Observations on Diphtheria in New York City U. S. A.

by

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which (more especially during the heat of summer) is unbearable.

From my own personal observations, which however, are limited, I am fully convinced, that the specific poison which produces this disease, very frequently, if not always, has its origin in the dwelling or near it; in other words, that the primary cause of this disease is to be found in drinking impure water or imperfect drainage.

The water supply of this city is furnished principally from the Croton Lake; the waters of which are considered to be very pure. Of late however, there has been a great amount of discussion regarding the impurity of its waters, owing to the alarming increase of malarial and typhoid fevers; in consequence of which, as the proper authorities would not investigate the subject, a trustworthy man was appointed by Mr Gordon Bennet of the New York Herald to inspect the lake and adjoining lands. In his report he says "No sheet of water has more filthy boundaries. The people who reside in its vicinity will not drink its waters. They regard its waters as

dirty if not poisonous. The hilly shores are cut and intersected by drains, which convey into the lake continually the washing suds, refuse and sewerage of the kitchen, and barn yards &c" But, as the aqueduct from the dam to the reservoirs in the city is about thirty-eight miles in length the water must to a great digree be freed from its impurities before it reaches the city, and can hardly be the chief cause in producing these diseases.

Diphtheria was almost unknown in the houses of the better class. Of course the wealthy are not crowded together to the same extent as their more unfortunate brethren, and the drainage and ventilation about their houses are as perfect as possible. Does not this to some extent prove, that imperfect sanitary surroundings have as much to do with the development of this disease as typhoid fever? I think so. And when a sporadic case of one or other of these diseases breaks out in the houses of the better class (contagion or infection being excluded) drinking impure water or defective drainage will be found the exciting cause. In proof of the above statement, I take the liberty of giving the following case. A lady boarding in the

house of friend Dr I. Halbert of this city. took ill from diphtheria in the fall of 1874. On account of feeble health she was confined to the house for fully four weeks previous to her illness from diphtheria. The question that presented itself to our mind was, how had she contracted the disease? for at no time had she been exposed to its contagious or infectious influence. After careful investigation into the whole history of the case, we formed the opinion, that the cause of this case was due to her having inhaled the gases from the water closet: the soil pipe of which was frequently choked, and allowed the foul air to escape into the basin and diffuse itself through the whole house. The room occupied by this lady was within a few feet of the water closet, and her health at that time being below the normal standard, was susceptible to the influence of that particular poison, and she contracted the disease. The necessary repairs were done to the water closet: the house was thoroughly disinfected and no other person took ill.

The board of health in Jersey City, which is separ-ated from New York by the Hudson river are fully impressed with the importance of

good drainage; and at a special meeting of that board held a few days ago, they were convinced, that the origin and spread of this disease in that city to such an alarming extent, was due in great measure, if not altogether to imperfect drainage; and at the suggestion of Dr Lochner the sewer pipes of all houses are to be ventilated by pipes connecting with the sewers at their entrance to the houses in order that the foul gases from the sewers may be conducted away from the houses, and thus in a great measure prevent the development of malarial and other fevers.

In Brooklyn moreover (which may be considered a suburb of New York) during the end of October and the month of November 1875. diphtheria and small-pox was epidemic to such an alarming degree, and the mortality from these diseases was so high, that the board of health considered it necessary to quarantine the houses in which either one or the other disease appeared, by hanging out a yellow flag from one of the windows. to warn the people that such diseases were there and not expose themselves to unnecessary danger. The medical officers constituting the

board of health in this city were also fully satisfied, that the origin and spread of these diseases was due to imperfect drainage and other unfavourable hygienic surroundings and are making the necessary inquires to improve the sanitary condition of their city.

It is no unusual thing for this disease, and scarlet fever or typhoid fever to be epidemic together; but that small-pox and diphtheria should be epidemic in the same districts at the same time is some-thing remarkable; at least I cannot recollect of having read of such a thing occurring before.

Temperature and season of the year did not appear to influence the epidemic in any marked degree. If anything it was more prevalent during the months of March, April and May 1875 during which period there was considerable variation in temperature and humidity.

Its contagious character appears to be well established. Many cases occurred in this city to prove it. In particular, one very distressing instance is known in which a child took this disease, and owing to the other members of the family not being removed

from its contagious influence, one after the other took the disease and died: the husband or father alone, out of a family of seven, having escaped its ravages. On the other hand when the disease has broken out in a family, and the other members were immediately removed from its contagious influence, they remained exempt from the disease.

From my own personal observation. I have not known of a single case where its origin could be traced to the spread of infection by those convalescent from the disease. This by no means harmonizes with the opinion of some physicians; but, having made special inquires on this point, in no case as yet could I be traced to such an origin.

The variety of forms which the false membrane assumed and the condition of the throat varied. In some cases the tonsils were enlarged to such a degree that they almost met; in other cases they were very little swollen. The tonsils, palate, uvula and pharynx were more or less of a deep red colour, and unequally turgid. The false membrane assumed various degrees of colour, from white to pearly grey. Fetor of

breath was present in every case. When the membrane was of a white colour, the breath was slightly tainted: but, when it was of a grey colour, the breath was almost gangrenous.

The membrane in some cases was confined to one tonsil only; in others both tonsils were more or less involved: whilst in a few cases which were very malignant the posterior half of the hard palate, the soft palate and uvula the tonsils part of the pharynx and posterior nares were more or less covered with membrane. The false membrane varied considerably in thickness. Occasionally it was no thicker than a thin piece of chamois leather: in other cases it was fully one eighth of an inch in thickness. In the majority of cases the false membrane could be easily detached by the finger or dressing forceps, on removal of which a raw bleeding surface was left, which was rapidly covered with a new layer. This new layer of membrane was seldom as thick or as dirty in colour as the first deposit. In some cases during the epidemic the membrane appeared on the tonsils in the form of little specks: these were more like cases of herpetic tonsillitis

than this disease, but some physicians called these mild cases of diphtheria.

In all cases of this disease we expect to find enlargement of the submaxillary and cervical glands. In three cases in which the membrane was deposited on the larynx (without invading the tonsils or adjoining parts) there was no perceptible enlargement of these glands. But were they cases of diphtheria? I think there can be no doubt of it; for other members of the family contracted the disease, and the patch of false membrane was deposited on the tonsils and adjoining parts, so that all doubt regarding the nature of the first case was removed. But when the membrane was deposited on the tonsils and adjoining structures, the swelling of these glands was very marked, more especially the submaxillary. In many cases there was considerable effusion of serous fluid into the cellular tissue of the neck, which was swollen and of a brawny hardness. When the posterior nares were involved, a considerable amount of secretion poured from the nostrils and excoriated the the upper lip.

In some cases this is a nice

point to determine whether the larynx is invaded by the false membrane or not. for if the membrane is deposited on the epiglottis there will be more or less difficulty of respiration. I think we can usually arrive at a correct diagnosis by observing the manner in which that function is performed. When the membrane is deposited on the glottis inspiration and expiration are alike difficult; but if the epiglottis only be involved inspiration will be difficult whilst expiration is natural or nearly so. A correct diagnosis in such cases, has considerable bearing, on the success or non success of tracheotomy, and makes it a disputed point whether it is, or is not advisable to operate when the membrane has formed on the vocal chords and adjoining parts. Paralysis of deglutition, shewed itself in one case three weeks after the patient was convalescent. It was characterised by a nasal tone of voice, and inability to swallow liquids. We had no difficulty in swallowing solid food. liquids always regurgitated through the nostrils.

In this country two kinds of croup are recognised viz. Catarrhal and Membranous. Of late, the faculty have

been discussing the identity or non identity of diphtheria with membranous croup. Some physicians hold the opinion that they are distinct diseases: whilst others consider them one and the same disease. In proof that they are one and the same the following case is given. In October 1875 I was called in to see a child aged seven years who had been ill for several days with a croupy Cough. The mother had been dosing the child with squills and ipecacuanha from the beginning of her sickness; but, as the symptoms did not abate, but rather increased in severity, they sent for me.

When I saw the patient she had moderate fever, rapid pulse, and stridulous breathing. There was no perceptible enlargement of the submaxillary or other glands, and no membrane was observed on the tonsils, or palate or pharynx. The disease was diagnosed membranous croup; an unfavourable prognosis was given, and tracheotomy was proposed, as affording the best chance of saving the child's life. Her parents would not consent to the operation and she died in three days from asphyxia. The day before she died, a brother aged two years, who had

been going out and in the room during his sisters sickness, began to shew symptoms of illness and on inspection of his throat, the tonsils palate, uvula &c were covered with membrane and he died in three days. Two days after his death another child contracted the disease and recovered. I think there can be no doubt about the first case being one of laryngeal diphtheria, instead of membranous croup, or else they are one and the same disease and require the same constitutional treatment.

The poison that produces this disease appears to be a specific germ, developed under favourable circumstances (such as a certain degree of temperature and humidity) by the decomposition of organic matter. What degree of temperature and humidity is required for its development; what degree of temperature is required for its destruction; what its nature is; how it is introduced into the system (whether through the agency of the water we drink, or more probably in the air we breathe; and how it acts on the blood has not as been discovered. We cannot prove the presence of this germ, or even say positively

that the poison is a germ. But. as all specific fevers are caused by a specific poison which produces a certain disease and no other: and as the nature of these poisons has not been ascertained we are almost forced to believe, that this poison for want of a better name is a germ a minute organism floating about in the air or water, which, when introduced into the blood of one whose system at that time is susceptible to its influence, has the effect, of disarranging more or lef the whole vital functions of the body. and producing a certain train of symptoms characteristic of that disease and no other. Perhaps the instruction I received during my college life, and having been educated more or lef in the antiseptic treatment of disease. and having seen the great advantages of that treatment at home as well as abroad may have influenced me in forming an opinion in favour of its acting as a ferment in the blood. If this view of its effects in the blood should prove to be correct, the treatment that ought to give the best results, should be antiseptic and tonic in every sense of—

the word, and that treatment has been most successful in my hands.

Before giving the treatment which is invariably adopted in this disease, I may say, that nitrate of silver in stick and in solutions of various strength was tried locally with very unsatisfactory results; it appeared to have no effect whatever in arresting the spread of false membrane. A strong solution of perchloride of iron as recommended by Dr. W. Squire of London was tried in one case with no result. The membrane in this case was of unusual thickness and involved palate, uvula, tonsils and nares; part of the membrane had become detached, and alarming haemorrhage took place from the exposed surface which no amount of ice or iron could arrest — and the patient died from exhaustion. Strong hydrochloric acid or diluted with equal parts of glycerine yielded better results than any of the preceding.

The constitutional treatment consisted of quinine iron and chlorate of potash in solution every four hours, with wine and nourishing diet. The first three cases that came under my observation were treated more or less according to the preceding local and constitutional plan, with the result

that all died. This was rather discouraging and one day in conversation with my friend Dr W. C. Hunter of this city. I happened to mention the above cases the treatment adopted and the unfortunate results. He very kindly recommended me to try the chlorates in the dry form, adding that they had been very successful in his hands. I took my friends suggestion and gave the chlorates a fair trial and have been well pleased with the results.

The following is the treatment which I now adopt in every case of this disease.

If there are any children in the house, the parents are advised to distribute them among friends, or send them to the country until the patient is entirely convalescent. In a large majority of the poorer clases. these instructions cannot be carried out: in such cases we have to depend entirely upon good ventilation and thorough disinfection in preventing other members of the family from contracting the disease by contagion. The patient if posible is removed into a well ventilated room which is kept disinfected with carbolic acid or chlorinated lime. The bowels if confined are opened by a dose of calomel

and scammony, or any other cathartic that may suggest itself- which may be repeated during the progress of the case if required. Alcoholic stimul-ants as a rule are well borne, and are allowed from the beginning, rapid pulse indicating their use, and fever no contraindication. The symptoms that guide me in the administration of stimulants and the quantity required, are; if the pulse comes down in frequency and increases in volume- if the tongue becomes more moist, and the fever lessened, the patient is getting the proper quantity; but if the fever is increased by their administration, and the pulse becomes more rapid, and the tongue drier, the quantity of stimulants is reduced or withdrawn alto-gether. When vomiting occurs it is usually controlled by swallowing small pieces of ice, and a mustard poultice to the epigastric region; small quantities of lime water and milk being taken occasionally. The diet consists principally of milk, which was highly recommended in all cases of fever by my late esteemed professor in medicine Dr W. T. Gairdner and which experience has taught me to be the best diet in all cases of pleurisy. Farinaceous puddings, gruels and light soups are also allowed. I think

the nourishing qualities of beef tea have been exaggerated? In many cases it sours on the stomach, and produces diarrhoea, in consequence of which it is seldom recommended as an article of diet in this disease as typhoid fever.

Ice (which is to be found in the houses of the poorest in this city) is allowed the patient ad libitum. It appears to have a very good effect in subduing the inflammation of the fauces, and difficulty of deglutition, the latter being in some cases a very annoying symptom.

The patch of false membrane is cauterized with a strong solution of bromine This solution was first recommended by Dr. Smith of Louisville Kentucky as an excellent application in gangrenous sores. The following is the formula.

One hundred and sixty grains of bromide of potassium, is dissolved in two ounces of water, add one troy ounce of bromine, and stirring diligently pour in sufficient water to make the solution measure four fluid ounces It must be kept in well stoppered bottles.

Usually one application of this solution is sufficient to

arrest the progress of the disease! but if the cauterization is imperfectly done, and on the following day on inspection of the throat, the mucous membrane around the patch appears of an angry redness with the membrane shewing a tendency to spread the cauterization is repeated.

With children who cannot use a gargle, the parents are directed to paint the patch of membrane several times a day with the following solution

℞ Acid carbolici gr xxx
Sodae hyposulphit ʒvi
Glycerini ʒvi
Aquae ad ʒvi M

If there is any discharge from the nose, the nostrils are frequently syringed with a solution of carbolic acid and chlorate of potash. Lime water in the form of spray is strongly recommended by Dr Alonzo Clark of this city. Practically I can say nothing about this method of treating the local disease. Some physicians have tried it with benefit, whilst some of my friends have given it a fair trial in their practice with no appreciable result.

Adults in every case use a gargle frequently during the whole course of the disease

The gargle which is usually prescribed in this disease consists of a weak solution of the hypos or bisulphite of soda and carbolic acid. These antiseptics with the constitutional treatment to be immediately mentioned appear to destroy the local disease by dissolving the false membrane, and neutralizing the poison in the blood.

Quinine and iron are given in full doses from the beginning every four hours. We think nothing of giving three or even five grain doses of quinine to a child: It has a marked effect in reducing the fever. In many cases of this disease the antipyretic action of quinine is marked. For example on the 24th of December 1875 I was called about three p.m to see a boy aged five years who was suffering from this disease. His temperature was 103½. pulse 145: the tongue was dry and brown. and he was deliriaus. The false membrane had formed on both tonsils & the whole mucous membrane of the throat was of a dusky redness. The false membrane was cauterized with the bromine solution. and he was ordered to take three grains of quinine with ten drops of the perchloride of iron every four hours. He was also ordered of chlorate of potash and chlorate of soda of each five grains every two hours. which was increased

to eight grains of each the following day. I saw this patient the following morning, and found him very much better. His temperature was 99° pulse 116 with good volumne. the tongue was moist, but coated with a white fur. He had slept well and awoke free from delirium. After the second day his temperature was normal and in four days he was almost well. After the disappearance of the local disease, the constitutional ×treatment is continued for about a fortnight longer as there is a tendency to a relapse in some cases. Iron produces local and constitutional effects in this disease: locally it constringes the blood vesels, and acts as an antiseptic on the decomposing membrane: constitutionally it improves the condition of the blood which in this disease soon becomes impoverished

Chlorate of potash and chlorate of soda are given in as large doses as the patient can bear every two hours. These salts are taken dry on the tongue, and are allowed to dissolve gradually in the mouth. This is a very important part of the treatment: for if the chlorates are given in solution it is impossible to give them in large doses unless in a very dilute form, and the local effect they produce is scarcely observable; but when given in large doses after the above method, the very last

results are obtained locally and constitutionally.
These good effects, I think, are due to the gradual
elimination of chlorine, which destroys the false
membrane, and prevents the separated particles from
infecting excoriated, surfaces and what is of still more
importance, preventing by its disinfectant action
further constitutional infection from the absorption
of these particles. Dr. A. Jacobi our leading
authority on diseases of children says "this disease,
when seen early, and treated with large doses
of the chlorates as above, is one of the most
manageable diseases a physician has to treat."
That is rather strong language, a few men will
be found to endorse his statement. This much
I have observed, that if the membrane had not
invaded the larynx before this treatment was began
and the patient took the medicine regularly every
one got better. Up to the present time I have
not observed a single case in which the membrane
was deposited on the larynx secondarily. In three
cases the membrane was primarily deposited on
the larynx, These were treated by emetics of senega
and sulphate of zinc, besides the general constitutional
treatment. This treatment did not appear to
be of any special service. When vomiting
was produced shreds of false membrane were
expelled, and the dispnea was temporarily relieved

but. it always returned with more alarming symptoms and all died from asphyxia. Having great dread of producing spasm of the glottis. I have not had the courage to try cauterization of the false membrane with the bromine solution.

Statistics regarding the success of tracheotomy in this disease vary. In answer to a letter to Dr A. Jacobi of this city, asking the favour of his statistics in this operation he says "Since 1868 I have operated on one hundred cases of diphtheria, but saved only five". M. Trousseau's operations give a success of more than one in four: Dr G. Buchanan of Glasgow one in three: Rosen of Tubingen one in two and a quarter. How are we to account for the great success of some surgeons and the non success of others? It may be accounted for in two ways. In some of the cases the membrane was deposited on the epiglottis (did not involve the larynx proper) and the impediment to respiration was caused by the swollen epiglottis falling down on the chink of the glottis during inspiration: these cases might have got well without tracheotomy being performed, but it was justifiable owing to the urgent dyspnœa: and it helped the patients recovery, if not saving them from secondary lung complication or death from

asphyxia. Or again if the membrane was deposited on the vocal chords and adjoining parts in all the cases, the great success of some surgeons compared with others, must have depended altogether on the after treatment of the case. I understand Dr Jacobi makes it a point never to operate unless he is confident that the membrane is deposited on the vocal chords and adjoining parts. When we consider the small number of lives saved by the operation; the loss of blood that attends it; the danger of blood flowing into the trachea; and the tendency to the formation of false membrane on cut surfaces, the question presents itself — is it advisable to operate in this disease? I think it is, and it matters little in regard to the operation (in relation to prognosis it is of considerable importance) whether the impending asphyxia is from the membrane having been deposited on the epi-glottis, or from its having invaded the larynx. the operation offers the best possible chance of saving the patients life. Salicylic acid sprinkled on and around the edges of the wound might have some effect in preventing the deposition of false membrane on the cut surfaces.

Salicylic acid is being used in Jersey

city locally and constitutionally with good results. It is considered to be more effective than any other drug of its class, and the dose required to produce its effects is entirely devoid of irritant or injurious action on the human body. Another thing in its favour is, that it is without odour, is almost tasteless, what little taste it has being of a sweet nature. My friend Dr W. C. Hunter has tried this remedy in combination with the chlorates in this disease and is well pleased with the results. He has ascertained that young children can take (with perfect safety) half a grain at a dose, which can be repeated every two hours if necessary.

Poultices are seldom applied to the throat. Some parents cannot be impressed with the importance of changing them frequently in order that a moderate degree of temperature and moisture is maintained and the consequence is, that poultices are kept on until they are quite cold. they are then taken off and heated over again or fresh ones are applied. Under such circumstances poultices do more harm than good, and I usually recommend them to rub in camphorated oil night and morning which relieves the pain and stiffness in the neck. Paralysis of deglutition occurred

in one case. I was successfully treated by painting the fauces with iodine and the administration of tonics internally. I have very few statistics to present in favour of the above treatment owing to not having kept a list of the cases treated. Dr Hunter has treated upwards of thirty cases with large doses of the chlorates and quinine without a single death. During 1875 I treated over twelve cases and lost two. One of the cases was laryngeal from the beginning and the parents not consenting to the operation of tracheotomy she died from asphyxia. The other was her brother aged two years. The membrane in his case was deposited on tonsils, hard and soft palate pharynx and posterior nares. It was impossible to cauterize the membrane thoroughly, and his parents could not get him to take the medicine and he died in three days with symptoms of effusion on the brain. In this case I suspected that the membrane had invaded the eustachian tube and had aroused inflammation of the membranes of the brain. These two cases could hardly be called test ones as bearing on the success of this treatment.