	Aquæ calcis,	fl. ℥ ijss.

M. S. A teaspoonful every hour.

This should be given alternately with the preceding one, with half-hour intervals between the two. This frequency of administration should be insisted on, except during the night, when the patient should be allowed to sleep an hour or two at a time if he will.

Instead of this latter prescription, I have in many of my more recent cases employed the following:

℞.	Acidi salicylici,	gr. x—ʒ j.
	Sodæ sulphitis,	ʒ ss— ʒ j.
	Glycerinæ,	fl. ℥ ss.
	Aquæ,	fl. ℥ ijss.

M. S. A teaspoonful every hour, alternating, at half-hour intervals, with the iron mixture.

The sulphite of soda is used to dissolve the salicylic acid. Theoretically the combination of two such septicides should be especially effective, and so it has seemed to be.

To these I have, when practicable, superadded the following:

℞.	Acidi carbolici,	m. xv.
	Aquæ calcis,	fl. ℥ vj.

M. S. To be applied to the throat very frequently in the form of spray.

It is important to use the right instrument for this purpose. This is a little perfumery-atomizer in which the rubber bulb is attached to the bottle at right angles without

the intervention of a flexible tube. It is "Apparatus No. 56" of Codman & Shurtleff's manufacture. Its great advantage is that it can be used with one hand, in any position. The patient being told to open the mouth widely, the spray should be thrown directly into the throat, the atomizer being held a few inches from the mouth. This should be done for several minutes at a time. To avoid disturbing the patient too frequently, I generally direct it to be done just before or after the administration of each dose of the medicine—that is, every half-hour. I have found this remedy, when faithfully and efficiently applied, of very great value. Its effect is more generally diffused and continuous than that of medicines that are swallowed, and is manifest in accelerating the softening and disappearance of membrane, and deodorizing the breath. It is pleasant to the patient, and can be freely applied to many children who are too young to use gargles. Unfortunately, children under two or three years of age resist its use, which precludes its effective employment in their cases.

The early and thorough use of the nasal syringe or douche is often essential to success. I believe that many cases have been lost because this means has been omitted or too long deferred. We should not always wait until the obstructed and snuffling breathing indicates that the posterior nares are already seriously invaded. If, after a faithful use of the applications which I have previously described, an offensive odor of the breath persists, we may infer that there is some lurking-place of the disease which we have failed to reach, and that this measure is indicated. The operation is certainly not pleasant to the patient, but, if properly performed, is not especially formidable. The child should be seated on the lap of one person, who should secure his hands. Another, preferably a man, should stand behind him and support the back of his head (which should be inclined forward) against his breast, holding it firmly with a hand on each side. A third can then easily make the injection into the nostrils. The more strength and decision are manifested, the less is the child likely to struggle. The syringe should not

be too small, and the fluid should be injected with considerable force. It will then make its exit by the other nostril and also by the throat. This should be repeated a number of times at each sitting, until the nasal passages and pharynx are thoroughly cleansed. I have always used a two-ounce hard-rubber ear-syringe. I usually first inject tepid salt-water until the passages are thoroughly cleansed, and then conclude with one or two syringefuls in each nostril of the salicylic-acid mixture already mentioned. I have usually repeated this two or three times a day.

I have sometimes applied to particularly unyielding membranes, occurring in the older class of patients, a mixture of tincture of iron, two parts, and glycerine, one part. This should be touched very carefully to the surface of the membrane with the tip of a camel's-hair pencil once or twice a day. It seems to shrivel up the membrane, and hasten its disintegration. But too great caution cannot be exercised in making strong local applications. They should never be mopped over the inflamed throat. I have again and again seen this proceeding followed by intensification of the inflammation and spread of the membrane, the whole aspect of the case being rapidly changed for the worse. I doubt if I shall ever apply a brush to a child's throat in this disease again.

I believe that quinine is, as a rule, in the case of young children at least, worse than useless. By its detested bitterness it often causes them to dread the approach of the spoon, and to struggle against all medicine and nourishment.

This evil may easily frustrate a treatment the most important element of which is the very frequent administration of medicines. If there be a frequent struggle and crying, not only are nervous irritation, febrile excitement, and exhaustion, greatly promoted, but also, in this struggling and crying, diphtheritic material or irritating medicine *is likely to be drawn into the larynx, thus setting up croup.* I have seen this connection of cause and result very evident in more than one case.

I believe that no mode of treatment will ever be very successful in diphtheria, of which unpleasantness is an element.

That the importance of this point has been in so many instances practically overlooked, doubtless helps to explain why so many intelligent people, who are far from adopting the absurd theories of homœopathy, yet employ it as the less of two evils, especially for their children.

In the later stage of bad cases, when the nervous energies are yielding to the continued strain, I frequently give a grain of quinine, or, in preference, a drachm or less of the compound tincture of cinchona two or three times a day, which quantity I am unfashionable enough to consider sufficient for children in the absence of definite malarial or pyrexial indications, and *less likely to do harm than more.*

I have also employed a single dose of quinine in a very few instances, with apparent benefit, under circumstances similar to the following:

On the morning of April 15, 1875, I was called, in my private practice, to Carrie S., aged nine, it being the third day of her illness, and the second of the existence of membrane. The temperature then was 103°. In the evening I found the temperature 105½°, pulse 156, much nervous disturbance, membranes extending, with a margin of intense inflammation —the whole showing a tendency toward a malignant form of disease. I at once prescribed six grains of quinine, ice and spray to be used freely. Returning in three hours, I found the temperature fallen to 101°. On the following morning the local appearances had greatly improved. The case thenceforth did well.

Very high fever furnishes a soil favorable to the spread and malignant development of diphtheria, as of most other diseases, general or local, and the temperature in severe cases should be carefully watched. High fever at the onset of the disease is common, and generally abates without special treatment. I think quinine at that stage would be inappropriate and injurious. When the fever of onset is excessive, and accompanied with convulsions or other marked indications of nervous disturbance, I have found a single dose of calomel to promptly relieve these symptoms, and modify favorably

the subsequent character of the disease. Among the many venerable errors formulated from scanty or superficial observation, and perpetuated even by such recent writers as Dr. Cohen, is the one that diphtheria will not bear antiphlogistic treatment. Like all other diseases, it will bear best just that treatment which is adapted to the special indications of each case. The great majority of cases, however, require *no medication* except such disinfectant measures as I have previously described.

Stimulants should not be indiscriminately used in diphtheria. I have treated the great majority of cases without them, and believe this to have been an important element of my success. When unnecessarily or excessively employed, they may be very injurious. Cold milk is generally the best diet through the height of the disease. When this, or other nourishment is not taken freely, eggnog containing a very little brandy or wine is often acceptable and very valuable. Fruit or its juices are positively beneficial. Ice should be given freely, when the patient will take it.

The treatment which I have thus described is simply the most efficient system of harmless local disinfection that I have been able to devise. Its essentials are earliness, thoroughness, and *frequency* of application, and the *careful avoidance of irritation*, with, of course, such modification of these means or adoption of others as may be required by special exigencies. When any of these elements are absent, disinfectant treatment can never be fairly tested or judged.

Before presenting the results of my own treatment, I shall venture a remark or two on results in general. Many cases of diphtheria recover in spite of bad treatment. Many others will recover if let alone, or only harmlessly treated. The fatal tendency of the disease differs widely at different times and in different localities. With no other data to guide me than my own observations of the disease, I should estimate that the spontaneous recoveries would be about sixty per cent.,[1] on

[1] This per cent. probably expresses about the *actual present* average rate of mortality from diphtheria, the good results of some modes of treatment

an average, of all cases. I should be glad to learn the views of other observers on this point. It is certainly one of some practical importance. Are we not constantly reading and hearing of the successes of the most diverse and opposite methods of treatment, not only in regular practice, but in that of homœopathists and eclectics? Until Nature shall receive her due share of credit in our cases of recovery, she will doubtless continue to revenge herself upon us by helping to confound therapeutical science and bolster the pretensions of charlatans.

At the other end of the scale, in order of severity, there are doubtless more than five per cent. of all cases that through especial malignancy or various complications would prove fatal under the best treatment. The thirty per cent. or so that come between these extremes are the possible trophies of successful therapeutics. These proportions may vary so widely in small groups of cases, that statistics of treatment can only be valuable when based on a considerable number.

Another point in regard to which a general and definite agreement is very important is this: What is to constitute for statistical purposes the criterion of a case of diphtheria? Are instances of the "catarrhal"[1] form of the disease to be

which are beneficial being just about balanced by the bad results of others that are injurious. Many methods are a *mélange* of the beneficial and the injurious. Could a large number of cases be left to the *vis medicatrix naturæ* with milk-diet and good nursing, the favorable results as compared with those from an equal number under heroic stimulation and medication and energetic topical treatment would probably surprise the advocates of the latter. The experiment would doubtless be (comparatively at least) an eminently safe one *for the former*. I believe also that the results from cases treated solely by harmless "constitutional" medication—the sulphocarbolates, for instance—given at considerable intervals, just about illustrate what Nature can effect in this disease. *Real* homœopathic treatment of course does the same thing.

[1] The term "catarrhal diphtheria" is not properly used by Oertel. All diphtheria probably begins with, or sets in upon, catarrhal inflammation. In the transition stage from that to membranous exudation there are often, as is stated by most writers, and as I have many times seen, on the inflamed mucous membrane, specks, spots, beads, streaks, or small patches

entered with those of the membranous in the enumeration of results, and that without any distinction being made? I am reliably informed that, of the cases reported to the Board of Health, a considerable proportion have been found on inspection not to be diphtheria at all, or at best very questionable. I am happy to add that most of these spurious returns have come from irregular practitioners, and that their patients have all recovered. Yet it is too true that in many statistics which come from very respectable sources, and in regard to which no unworthy motive can for a moment be imagined, there is great lack of definiteness of statement in this respect, to say the least. Every case of diphtheria mentioned in this paper has been a well-marked one, attended with membranous exudation. If diphtheria has any pathognomonic sign it is this, which is indeed implied in the very etymology of the word; and any attempt to ignore it can tend only to hopeless confusion, and the practical worthlessness of statistics.

In the year 1873 I visited in the South District of Demilt Dispensary thirty-eight cases of diphtheria, and in the first nine months of 1874 fifty-one. In the last three months of 1874 I visited in the North District of the same dispensary, bounded by Twenty-fifth and Fortieth Streets, Sixth Avenue and the East River, twenty-nine cases; and in 1875 one hundred and twenty-four—a total in the three years of two

of a whitish or grayish color, sometimes thin and translucent, sometimes thick and opaque, sometimes raised above and sometimes apparently on a level with the mucous surface, but lacking the size, the uniformity of surface, and the firmness of texture, necessary to mark them as unmistakable diphtheritic deposit. This transition or formative stage of the disease is catarrhal diphtheria, if the term can properly be used at all. When the membrane is organized and unmistakable, it is then "croupous diphtheria" (to use another of Oertel's cacological terms), whether it be a millimetre or a quarter of an inch in thickness, and whether it be of the size of a three-cent piece or cover the fauces. No case should be enumerated as one of diphtheria in which the membranous exudation is not so distinctly marked that it *could not possibly be anything else.* Of such cases the proper classification is into mild, severe, and malignant. *Very* mild cases, if enumerated, should be specially described, so that the reader as well as the narrator may be a judge of their genuineness.

hundred and forty-two. In the same three years I attended in my private practice twenty cases, nine of which occurred in the last year, making altogether two hundred and sixty-two cases, besides a few seen in consultation. My treatment having been, as I believe, progressive, and certainly attended with improving results, it is only of the more recent cases that I shall give some statistics. Some of my memoranda of the dispensary cases having been incomplete or lost, I have made my knowledge of the history of each case complete by much toilsome and careful recent personal inquiry; and of what I am about to offer I assert the absolute, or very nearly absolute, accuracy.

I should not omit to mention that I am indebted for kind and valuable assistance in the care of a number of these cases, and for the entire care of a few of them, to my friend Dr. D. C. Comstock. With this acknowledgment I shall, to avoid unnecessary multiplication of words, continue the narration in the first person.

Of the one hundred and twenty-four dispensary cases in 1875, eleven occurred in January, nine in February, three in March, eight in April, seven in May, five in June, nine in July, twenty-two in August, twenty in September, eight in October, fourteen in November, eight in December—showing the greatest prevalence in August and September.

Of these one hundred and twenty-four patients ninety-four recovered, and thirty died—or $24\frac{3}{10}$ per cent.

That this rate of mortality is at least fifteen per cent. less than the average from genuine cases of diphtheria during that year in that district will, I think, be admitted by those best qualified to judge; though, in the absence of full and accurate returns of the number of cases, it would be impossible to prove it statistically. But it yet gives no idea of the actual results of my treatment, which I fortunately can show statistically and accurately.

Of these one hundred and twenty-four cases, twenty-two passed under the care of other physicians, in most instances after a single visit only, and, in some, without the medicine

I prescribed having been procured—leaving one hundred and two that continued under my treatment. Of the one hundred and two that continued under my treatment, eighty-eight recovered and fourteen died.

Of the twenty-two who passed under the treatment of others, six recovered and sixteen died. The extreme badness of these latter results is partly to be accounted for by the fact that some of them were hopeless, and others severe cases, for which, on account of my unfavorable prognosis, other medical aid was called in.

This is not, however, true of all, fully half of them having been by no means bad when I saw them. Some of these left my care through dissatisfaction at my not using topical applications. The results in such cases, as I have since learned them, were particularly bad.

Of the fourteen who died under my care, one was moribund when first seen, surviving only two hours; one was already a hopeless case of laryngeal croup; two others were hopeless cases from extensive membranous affection and marked indications of blood-poisoning Deducting these, leaves ten deaths out of ninety-eight cases in which the treatment was tested with some degree of fairness, or a little over ten per cent.[1]

In judging of these results the very unfavorable conditions of much dispensary practice must be taken into consideration, in the lack of intelligent and efficient nursing, and the circumstance that in many of this class of cases the physician is only called in after the disease has already made great progress. Again, from endemic causes the general mortality of the disease in some portions of my district was simply frightful, the deaths of several children in one family, or of a considerable number in a single tenement-house, being an occurrence of which I often heard. It was within the limits of this district that that dreadful instance of the death of six children out of eight in one family, which attracted such gen-

[1] Two other bad cases might properly have been deducted, leaving only a little over eight per cent.

eral attention about a year ago, occurred. The records of the Board of Health show that this region contributed more than its full quota to the death-roll of 2,329 in this city in 1875.

While the population of the Twenty-first Ward is less than $\frac{1}{17}$ of that of the city by the last census, the deaths from diphtheria in it in 1875 were $\frac{181}{2329}$, or more than $\frac{1}{13}$ of all. Making proper allowance for the fact that nearly all of the diphtheria cases occurred in that half of the ward which is bounded on the west by Third Avenue, and which constitutes practically my visiting district, the mortality from the disease was decidedly greater in proportion to population here *than in any ward in the city.*

Again, these one hundred and twenty-four cases of diphtheria occurred among a total of 2,056 *different* patients visited by me in that year, as the books of the dispensary show. Considering the great prevalence of the disease in my district during that period, is this proportion a large one? And, considering its great fatality there, is it probable that my cases were "exceptionally mild ones?" Who would be likely to see a full proportion of the bad cases, if not the visiting physician of the dispensary? I have notes of the full name, residence, and date, of each of these cases, with the result in each, and shall be glad to submit them to the inspection of any one; and I challenge investigation of any or all of them.

Considering all drawbacks, the results in these cases cannot fail to be regarded as remarkably good, and decidedly favorable to the utility of the treatment employed.

That this system of treatment is capable of yielding still more brilliant results, when tested under the more favorable conditions that usually exist in private practice, I am now prepared to show.

From May, 1874, to the present time, I have treated in my private practice seventeen cases of diphtheria, with only one fatal result, and this one in consequence of a peculiar complication which I will presently describe. These cases were nearly all seen early. Eight of them were of decidedly severe tendency, two being only narrowly saved from a fatal termi-

nation; the others were mild. I give them in the order of their occurrence, as follows:

Case I.—Lottie B., aged four; Windsor Hotel, May 9, 1874. Duration of the disease (that is, from the first visit to the final disappearance of the membrane), four days.

Case II.—Will B., aged two and a half years; 646 Third Avenue, September 14, 1874; duration, four days.

Case III.—Edward D.,[1] aged eleven years; 245 East Twentieth Street, November 15, 1874; a case of severe tendency; duration, five days.

Case IV.—Michael D., aged thirty years; 124 East Twenty-seventh Street, February 25, 1875. This was one of the class of cases which some writers denominate croupous or membranous pharyngitis. Believing that all true membranous exudation on mucous surfaces is essentially diphtheritic,[2] I have enumerated it here. In this case, firmly-organized membrane on the tonsils and the posterior wall of the pharynx supervened in the course of a previously-existing subacute pharyngitis, and persisted, by partial renewals, for nine or ten days, the pharyngitis still continuing for some time afterward, with much constitutional prostration. Similar to this has been the character of the few other adult cases which I have seen. The adult mucous membrane, in health or in acute inflammation, is inhospitable to diphtheritic contagion-germs, but in these instances seemed to be prepared for their reception by its previously enfeebled and relaxed condition. Similar supervention often occurs upon the enlarged tonsils of children, and the angina of scarlatina, and, as I have seen in

[1] There had just been two fatal cases in this family.

[2] Many writers, following Bretonneau, describe a croupous or membranous sore-throat which they assume to be something distinct from diphtheria. This is, probably, a "distinction without a difference." These writers simply describe diphtheria supervening upon a sort of herpetic tonsillitis, as I have previously pointed out. I have seen some most malignant cases of diphtheria begin in just this way, and many mild ones that did not so begin. Dr. A. H. Smith reported a few months since to the Pathological Society an interesting adult case, which began as "membranous sore-throat," and terminated fatally as diphtheria.

some recent instances, upon that of the influenza now so prevalent. Some of these cases of compound disease have presented interesting peculiarities. While the previously-existing disease has evidently invited the diphtheritic contagion, and has occasioned the unusually long persistence of membrane, it has seemed to ward off the absorption of poison, and consequent constitutional infection.

Cases V., VI., VII.—Minnie, George, and Carrie S., 195 Third Avenue, ages seven, eleven, and nine years; March 30, April 12, and April 15, 1875; three cases of severe tendency, but kept in control by the very efficient application of the treatment; duration, four, three, and five days.

Case VIII.—Lizzie H., aged five years; 322 East Twenty-seventh Street, October 29, 1875; a case of severe tendency; duration, six days.

Case IX.—John B., aged five years; 236 East Twenty-seventh Street,[1] November 27, 1875; duration, four days.

Case X.—Mary B., aged two years, sister of the preceding; November 29. In this case the tonsils and soft palate rapidly became intensely inflamed, the uvula being much swollen. Vomiting, evidently of a reflex character, followed every act of swallowing. Various mild and unirritating remedies were administered internally and by local application, the iron-mixture having been found inadmissible. The use of the spray was attempted, but the resistance of the child made its efficient application impossible. For forty-eight hours all medicine and nourishment were at once rejected. Then the vomiting gradually ceased. Eggnog was taken and retained pretty freely. But the mischief done was irreparable. The membrane had spread very extensively. In the absence of nourishment, septic poison had been absorbed. Death ensued on the fourth day of the illness. This is the second instance, within my experience, of the same complication in very young children, with fatal result. In a few instances, in which it has occurred in older children, it has yielded to the use of the spray within a few hours.

[1] There had been a fatal case in this house a week or two before.

Case XI.—Walter A., aged five years; 212 East Twenty-fifth Street, December 9, 1875; a very severe and critical case, with vomiting, intense throat-inflammation, membrane on tonsils, faucial arch, and uvula, and nasal implication; duration, six days.

Case XII.—Mary L., aged two years; 309 East Twenty-fifth Street, December 31, 1875; a mild but distinctly membranous case; duration, three days.

Case XIII.—Mary C., aged seven years; 158 East Thirtieth Street,[1] February 9, 1876; a severe case, with membrane covering tonsils and uvula, nasal implication, croupy cough, and aphonia; duration, five days.

Case XIV.—John D., aged fourteen years; 220 East Twenty-ninth Street, February 20, 1876; duration three days, the tonsillar inflammation and enlargement continuing for some days afterward.

Case XV.—Will W., aged three years; 285 Third Avenue, February 25, 1876. This patient was attacked suddenly at evening with high fever and convulsions. The throat was not examined, but the tonsils showed externally slight enlargement. Three grains of calomel were prescribed, and my usual remedies. On the following morning the fever had almost entirely abated. The tonsils were enlarged and inflamed, with a small patch of membrane on each. Twenty-four hours later these had disappeared. The surface they had occupied was plainly denuded of its epithelium, though there was none of that loss of deeper substance characteristic of ulceration. This "exceptionally mild case," but for the treatment so promptly employed, would probably have been severe.

Case XVI.—Mary B., aged six years; 692 Third Avenue, March 13, 1876; duration, four days.

Case XVII.—Willie, brother of the preceding, aged four years, March 16th; duration, five days.[2]

My friend Dr. E. J. Darken, house-physician to Demilt Dispensary, furnishes me with a still better record of results.

[1] There had been a fatal case in this house a short time before.

[2] There had been a fatal case in this house a week or two before.

Since November, 1874, he has employed in his private practice the treatment which I have described. From that time to the present, he has treated twenty-four cases, without a single directly fatal result. Four were severe cases, with much nasal trouble and glandular swelling. Five others were severe cases, with membrane over the soft palate and uvula. The ages were as follows: two of one year; three of two years; two of three; three of four; one of five; four of six; one of seven; three of eight; one of nine; two of ten; two of twelve.

The duration of membranous affection was as follows: in one case, two days; in two, three days; in six, four days; in five, five days; in ten, six days.

One was followed by convergent strabismus of both eyes, another by amaurosis, and two by faucial paralysis.

One, a child, one year and a half old, died more than four weeks after the final disappearance of membrane, and more than three weeks after Dr. Darken's last visit, under the following circumstances: It exhibited no particular indication of illness, but continued weak; not so much so, however, that its parents thought it requisite to consult a physician. At length it was taken suddenly ill, with symptoms of extreme prostration, and Dr. Darken, on arrival, found it dying. No *post mortem* was made. This death was evidently due, not directly to the primary nor the constitutional disease, but to some resulting lesion. It happened to Dr. Darken, during this period, to be called to two moribund cases. One was not prescribed for; the other was prescribed for, but was dead before the medicine was procured.

About the middle of February, the time at which I formed the design of preparing this paper, my friend and neighbor, Dr. William E. Bullard, kindly consented to give me such assistance, in the care of all dispensary cases of diphtheria that should subsequently occur, as should enable us, by very frequent visits, to insure thoroughness in the application of the treatment. From that time to the present, we have had fourteen cases, one other, a mild case, having, after a single visit,

passed under the care of another physician. Every one of these has recovered. The majority have been, or at least have been kept by the treatment, rather mild. But among them have been three of the very worst cases that were ever known to recover. In two of these, Sarah and George Davis, aged nine and six years, residing at 324 East Twenty-sixth Street, the tonsils were greatly enlarged, and tonsils, pharynx, uvula, and soft palate, were covered with firm, thick, and very persistent membrane. The nasal implication was also extreme. Besides much offensive sanious, muco-purulent material, a membranous cast of one of the nasal passages, an inch long, was brought away by nasal syringing. Of another, a case of croup, I will give the particulars presently.

The ages were as follows: one of four years; one of three; four of four; one of five; two of six; one of seven; two of nine; one of ten; one of twenty-seven.

The duration of membrane was as follows: Two of two days; four of three days; two of four days; one of five days; one of six days; one of eight days; one of ten days; one of twelve days; one of twenty days.

I have thus presented three series of consecutive cases, my seventeen, Dr. Darken's twenty-four, and Dr. Bullard's and my fourteen, commencing in each series at the time when this method of treatment was effectively commenced, and extending, with no omissions of any case treated, to the present time, making fifty-five in all, with only one death directly resulting from the disease, and one other remotely.

I believe that in genuine membranous diphtheria very few, if any, such favorable results, from so large a number of unselected cases, have ever been reliably reported. They will naturally excite incredulity.[1] I can only say of these cases, as

[1] The opposition of opinions as to the necessary fatality of diphtheria is astonishing. I am informed that, of two eminent professors in one of our medical colleges, one teaches that a true case of diphtheria never recovers; the other states that, out of a considerable number which he has treated, he has rarely, if ever, lost one which he saw early. In a recent discussion in the Obstetrical Section of the Academy of Medicine, as re-

of the others, that the name and address of each are at the service of any one, and that thorough investigation is invited. In my own cases, at least, even the correctness of the diagnosis can be substantially verified, for it has been my custom in private practice to show the throat to parents, and to point out the distinguishing features of the genuine disease.

Nor will it do to object that these have been "exceptionally mild cases." The number is too large, and they have occurred at a time and in localities in which the general mortality of the disease is well known to have been very great. Unmodified by treatment, their severity would doubtless have been fully equal to the average.

But while I thus defend my statistics against possible unjust criticism, I freely admit that it is only by the concurrence of unusual good fortune that this last group are so extremely favorable. I wish to state explicitly that I do not claim that this treatment will as a rule cure such cases as the two which I have just described. I do claim that it will, in the great majority of cases, when early applied, prevent the disease from becoming very severe, greatly shorten its duration, and avert serious systemic infection.

I believe I am warranted in claiming for it something more. Out of fully one hundred cases, including Dr. Darken's, in which the spray of lime-water and carbolic acid has been employed, there has been no instance of the subsequent occurrence of serious laryngeal complication, although in several of them it has been threatened by croupy cough, hoarseness, and aphonia. That the inhalation of the spray may have acted as a preventive in some of these is, I think, not improbable.

In a recent case of Dr. Darken's, this complication was

ported in the *Medical Record* of April 8th, Dr. F—— stated that "he had not saved a single case in which the membrane had become formed" (it would be interesting to know what treatment he has employed), "and inquired of Dr. C—— if he could point to any cases of diphtheria which had got well under his plan of treatment. Dr. C——, in reply, cited six cases in one family, with recovery in every case."

more than threatened, all the symptoms having been well marked, but having disappeared in about two days.

On Friday, February 19, 1876, I visited from the dispensary Rebecca Hewitt, aged four years, a robust child, at 338 East Thirty-third Street. The day before, as her mother said, she had begun to have a croupy cough, to which in the night had been added difficulty in breathing. I found her suffering from high fever, brassy cough which gave her great pain in the larynx, and stridulous, labored breathing, with marked depression over the clavicles at each inspiration. The throat was congested, and the tonsils much swollen, and on each of the latter was a patch of firmly-organized membrane. Believing that the case must end fatally in from twenty-four to forty-eight hours, I yet prescribed the iron and the salicylic-acid mixtures at half-hour intervals; had an atomizer procured, and directed the spray to be applied almost constantly. Fortunately, the child favored the operation by opening her mouth widely and inhaling the spray.

The next day I found the symptoms aggravated, both tonsils now being nearly covered with membrane, the aphonia complete, and the cough extremely harsh and painful, sometimes bringing up muco-purulent material in considerable quantities. There were high fever and violent headache. I prescribed five grains of calomel, the other remedies to be continued.

On the third day I called, expecting to find my patient dead, but on the contrary found her a little better. The dyspnœa persisted, but the sound of the cough was softer. The membrane upon the tonsils was loosening.

On the fourth day the case was seen by Dr. Bullard. The croupy symptoms were somewhat mitigated, but still grave. The membrane had disappeared from one tonsil and partially from the other.

On the fifth day, further improvement; membrane entirely gone from the throat.

On the sixth day all the symptoms were much worse, the patient having taken cold from a sudden change in the weather.

From this to the eleventh day gradual improvement occurred. During all this period the labored, stridulous respiration, with depression over the clavicles and capillary congestion, the harsh, painful cough, and the aphonia, persisted without any intermission. After the eighth day bloody material was coughed up profusely. The spray was applied throughout at very frequent intervals. After the ninth day inhalations of the vapor of hot-water containing the compound tincture of benzoin were also used.

On the thirteenth day, all the bad symptoms had nearly disappeared; but bloody material was still coughed up for several days.

The early disappearance of the membrane from the throat, and the absence throughout of indications of constitutional infection, are circumstances to be noted.

In my previous cases of this kind I had employed the usual steam-treatment, with no successful result. They nearly all illustrated the truth of Prof. Jacobi's remark that "the fact that it" (moist heat) "softens healthy tissue as well as morbid exudations, appears to favor the penetration of the poison into deeper layers." It has also seemed to favor the rapid superficial extension of the diphtheritic disease in the fauces, this having ensued in several of my cases which previously manifested no such tendency. I hope that, in the discussion which is to follow, some facts may be elicited as to the actual results of a mode of treatment in diphtheria which has been so extensively introduced among us by Oertel's article in Ziemssen's "Cyclopædia."

It is a truism that, however plausible the theory that suggests a method of treatment, the only touchstone of its merits is its actual results. So many and so well known are the elements of uncertainty attending even these, that they can become a reliable basis of comparison only when multiplied by a large number. The materials for such statistics exist among us in ample abundance. Had they been utilized, the young or inexperienced practitioner would hardly be so sorely perplexed as he must be to-day among a multitude of diverse

teachings. Let us for a moment imagine that, during these years of the fatal prevalence of diphtheria, there had existed among us a properly-accredited society or bureau for the collection of such statistics. Let us imagine that to this bureau all physicians had been requested to contribute particulars of the disease and of the treatment employed, in every case of recovery and of death. With such a request many would doubtless have complied. Had this been done we should now be in possession, not of a few detached and fragmentary data, but of masses of authoritative facts. Some of these would present unmistakably the results of modes of treatment that are simply harmless; others, of those that are beneficial; and still others might, like beacon-fires on a dangerous coast, warn us from the employment of methods that are positively injurious.

Shall the golden harvest of vital facts that is perpetually maturing in our midst remain longer ungarnered?

Postscript.—In illustration of some of my *negative* recommendations, which are scarcely less important than the positive ones, I append two cases out of many that might be cited:

Case I.—On a Tuesday, in August, 1875, I visited from the dispensary Mary Lyons, aged seven years, at No. 230 East Twenty-ninth Street, which block was infested with malignant diphtheria. The local disease was already extensive when I first saw her, and rapidly spread so that the pharynx, fauces, and nearly the whole roof of the mouth, were covered with thick membrane. I employed my usual treatment, with no quinine or stimulants, and milk as a diet, which she took freely. She continued to sit up much of the time; her pulse was good, and she exhibited very little appearance of blood-poisoning.

She was in this condition on the following Sunday, when, going in at an unexpected time, I found another physician visiting my patient. I at once resigned the case to him. This doctor, who was a very intelligent and courteous gentleman, expressed astonishment (as well he might) at seeing a case

with so extensive exudation exhibit so little constitutional disease. But did he let this remarkable phenomenon teach him its proper lesson? Instead of "letting well enough alone," he proceeded, in spite of my mild remonstrance, to "sustain" the patient by ordering alcoholic stimulants.

I recently learned the further history of the case from the mother. On the next day the doctor made some kind of topical application. The child "went right down." Five other doctors were called in by the distracted father. The child probably got stimulants and quinine enough, but died about a week later, covered with purpuric spots. The sudden change in the phenomena of this case needs no comment.

Case II.—In November, 1875, I visited from the dispensary Kate and John Mulhern, aged six and eight years, at No. 696 Second Avenue. They were cases of about average severity, both tonsils in each being enlarged and covered with membrane. I prescribed the tincture-of-iron mixture, to be taken every half-hour. The mother asked me if that was all I was going to do for her children. She said the doctor who was attending some cases in the same house came several times a day and made some application with a brush. My further services were not desired.

Calling a few weeks ago, in pursuit of statistics for this paper, I found that the family had moved away. The neighbors told me that these two children and a third, subsequently taken ill, had died. It may be said that they might have died under my treatment. This is, of course, possible, but is extremely improbable, so widely would it have been at variance with my usual results in such cases.

If any shall adopt some of my methods only to make them *part* of a treatment in which quinine, alcohol, etc., or topical brushing, play an important part, I predict that they will be the very ones who will report that my system is a failure!

In the discussion which followed the reading of this paper, Dr. J. C. Peters made a most suggestive statement. Having mentioned his concurrence with the views I had expressed, and the fact that he had for years employed a treatment similar in essentials to my own, he added:

"During my illness, my practice passed into the hands of other physicians, and I was surprised to hear of the number of malignant cases of diphtheria that occurred in it. After I recovered and resumed my practice, they *ceased to occur*."

In conclusion, I wish to place in this connection a brief extract from the remarks of my friend Dr. H. T. Hanks, in the course of the same discussion, as reported in the *Medical Record* for March 25th, for the sake of the corroborative testimony and a most important practical suggestion which it contains. Dr. Hanks said:

"Dr. Billington's success was truly remarkable, for he well knew the type of the disease as it had appeared in the Twenty-first Ward, having had, in his private practice during the last five years in that district, from twenty to thirty cases every year. He knew that many of the cases attended by Dr. Billington had been severe, and not a few malignant. Therefore, when the large per cent. of recoveries was considered, a cause must be looked for; and he believed two excellent reasons could be found for this satisfactory result. One was the kind of medicaments used locally and internally, and the other was the great care he bestowed in teaching the parents or nurses the *proper manner* of administering the remedies presented. This carrying out to the letter every little detail has had much to do, more than many have been led to suppose, in the cure of diphtheria.

"He wished he could sufficiently emphasize the vast importance, in treating diphtheria, of careful attention to the minutiæ. Many had been, and still were, in the habit of looking at the patient's throat, writing a prescription, ordering a gargle every few hours, and the nose to be syringed twice a day, believing that their directions would be followed. He knew, however, that one-half of the best class of patients even did not receive the full benefit of the medicaments, through lack of proper, intelligent nursing."

Dr. Hanks also mentioned that experience had taught him to employ a treatment similar in principle to mine, and with very good results.