The fight with infection : what to do when scarlet fever, diphtheria, typhoid, &c.;, enter our homes / by William Stephenson.

Contributors

Stephenson, William, 1837-1919.
Royal College of Physicians of Edinburgh

Publication/Creation

Aberdeen : D. Wyllie, 1879.

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THE

FIGHT WITH INFECTION.

WHAT TO DO WHEN

SCARLET FEVER, DIPHTHERIA, TYPHOID, &c.,

ENTER OUR HOMES.

BY

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ABERDEEN: D. WYLLIE & SON.
EDINBURGH: MACLAUCHLAN & STEWART.

1879.

In the following pages is given the information regarding the Specific Infectious Diseases which all should possess; which many have felt the want of when required, but knew not where to get; and which medical men cannot always have the time to impart.

THE FIGHT WITH INFECTION IN OUR HOMES.

THE prevalence of infectious disease is within human control, quite as much as is that of fires. It is possible to "stamp out" infection, just as theoretically we can prevent buildings being destroyed by fire; but from accidents and carelessness we are ever likely to have outbreaks of both. Great epidemics, however, will become as rare as great conflagrations. Infectious diseases can be arrested by proper measures, as certainly as at present we arrest the progress of fire.

This is no visionary idea, it has already been to a great extent accomplished. The Plague has been banished. It is unlikely that Cholera will in this country ever attain in the future the severity it has had in the past. The outbreaks of Smallpox are now limited in extent, and occur only through carelessness. We have banished Typhus from our jails, as "jail fever" it is no longer known. It still smoulders, and ever and anon breaks out in our towns, but as soon as it appears the Sanitary Brigade are called out and interpose, as readily as the Fire Brigade on the alarm of fire. By the measures adopted it is gradually, though slowly, being suppressed. A like success cannot however be claimed for Scarlet Fever and the other infectious diseases. This is owing to the want of the same vigilance and the adoption of the necessary precautions. Property is held in higher estimation than life. If a man were to deposit

the embers of a fire at the foot of a hay stack, and thereby burn it down, he would certainly be arraigned before a court of justice; but he may yet with impunity recklessly carry the smouldering embers of a fever into a household and thereby destroy life.

There is a recklessness and selfish indifference to the spread of infection, which, it is to be feared, the power of the law can alone put down. Public sanitary measures, above what exist at present, are required; and especially the early intimation and registration of all infectious diseases, together with *official* inquiry into the source of the infection.

But all public work of this nature cannot do away with, or supercede, the *private* duties which devolve upon all in the presence of infection. The fight with infection must be waged within the house as well as without. The subject has its domestic as well as public aspect. It is of this individual or personal relation we would here treat. How can we best carry out the necessary measures whereby we can effectively battle with infection when it enters our homes? How may we limit its spread in our households, and prevent its extension to others in relation with us?

The domestic management of infection is not less important than the public sanitary measures upon which alone we are too apt to rely for protection. One person by ignorance or carelessness may render all public precautions of no avail, and be the means of widely diffusing the disease. It is in fact always by the ignorant, and ofttimes culpable acts of individuals, that infection is carried from one part of the country to another.

The domestic management of infection is important, because it acts at the source or origin of the disease. Every new case is a fresh source of mischief, but at the

same time it is within the narrow limits of the case, and can be dealt with effectively.

The domestic battle must be waged with knowledge—knowledge is power. The character or properties of the infective poison must be known, how it is communicated, how it may be preserved, how it can be destroyed—in other words, its natural history. Measures adopted in ignorance of the nature of the poison, are often far in excess of what is required, or are wholly ineffective. Much expense has frequently been incurred by a family in the endeavour to get rid of infection, and in the end has been found useless, because some trifling precaution has been overlooked. Disinfectants are constantly used in a manner which is wholly ineffective, and beget a feeling of false security. From ignorance of the differences in the natural history of the various poisons, they are by many all looked upon in the same light, all arising from the same causes, all equally infectious; and most exaggerated and ofttimes ludicrous ideas are entertained of how infection has arisen or been caught. Ignorance has so increased the dread of infection that social and domestic ties have been cruelly riven asunder, friend holding aloof from friend, brother from sister; when from the real nature of the poison it might be known there is no risk.

Fortunately, no acquaintance with the sciences is required to comprehend the subject. It is within the understanding of any ordinarily educated person. The knowledge is the result of much observation, and the experience of medical men. On many points we are still in ignorance, but these need not be discussed by the people. Sufficient, however, has already been definitely determined, to enable us to carry on the struggle intelligently, to know often where the danger lies, and how to

meet it. Whilst, however, medical opinion regarding the infectious diseases is well advanced, there still exists with the public much ignorance and confusion of ideas. It is not until this ignorance is removed, and penalties inflicted on culpable negligence, that we can look for any mitigation of those so much to be dreaded affections.

The infectious diseases which are more commonly met with in this country are Scarlet Fever, Measles, German Measles, Hooping Cough, Chicken-pox, Mumps, Typhoid Fever, Typhus Fever, Diphtheria, Smallpox, and, more rarely, Cholera. Some of these diseases have other names; Typhoid is also called Enteric and Gastric Fever; in children it is sometimes named Remittent Fever. The term Typhoid must not be confounded with Typhus, they are totally distinct affections. There is no difference between Scarlet Fever and Scarlatina. The latter term may be used to indicate a mild attack, but the disease is the same, and equally infectious. German Measles is a distinct disease from Measles and from Scarlet Fever; it is also known under the names of Rubeola, Roseola, and Rötheln, but it is probable that more than one disease is included under these terms.

There are certain characters common to all these diseases; at the same time each has its own peculiarities or special nature. Let us first look at what is common to all of them. They are all caused by the introduction into the body of the person affected, of a poison, which there produces a well marked train of symptoms by which its presence and nature are recognised. Each disease is produced by a distinct and separate poison; the one never gives rise to or passes into the other; Typhus never begets Typhoid, Scarlet Fever never becomes Diphtheria.

Whilst each one is distinct from the other, they have

all this peculiarity—the illness which each poison produces is the same in all persons, in the young and in the old, in the white man and in the black. The virus of smallpox always produces the symptoms of smallpox, that of scarlet fever the symptoms of scarlet fever. It is different with other causes of disease, such as cold or damp, these will cause bronchitis in one person, neuralgia in a second, diarrhœa in a third. Again, bronchitis and the like may be the result of different causes in different individuals. Not so with the infectious diseases, each one is alone produced by its own poison; the poison produces only the symptoms peculiar to the disease. This is the meaning of the term *specific* which is applied to the infectious poisons.

They differ also from other specific poisons which produce disease, such as malaria, which cause ague and the like, in that they are reproduced within the body, and there multiply to an unlimited extent. Hence they are spoken of as specific infectious poisons. They can be directly communicated from one person to another. There are, however, as we shall see presently, differences in this respect amongst them. Each person affected becomes the source of fresh danger, and one individual may thus be the means of infecting a whole country. The diseases are all propagated in this way. Whether any of them can arise spontaneously, that is *de novo*, from a concurrence of effects, without the medium of a previously infected person, or the transmission of the poison from such, is a question still under discussion. No one now believes that cholera or smallpox ever so arises in this country. But with regard to the others there are still differences of opinion. It is our object, however, not to enter into the discussion of disputed

points. My own belief is decidedly against the idea of a spontaneous origin for any one of them.

Another character of these diseases is that one attack protects the system from again being liable to the affection, and hence they occur but once in a lifetime. The rule is not invariable, but the exceptions are much rarer than is supposed. We frequently hear of a person having had Measles twice, but the explanation of many such is that German Measles so closely resembles Measles that it is often very difficult to distinguish between them. Indeed it is still undetermined whether there are not three distinct affections closely resembling one another. That Measles and German Measles are distinct is proved by the fact that the one never protects a person from an attack of the other, and the infection from the one never produces the other. German Measles at times resembles Scarlet Fever more than Measles, and this has given rise to the idea that it is a hybrid of both, but as it protects the system against neither, it must be regarded as distinct from both. The diagnosis of these affections cannot be entered upon in a popular work, but it may be generally known that where an illness has not been followed by a general peeling of the skin there are doubts that it has been Scarlet Fever ; and that although some desquamation does often follow Measles and other fevers, yet it is rare for it to be of the general and well marked nature characteristic of Scarlet Fever.

All persons are not equally susceptible to the actions of the poisons. The susceptibility of an individual also varies at one time from another. It has frequently been observed that a child will live in a family where there is scarlet fever or measles, sleeping perhaps in the same bed with the sick, and yet not take the disease ; and yet months, or it may be years, after, he falls a victim to it.

Medical men often attend large numbers of typhus patients, are even medical officers of fever hospitals, without contracting the disease ; and yet afterwards take the infection from some casual case. Unfortunately we cannot determine beforehand by any means the degree of susceptibility. No one can consider himself safe except by a previous attack. But it is known that certain conditions increase the susceptibility. Prolonged exposure to the poison often diminishes the power of resistance. Any deteriorated condition of the body renders it more liable to be infected—fatigue, especially from nursing the sick, fasting, or being underfed, and the living in an atmosphere rendered impure by the presence of decaying matter. Dung heaps, bad drainage, and the like, are not the only sources of the latter condition—want of thorough home cleansing and ventilation, and badly aired rooms are quite sufficient. These not only render the body more susceptible to the attack, but the disease is likely to be more virulent and dangerous to life. Means, therefore, which tend to improve the general health of a person, or of a community, have a direct bearing upon protection against infectious disease.

What these poisons are, what their exact form, is not known. We cannot separate them. In smallpox we know that the germs of the disease exist in the matter and crust which forms on the skin. The same is the case with its allied or modified form in vaccine matter. But it cannot be further separated and scrutinised. The virus of the other diseases has not been so far isolated, nevertheless we know some of their characters or properties. Let us study them by an example of one with which we have been able to experiment with safety and certainty.

A small drop of fluid taken on the point of a lancet

from the vesicle which forms on the arm of a vaccinated child, applied to the arm of a second child, produces in the latter a condition identical with that in the former. Nay, more, the tiny drop has been multiplied, so that from the second child sufficient virus may be obtained to again vaccinate a number of other children. Here we see the multiplication of the poison already referred to. Note also the small amount of the poison sufficient to produce the result. But even that tiny drop might have been further diluted with three or four drops of water, and a single drop of that fluid will produce the same result.

After the vaccine matter has been applied, a time elapses before any effect is visible. This is common to all the poisons, and is called *the period of incubation.* The time varies with each disease. In vaccination it is about four days, in scarlet fever four to six days, in measles about fourteen days. The period for each will be afterwards stated, and their practical importance pointed out. (See p. 21.)

To return to our drop of vaccine matter, there are other characters worthy of note. We have seen that it may be diluted to a certain extent, but the degree is limited. A very small amount is sufficient to produce the specific action, but if over diluted the activity is lost or destroyed. It does not multiply or reproduce itself in any fluid out of the body. This same holds good with many of the poisons, more especially with those which are communicable through the air. Dilute them sufficiently and their activity is lost. They do not multiply or increase out of the body. This is not true however of all. It is becoming evident that there are some of the infectious poisons which do undergo a transition change, and probably increase out of the body before they can again reproduce the disease. But of this, more afterwards.

If instead of being diluted, the vaccine matter is left exposed to the air, it again becomes inert. So far as we know, none of the poisons retain their active properties when left exposed to the atmosphere. In free exposure to the air, therefore, by ventilation or otherwise, we have the means of destroying these dangerous poisons, not merely by diluting them, but also actually killing them. But instead of leaving the drop exposed let it be enclosed in a fine glass tube. It may then be kept for months, and even years, and at the end be still active.

It is well known that the vaccine pock on the arm of a child dries into a crust, which after a time falls off. In this crust there is imprisoned a large amount of the vaccine virus. These crusts may be used like the fresh lymph for vaccination. The poison thus preserved will retain its active properties for a long time ; all that is necessary is to moisten it with a little water, and we have again a serviceable drop of vaccine matter.

What we can thus safely demonstrate by experiment to be true of vaccinia, has been found by experience to be true also of all the infectious poisons. Expose them, or articles of clothing impregnated with them, freely to the air, and the poison is destroyed. Shut them up in a drawer, or in a box, and their activity may be retained for months or years, and they may be sent from one part of the country to another. Any matter coming from an infected person, which contains the poison, may dry or harden upon clothing, or on furniture, and thus form an analagous condition to the crust of the vaccination. It may in this way be protected from the action of the air, and preserved for an indefinite time. This condition is spoken of in medical language as *fomites*.

In addition to the action of dilution, and free exposure to the air, the active properties of the poisons can be

destroyed by heat, and various substances known as disinfectants. This subject will afterwards be treated of in its practical application.

The above characters are common to all the infectious poisons. Let us now examine wherein they differ. An accurate knowledge of the essential differences is of great practical importance, for upon them depend the special precautions to be followed in their management.

The more important differences lie in (1) The degree of infectious character; (2) Mode of Propagation; (3) The period of incubation, and when the infection begins; (4) The length of time before a patient can be considered personally free from infection. In the management, all the peculiarities must be considered, the one often bearing upon the other, but it is more convenient to describe them under these divisions.

I.—THE DEGREE AND NATURE OF THE INFECTIOUS CHARACTER.

By the use of the adjective here we mean the risk, which those living in the same house run of taking the disease from the sick; or of the danger which a person incurs, by visiting a house where there is infection, of carrying it to another house. To understand the subject it is necessary to know certain properties of infection. Some of the poisons may be regarded as volatile,* that is the air in the immediate neighbourhood of a patient or of the poison becomes charged with it, as it may with dust or a perfume; and a person breathing that atmosphere may in this way contract the disease, or the poison may be deposited upon clothing, as is dust or an odour. Another

* The word volatile is not here used in the strict chemical meaning of the term, but denotes only that the air becomes impregnated with poison bearing particles.

property may be described as that of tenacity, or the tendency to adhere to any article, and in this way be carried from one place to another. This property must be kept distinct from what has been described as fomites, or matter containing the poison being deposited upon an article. It may help the understanding of these different properties of infection by a comparison with the odours of different substances. All substances possessing an odour have a volatile property ; the degree of volatility also varies ; odours have also different degrees of tenacity. Musk is well known to be very tenacious, whereas other perfumes are very evanescent ; the flavour of fish or an onion is very tenacious. Muslin curtains hung in a room soon get dirty ; the dust becomes incorporated with them ; but some kinds of dust or dirt are more readily washed out than others. So with the poisons, they adhere like dust to any garment ; some are more readily got rid of than others ; they are less tenacious.

Two only of the poisons we are considering are known not be volatile, so far as the patient is directly concerned ; that is, there is no risk of the attendants taking the disease directly from the patients. They are typhoid fever and cholera.

In **TYPHOID FEVER** there is no direct contagion, from person to person. This has been as clearly proved as the nature of the case will permit. One fact only need be given here. Dr. Murchison records that in the London Fever Hospital "the patients suffering from enteric (typhoid) fever have been treated in the same wards with the many patients sent to the hospital, who have not been the subjects of any form of contagious fever. The two classes of patients have remained together, both during the acute stage of their maladies and in convalescence, in most instances for several weeks. . . The result has

been this. During nine years 3,555 cases of enteric fever have been treated along with 5,144 patients not suffering from any specific fever; not one of the latter has contracted enteric fever." He further adds—"Although enteric fever is communicable, my experience is entirely opposed to the view that it is contagious in the strict sense of the term. Visiting or contact with the sick is neither sufficient nor necessary to produce it, and it is never propagated by a third person."

This one fact—That *typhoid fever is not directly contagious and is not carried away with them by a person visiting a typhoid patient*—is of itself a great gain. It is unnecessary to point out its social relations. The public are, however, as yet, far from realising the truth.

But the specific virus of typhoid fever does afterwards become infectious, and acquires volatile properties. To become infectious it has probably to undergo a change out of the body; and for this purpose it seems necessary to combine, or come in contact with, decomposing matter. Having undergone this further stage of development, it acquires volatile properties, whereby it can enter our houses through our drain pipes, or passes into our water supply. In this state it is very persistent, and when combined with other matter may remain latent and retain its vitality for a very long period. It must be specially noted, that although the specific poison is not communicated directly from one person to another, yet anyone suffering from the disease is a direct source of danger; that he may carry the poison from one place to another, where it may spread widely; and that the danger of propagation, although by indirect means, is really greater in this disease than in those that are directly infectious. It has also been clearly proved that the body of a person may continue to propagate the poison for a

considerable time after convalescence. The disease has frequently been introduced in this way into a locality where it has been long absent, by a person after he is convalescent, going to the country, or returning to his family.

The infective characters of **CHOLERA** are closely allied to those of Typhoid. It is not directly transmitted from patient to patient, but indirectly through some medium, chiefly water. With typhoid we have seen the atmosphere does become secondarily charged with the poison, with cholera this is improbable, so that there is greater security against the latter than the former.

DIPHTHERIA holds an intermediate position between the above diseases, and the class which follows. It cannot be said that it is propagated *only* by indirect means, but the risk of direct transmission is much less than in the other affections to be presently mentioned. The poison is diffused in the atmosphere around the patient, but in a condition which is less active, than the same poison after it has been fully developed by contact with decaying matter. In the latter condition it attacks the healthy as well as the weak—all run great risk; whereas in the former condition, it is the weak only that are affected by it. The risk is greater if there is any wound or open sore. Patients in an hospital, and more especially surgical cases, are thus frequently infected if a case of diphtheria is admitted to a ward. But the attendants do not run the same risk. *With cleanliness and ventilation there is no risk to healthy persons in nursing a diphtheritic patient.* At the same time it must be remembered that fatigue and prolonged exposure to the infection may create a susceptibility to the disease, and care must be taken that no phlegm be coughed or otherwise conveyed by the patient upon them, that they have no sores or scratches upon their

fingers, or an inflamed state of the lining of the mouth, throat, or nose ; that they frequently wash their hands in disinfectant fluid ; and that they do not kiss the patient. They should also spend some time daily in the open air.* When two or more cases of diphtheria occur in the same house, the cause is more likely to be that all have received it from the same source, than that the one has taken it from the other.

All the other poisons are directly communicable from one person to another. They possess the volatile property. The degree of volatility, however, it is extremely difficult to estimate. The important point is, that the means of combating this property is dilution ; attention to the ventilation of the sick chamber is sufficient to diminish the risk to a minimum. The degree of infectious character is much more dependent upon the property of tenacity, and in this respect we may divide them into two classes. **SCARLET FEVER, MEASLES, and TYPHUS FEVER** possess it in a high degree. **HOOPING COUGH, MUMPS,** and **CHICKEN-POX** only to a very slight extent. Those of the latter group are not propagated by a third person, that is in visiting a house where the disease is, a person may, if susceptible, take the disease himself, but he will not carry it away (except by fomites) in his clothes. A lady, therefore, may visit her relations where there is hooping cough without fear of carrying it to her own family. If, however, during her visit she were to attend to a child during a fit of coughing and receive some of the expectoration on her dress, or wipe the child's mouth with her handkerchief, she might in this way carry the infection with her. In

* The above was in type before it received the sad corroboration, in the family and person of the Princess of Hesse Darmstadt, whose death is universally mourned. The experience gained by the touching incidents are referred to at p. 48.

prolonged visitation in a badly ventilated house, the clothes may become so much impregnated as to be the vehicle of conveying the infection.

The poisons of **SCARLET FEVER** and **MEASLES** possess tenacity to a considerable extent, more especially the former. There is therefore more danger of a third person communicating the disease. But even here the precautions are so evident and simple that no risk need be run. The dread of thus carrying infection in the public mind is foolishly and cruelly great. The house where the disease has appeared is shunned by every friend for months, and sister will hold aloof from sister, even when passing through the sore trial of bereavement. There is no necessity for this cruelty and ostracism. Where friendship and sympathy suggests, or relationship demands, a visit may be made to an infected house with safety. Do medical men find that, even in coming into close relationship with infectious diseases, they carry the poison home to their families? So much is it the reverse that many have thought there must be some charm about them that they do not convey it home. Those people, too, who entertain the greatest dread of carrying infection, receive willingly the visits of their medical attendant, in ignorance of how many infected houses he may that day have visited. With proper care, the same safety as in the case of medical men can easily be obtained ; a visit may be made to a house where there is infection without incurring danger. While inculcating all due precautions, I would urge a more sympathetic conduct towards an afflicted family, than is everywhere the custom. If a person does not actually enter the sick room, and if further he passes sometime after in the open air, there is no likelihood of him carrying home any infection by visiting an infected house. Should he, however, not be

personally protected by having had the disease, there is a risk of his taking it, in the case of all, except Typhoid and Cholera. This risk, however, is extremely small if the ventilation of the house be properly attended to.

The poison of **TYPHUS FEVER** is readily destroyed by ventilation. It is, however, easily converted into the condition described as fomites, and adheres to, or is absorbed by, the walls and ceilings. In this state it is very tenacious. It thus lurks about the houses of the poor, and ever and anon breaks forth. When attached to clothing it is also very tenacious. In this way it is often sent from one place to another; and patients, returning from an hospital, have brought the poison back with them to houses that have been thoroughly disinfected, to again communicate the disease to another member of the family. *Hospital authorities are not always sufficiently careful in disinfecting the body-clothes of the patients.*

II.—MODE OF PROPAGATION OR DIFFUSION OF THE INFECTIOUS DISEASES.

We may leave for discussion by scientific men the question of spontaneous origin of the diseases. It is still a very doubtful question, and year by year is becoming more so. What we have to do with, in our domestic relations, is, that all the diseases can be directly or indirectly communicated from the affected to those in health. It is in this way alone, I believe, that they are being continuously propagated. If the first case in a locality of any of the diseases were to be completely isolated, and care taken that the poison was destroyed as soon as formed, there need be no spreading of the ailment. This, however, cannot be done in every case; there are

insuperable difficulties to contend with, especially amongst the poor. But nevertheless there might be much more care taken than there is at present. Instead of care there is frequently culpable negligence—*and that in all classes of society.*

The means whereby the poisons are propagated are principally in five ways.

1. Patients mingle in society before the infectious period has passed. They return to work or business, go back to school, travel from one place to another, long before they should.

2. There is great carelessness in the disinfection of clothing. Even where much pains have been taken to protect other members of the family, in the end it has been found in vain, because some article of clothing has not been included in the purifying process. A child may not be permitted to return to school till long after the period of infection is over ; yet if he wear the clothing he had on when taken ill, or others he has worn during convalescence, without their having undergone disinfection, he may communicate the disease. Clothing washed at a laundry with infected articles has been known to communicate the infection. Numerous instances have been recorded of disease being sent from one part of the country to another in boxes of clothing. There must therefore be not only isolation of the sick, but also careful disinfection of ALL articles which have been in the same room or worn by the patient.

3. The third means is more difficult to contend with, it depends upon the fact that some of the diseases are infectious before their nature can be certainly recognised. Hooping Cough and Measles are of this nature. The earlier symptoms, in both, are those of an ordinary cough or cold. A child suffering from either, at this stage, may

not appear to be sufficiently ill to necessitate being kept from school, and the consequence is that he infects a number of his fellow scholars. It is impossible altogether to protect our schools from the danger ; but when either of these diseases is prevalent in a locality, no child should be allowed to attend school suffering from a cough or cold however slight. The early stage of scarlet fever is shorter, and the disease is perhaps not so early infectious ; there is, therefore, less danger under this head from it. It is in the after period that care must be exercised.

4. A fourth means of propagation is in the careless intercourse between an infected house, and those brought into relation therewith. A new coat, or new dress, has brought the infection of scarlet fever from the tailor's or dressmaker's. Milk has been the means of communication in well marked cases, both in scarlet fever and typhoid. Charwomen, whose children are ill, have carried the infection to the families of their employers. Infected clothing sent out to wash has communicated disease to the families of the laundress. Servants, in situations, sometimes visit the houses of their friends where there is infection, attend to the patient, even take a sick child in their arms, and return straightway to the house of their master, where there may also be children. Amongst the poor, neighbours visit freely with one another when there is sickness, and will even carry a child in their arms into an infected house.

The duty devolving upon the individual members of society is too evident to need comment.

5. A general opinion exists that all the diseases are propagated through drains or in connection with accumulations of refuse matter. Typhoid Fever, Diphtheria, and Cholera are alone communicated in this manner.

Drainage has also been suspected in Scarlet Fever, but the influence which these sources of danger exert on the other poisons is only by increasing the susceptibility of the person to take them; they are not the source of the disease.

III. PERIOD OF INCUBATION.

The meaning of this term has already been explained. The duration varies in the different diseases, and owing to many disturbing influences, varies also to some extent for each.

TABLE OF PERIOD OF INCUBATION.

Scarlet Fever	2— 7 days	—rarely later.
Diphtheria	2— 5	—
Hooping Cough	4— 7 days	—uncertain.
Measles	14	—
German Measles	14	—
Chicken-pox	14	—
Mumps	14—21	—
Typhoid Fever	10—14	—sometimes shorter, rarely longer.
Typhus Fever	10—14	—rarely longer.
Small Pox	10—14	—

A knowledge of the period of incubation enables us to decide some important practical points. Thus a child has been exposed to the infection of Scarlet Fever, or has been removed from an infected house, how long is it before it can be assured that he has not imbibed the poison? If he has kept well for a week subsequent to his removal, and there is no likelihood that he has brought any infected article with him he may be considered safe, and may mingle with other children after a week, or to make quite certain, 10 days. In Measles again it is 14 days. If a child in a family takes Measles and other members take it from him, they will not be ill for 10 or 14 days. There is usually a fortnight between the appearance of

the eruption in the first child and in the second; that is, where the infection has been at once imbibed. The second child however, may have escaped at first and become infected at a later stage; the interval between the two eruptions will then be more than a fortnight. Again, in investigating in any case where the infection has likely come from, the period of incubation becomes an important factor. If the disease be measles, the question is not where was the child yesterday, or the day before, but where was he the day fortnight before the appearance of the eruption. If it be scarlet fever the relations of the past week are alone necessary to be considered. If again one child is taken ill, and within three days for scarlet fever, or within 10 days for measles, a second child is attacked, it is probable that the second child has not been infected by the first, but that both have received the disease from the same source.

When an infectious disease breaks out in a family the other children should not attend school; if however they are removed to another house, they may return to school after a time equal to the period of incubation for the disease, but not before it, it must first be made certain that they have not contracted the affection. When an infectious disease breaks out in a boarding school and it is broken up in consequence, the pupils should not be sent home direct, but should be kept somewhere in quarantine till after the period of incubation has passed. Scarlet Fever has frequently been scattered over the country by neglect of this precaution.

IV. HOW SOON DO THE SICK BECOME THE SOURCE OF INFECTION TO OTHERS? With regard to measles it has been certainly proved that the disease is infectious

during the three days before the eruption appears, when only symptoms of a cold are present. Hooping cough also is infectious during the first stage, before the child hoops. It is more difficult to determine the question with regard to the other diseases; but until decided, they must be considered as infectious from the beginning of the illness. The danger however may be considered to be less during the first day, and to increase as the disease develops. The earliest possible isolation is necessary in every case ; and all who have been in close relation, who are not protected by a previous attack, must for the time be considered as possibly to have become infected. Numerous cases, however, prove, that a case of scarlet fever may break out in a family or school, and no subsequent case occur, if the sick child be at once removed and disinfectants employed. This does not however prove that there has been no infection developed at this early period, but only that the amount of infection is readily controlled.

V. WHEN MAY A PERSON WHO HAS BEEN ILL BE CONSIDERED FREE FROM INFECTION; OR, WHAT IS THE DURATION OF THE INFECTION PERIOD? This question has reference to the body only; so far as clothing is concerned the period may be indefinitely prolonged. But the question has to be considered, how long may the infective power remain in the person who has been ill? It is difficult in many cases to answer. For *scarlet fever* there are facts which show that even after desquamation is complete there is still some risk. Six weeks is the shortest time that can be stated. Yet how often do people return to work, or children are sent back to school within this period? *For safety, isolation*

in the cases of scarlet fever should extend to seven weeeks. In measles the period is shorter, but four weeks is the shortest limit. In *Diphtheria a patient is not free from the risk of communicating the disease until the throat is perfectly well, even although convalescence is otherwise established.* With *hooping cough* it is very difficult to judge : in mild cases the infective period may be considered to last so long as the child is coughing. But in severe cases the cough and the hoop may be prolonged long after the danger of infection has passed. *Two months, however, is the shortest limit* that can be assigned. In the other diseases, except Typhoid Fever, the infection may be considered to disappear with convalescence. But in the case of *Typhoid the power of communicating infection often continues long after convalescence,* it is impossible to assign any limit.

PREVENTIVE MEASURES AGAINST INFECTION.

We are now in a position to enter on the discussion of what are the means to be adopted in the battle with infection. We have seen that emanations from decaying animal and vegetable matter are favourable to the propagation of all infectious poisons. *To avoid therefore, the deteriorating influences of air vitiated with organic matter, is the first essential in the battle.* To the local authorities we look to put in force the measures for maintaining the external atmosphere as pure as possible. But this public work must be associated with purity within our houses. There must be careful sanitary arrangements. Faults in our drain and water supply often exist either in their construction or from getting out of repair. This subject is treated under the measures for preventing Typhoid Fever. (See p. 45.) But sanitary arrangements embrace much more than is generally supposed. Ventila-

tion is essential, but a window may be kept constantly open and yet the atmosphere of the room be very far from pure and sweet.

A room that is occupied soon becomes charged with *organic* matter given off with the breath and skin. It is this organic matter which soon renders the air unfit to breathe, more so than the Carbonic Acid which is also present in respired air. It condenses with the moisture upon the surface of every article and remains there after the air has been renewed. It is seen upon the inner side of the windows, and upon looking glasses, forming a film of dirt which is not removed by dusting. Porous surfaces such as woollen and cotton articles, and the walls, absorb the moisture, and the dirt is deposited there as surely as upon glass. It has a heavy disagreeable smell, and when allowed to accumulate for a time, no amount of ventilation will render the room *sweet.* Contrast the freshness of the air of a room which has undergone a thorough cleaning with the same room before. To keep the air of a house pure there must therefore be something more than ventilation. There must be thorough cleansing: no dust must be allowed to accumulate anywhere, there must be daily cleansing, and also periodic lifting of carpets, turning out and airing of cupboards and furniture, scrubbing of floors, washing of paint, rubbing down of walls, and whitewashing of ceilings. It is highly important that mattresses and feather beds with bedhangings should be, at stated times, left freely exposed to the air for a whole day. This can be done in a room but it is much better, when possible, to carry them out to a court yard, or garden. Fresh air and water are Nature's great purifiers, but there must be a current of both, a constant renewal, no stagnation. The duster, the broom, and the scrubbing brush, are as

true, and as essential, sanitary aids, as are drains and water-supply. The idea which it is important to realise in our dealings with infectious poisons is not merely cleanliness but *sweetness*. Clothes may be fresh from the wash, yet far from sweet; a knife may have been newly cleaned, yet retain the taint of fish or onion; a milk pail may have been recently rinsed with water, yet in a condition to turn milk kept in it; and even so, a room may be newly swept and dusted, yet be far from sweet. Just as we find that where there is dampness, there is great difficulty in keeping clear of mouldiness; so where there is a film of dirt, there will be the conditions for the infectious poisons lurking and manifesting themselves from time to time.

Thoroughness in cleansing and a constant free ventilation are essential to protect against the inroad of infection. They are also the best means of getting rid of a poison when present.

The air of a room which is not occupied will become "close" if allowed to be stagnant. *Keep the windows therefore open as much as possible in all rooms when not in use. Ventilate all rooms by the windows, not the door*, provided there is no source of pollution in the immediate proximity to the window; bad air in this way may be admitted.

VENTILATION OF A ROOM WHEN OCCUPIED. This can always be done by the window without causing a draught. If the window is opened at the top, there will be a cold current of air felt falling on the head; if it is opened at the bottom, the cold current is felt by the feet and legs. The simplest contrivance to obviate this is to have a slip of wood, the width of the window and 3 or 4 inches broad: throw the lower sash up and insert

the wood along the sill, shut down the window on it so as to close completely the lower aperture. There will be a space at the middle of the window between the sashes to admit a large supply of air, which will be directed upwards, and the force of the current broken and diffused as it enters. Sitting rooms and bedrooms may in this way be ventilated without risk, and this simple means of ventilation should always be adopted in all sick rooms. The fire-place is the natural means of exit for the air aided when necessary by a fire. At the same time no amount of *ordinary* ventilation, will do away with the necessity for opening widely the window as often and as long as possible. Nurses require to be looked after and well drilled into this habit. I find it on all hands the most difficult lesson to inculcate.

In bedrooms and especially sick rooms CURTAINS are too generally condemned. They may be abused, like all other good things, but they are certainly of much and frequent service, in shading the light, or protecting from the risk of a draught. They need never be so extensive as interfere with ventilation; and in the case of infectious diseases can always be purified along with the rest of the bedding. Whether attached to the bed, or hung near the window, they are often of undoubted service and therefore are not to be generally condemned.

When any infectious disease has entered a house the first duty is, **ISOLATION OF THE SICK.** This should be done at once and made as complete as possible. There are however difficulties which cannot be surmounted in very many cases. Hospital accommodation is now being largely provided, even in country districts, and should be taken advantage of when it is the only available means of isolation. It is to the advantage of the sick as well as the healthy.

When however a separate room can be provided in the house, the question often arises, is it necessary to remove the healthy members of the family? This can only be determined by the character of the house and the nature of the disease. It is a grave error which is often expressed by saying, "It is as well that the children take their chance, they must take it sometime, and the disease is mild". There is no reason why children must take any infectious disease, they are not bound to do so if properly protected; and although the disease may be mild in one member of the family, there is no certainty that it may not prove very serious in others. And more, all the infectious diseases, however mild, are liable to leave after effects upon the constitution. However much, therefore, it is a matter of congratulation to get the infantile diseases over, there is cause to use every means of protecting all children against them. Another point in considering the question of removal of the healthy is this: is the source or origin of the disease connected with the house? This is most probable in Diphtheria, and likely in Typhus and Typhoid; not so in the other diseases.

As part of the principle of Isolation, the healthy members of the family, if living in the same house, must be careful in their intercourse with society. The children must be kept from school and from playing with their neighbours. There may be an excess of caution in this, yet it is better it should be so. In hooping cough, those who have had the disease, run little risk of carrying it, and the rule may be relaxed in their case; but all members who have not had it should be kept strictly away. This is not always done; they often attend until they show well-marked evidence of the cough, and other children are infected by them. There is altogether too great laxity in isolation of children with hooping cough. It is the

same with Measles; children belonging to an infected family are allowed to mingle at play, if not sent to school, until the rash is out. We have already seen that the disease is infectious before this period. It is not, however, with the children only that there is too great laxity in the precaution of isolation. The older members are frequently at work or business, and the disease may be spread by them. This is a hopeless complication, but at the same time much of the danger is avoidable if due care be taken in avoiding unnecessary contact with the sick, and in the proper purification of clothing.

Another necessary step is to **ASCERTAIN IF POSSIBLE THE SOURCE OF THE INFECTION,** so as to cut it off. There is danger from the sick, but there is equal danger if the poison is otherwise being introduced into the house. In diphtheria there is certain to be something wrong in connection with pipes or drains, and the like. In typhoid fever there is likely to be a similar cause, but the sources are more numerous. The water supply must also be examined. It has also been proved that it may be introduced in the milk; careful enquiry should therefore be made at the dairy. Too hasty a conclusion should not be come to, where something wrong has been discovered, but enquiries made regarding every possible source. A defect in the drains may exist without its being the true cause, and afterwards the source may be found to have been the milk or the water supply. With regard to the other affections, and especially Scarlet Fever and Measles, the drains and water supply are not so likely to be the cause; yet cases have been recorded where they have had some influence. The former disease has been communicated through the milk; enquiries should therefore be made in this direction.

The period of incubation must also be borne in mind;

in scarlet fever go back four to seven days, in measles ten to fourteen days. When the disease b:eaks out about the same time in several families, the true source may be discovered by finding what is common to all the families: Are the first to be affected, all children attending school, and do they all attend the same institution? Do all the families affected get the milk from the same dairy, and are no families with different milk supply affected at the same time? If several children, belonging to different families, are all laid down on the same day, with the same disease, there is a very great probability that they have derived it from the same source. In one outburst of measles of this kind which the writer investigated, all the children had attended a missionary meeting, exactly a fortnight before the appearance of the rash. In boarding schools and other institutions the source of the infection may be ascertained by enquiring whether the children affected have occupied the same dormitory, whether they have been sitting together on the same forms, or whether they have been visiting at the same houses, &c.

Enquiries of this nature ought in every case to be made by the medical officer of health, who should receive notice at once on the occurrence of any infectious disease in a locality. Were this done, epidemics might often be arrested at once, by the source of the poison being detected. A public official is the only person who can in many cases make the necessary enquiries. An official enquiry, made in the interests of all, can do no harm, whereas the rumours that so frequently get afloat do much mischief.

The source of infection is frequently in connection with the soil pipes and drains. If any disagreeable smell is felt, the source should at once be investigated. The mischief, however, is often present without any nasty odour being perceptible, or it may only be felt when a

room has been shut for a time. The escape of drain gas does not of itself produce infectious disease, but it lowers vitality, and renders a person more liable to take infection, and the disease to be more virulent. Foul air will often produce languor, loss of strength, headaches, diarrhœa, sore throats, and general decline of health, without any occurrence of a specific disease. An excellent test of the efficiency of the pipe and drainage system is to pour some strongly smelling substance, such as the impure carbolic acid, into the drain outside the house. Access can always be obtained through the opening for carrying off the surface water. If the smell is afterwards perceptible in the house, there is something wrong. The same means may be used to test the trappings inside the house, by pouring the carbolic acid down the water closet, and taking care that the ventilation carries off all the first odour which will arise in the process. Should it afterwards find its way into other rooms of the house, there is something which requires investigation.

THE SICK ROOM.—Except in Scarlet Fever, Measles, and Typhus, it is unnecessary to make any changes in the room, but in these diseases all clothing and unnecessary woollen articles should be removed. It lessens trouble also to take up the carpet, and in Scarlet Fever especially, all curtains and hangings should be removed. They are but harbours of infection. If required as a shade, temporary ones can be devised when wanted. The room must be devoted solely to the sick, and if several members of the family are laid down at one time, two or more rooms should be used rather than overcrowd. A large amount of cubic space is necessary for the welfare both of the sick and the healthy. Here for a period we have an enormous production of the

poison which will become diffused in the air and impregnate every article in the room. Against this danger, large dilution of the poison with atmospheric air is the best, speediest, and cheapest means of counteracting it; destruction, must keep pace with the formation of poison. *The room must be freely and continuously ventilated by means of the window and fireplace.* The effect of cold must be counteracted by the fire, which of itself is a valuable aid in ventilation. The doors must be kept shut—they should never be left open. The rooms should not be ventilated through the passages. Even in the coldest months of winter, the temperature of a room may be sustained with the window open, as described above. Nor is there anything to be dreaded from *night* air to require the ventilator being removed. It may be necessary to alter the position of the bed, so as to avoid the risk of a draught over the patient. In addition to the continuous ventilation, the window should be thrown widely open three or four times a-day in order to more thoroughly disinfect the room. In warm weather it may be constantly kept widely open. When necessary some special temporary shield from a draught can be devised to protect the patient. The continuous and free ventilation is the only means of disinfection which is of any service so far as the atmosphere of the room is concerned. The saucers of Condy's fluid and the like are useless. It is upon the full service of atmospheric air alone that we can rely to diminish, to a minimum, the risk of the infection which becomes diffused in the air around the patient; and by having the ventilation kept apart from that of the house in general, the risk of the infection being spread in the house is diminished. Instead of it being an odourless poison, imagine it to be a disagreeable smell which is given off by the patient, and which it is

desirable should not extend throughout the house, and the means suggested above will at once appear as that which alone would be effectual.

THE BED.—Mattresses only should be used—feather beds are unwholesome and uncomfortable in all fevers. Waterproofing is often of service above the mattresses. The sheets should be changed once or twice a-week according to the nature of the disease. This can always be done without risk or discomfort to the patient. It is well also to use a draw-sheet,* especially when diarrhœa is present. The necessity for frequent changing of the pillow-slips can be avoided by covering them with a towel, which can be changed daily. This is often necessary when there is a discharge from the ears or mouth.

Food should never be allowed to remain in the sick room. Any article left by the patient should not be given to another member of the household.

There are important personal duties which it is necessary that the attendant upon the sick should constantly bear in mind. She should wash her hands in some disinfectant fluid after performing any service for the sick. Her clothing should be considered impure and requiring the same precautions as that of the patient. She should mingle as little as possible with the rest of the family, and before going out to visit any house, or to shop, she should change all her clothes. When possible she should take a bath frequently, and regular exercise in the open air. Should a hired nurse be employed, all her clothing should be disinfected before she returns home.

* The "draw-sheet" is ordinary sheeting folded, so that it can be easily slipped in and drawn out from under the patient, and be readily removed. It protects the under sheet.

THE USE OF DISINFECTANTS.—Free ventilation of the sick room is the only means that can be relied upon for disinfecting the air. By this means also we diminish the risk of any article in the room becoming impregnated with the poison. "Aerial disinfection, as commonly practised in the sick room, is either useless or positively objectionable, owing to the false sense of security it is calculated to produce. To make the air of a room smell strongly of carbolic acid, by scattering carbolic powders about the floor, or of chlorine, by placing a tray of chloride of lime in a corner, is so far as the destruction of specific contagia is concerned, an utterly futile proceeding."* Still more useless are the saucers of Condy's fluid so frequently seen. The latter disinfectant can only act upon what it comes in contact with, and can therefore have little effect on germs floating in the air. Chlorine gas and the vapour of carbolic acid destroy the activity of the germs only when present to a greater extent than they can be breathed with safety ; they are therefore of but slight use, if any, so long as the room is occupied. It is upon free ventilation alone that we must rely, and it is both most successful and in every way beneficial.

The use of disinfectants is to purify (1) The body of the patient, (2) Whatever has come in contact with or been used by him, (3) All excretions of the body.

1. *The Body of the Sick.*—Frequent sponging of the whole body with tepid or cold water containing a disinfectant is of great service in all stages of fevers. The frequency must be left to the discretion of the medical attendant. There is an absurd popular idea very prevalent, that it is dangerous to wet the skin in scarlet fever or measles, lest the rash be driven in. This is wholly wrong. Cleanliness is important, but more, the

* Dr. Baxter's Report on Disinfectants, Public Health Reports of Privy Council, No. 6, 1875.

sponging with water tends to reduce the high temperature, and when properly performed is grateful to the patient. Only a little of the body need be exposed at a time, there is then no fear of catching cold. Condy's fluid is one of the best disinfectants for this purpose. It has the advantage of having no odour of itself. It must be used of sufficient strength to slightly tinge the skin.

In the later stages of scarlet fever it has become a frequent custom to anoint the whole body with carbolic oil, with the view of diminishing the risk of infection. Notwithstanding the high authorities for this practice, I cannot but regard it as unnecessary, injurious in one sense, and very dirty. It is claimed for it, that it tends to prevent the diffusion of the particles of skin in the atmosphere and disinfects them. Against this it may be said that the disinfection may be performed as effectually, and made more cleanly, by a watery solution of carbolic acid. And there is this further objection, that the oil will tend to protect the poison from being destroyed. Apart from the action of the disinfectant, the scales are more likely to resist the action of the air or other destroyer, and remain infective for a longer time when soaked in oil, than in their natural condition. The only use therefore in the oil is as a vehicle for using carbolic acid, and as such it is a dirty material. The very dirt which it produces on the body and on the clothing is sufficient to condemn it.

Until the patient can have a bath, a solution of carbolic acid may be used, if preferred to the Condy's Fluid. It must be used of good strength, one in twenty, not weaker than one in forty. It should be kept of double strength, and then diluted with equal parts of warm water. Where there is itchiness of the skin it tends greatly to allay it. Carbolic soap is too weak a preparation to exert any

destructive influence on the contagion. It is another instance of encouraging a false security when relied upon alone.

2. *Whatever has come in contact with, or been used by, the patient must be considered impure, and disinfected at once.* For this purpose a large basin containing Condy's Fluid in water should be kept in the room, and spoons, cups, &c., which have been used, at once placed therein. As, however, the fluid stains articles of dress and clothing, whatever can be washed should be at once placed in a tub with water containing either carbolic acid or a solution of sulphurous acid ; or boiling water may be at once poured upon them. They should subsequently be well boiled and washed separately from other clothing.

Great risk lies in pieces of flannel or shawls being overlooked and escaping the disinfecting process to be afterwards described. Also in the use of toys and books. The latter should be only such as can be burned. Infection has been known to lurk in a doll and afterwards communicate the disease to another child. Ladies, when convalescent, or whilst nursing, often engage in sewing or knitting. All such articles must be included in the purification. Little things overlooked have often rendered useless extensive means of purification. *Put nothing away until it has been disinfected, especially little things, watch and disinfect everything.*

3. *All excretions which pass from the body should be at once disinfected and removed from the room.* For this purpose the carbolic or other powders may be employed. The error frequently made is, in using them too sparingly for this purpose. In scarlet fever, diphtheria, and hooping cough, careful attention must be paid to any article which has received matter which has been coughed, spat, or vomited up by the patient. It should be at once disinfected.

By these means, constantly and carefully perserved in, throughout the illness and the period of convalescence, the fight with infection may be successfully pursued; and the contagion, which is being produced in large quantities, destroyed at its source. As however much may have escaped destruction, and as in most of the diseases the air is infected, the surface of the walls and of every article in the room may have become impregnated with the poison, it is necessary, when once the patient is free of infection, not before, to set about

THE PROCESS OF PURIFICATION. This should be done in two stages. Nothing should be removed from the room until after the first fumigation. The windows and fireplace should be closed. Then a large flower pot taken, half filled with earth, and arranged so that there is a cup-shaped depression in the centre. Into this put three or more ounces of coarsely powdered stick sulphur or the flowers of sulphur. Set fire to it by a match or live cinder, and, having placed the pot in the middle of the room and made sure it is burning, retire, shutting the door, and place a mat against the foot of it.

The object is to fill the room with a dense vapour of sulphurous acid, which is undoubtedly the readiest and best disinfectant which can be used in the process of purification. The first fumigation should last at least four hours. At the expiry of this time, the window should be thrown open, and when once the atmosphere is fit to breathe, the room may be emptied to prepare it for the second process. All articles of clothing and furniture must be exposed freely to the air. When possible they may be taken out into the garden or to a drying loft; when this cannot be done, they must be left arranged in a room with the window open, for two or three days.

When the room is empty it should be again fumigated as before, and afterwards thoroughly cleansed, the ceiling whitewashed, the woodwork washed down and the walls well swept, the windows being kept meanwhile widely open. It is not essential, if fumigation has been thorough, that there be any repainting or papering. The whole house should also undergo a thorough cleaning.

Amongst the poor who have only one or two rooms, and who cannot leave their house, reliance must be placed upon the fumigation, and afterwards good cleaning and free ventilation. The rich can send away their bedding to be purified and cleaned, but the poor must rely on their own efforts. Sheets and blankets can be washed, the mattress if of chaff can be refilled, but if of other material it should be exposed to the fumes of sulphur and then placed near the open window. Sulphur and fresh air, with soap and water, are within the reach of all.

Care must be taken that no article is shut up in a drawer or otherwise laid aside before it has been purified. This must include the clothing worn by the patient before the sickness as well as during the illness and period of convalescence. It must also be extended to every article in the room. First the free use of sulphur vapour, and secondly free exposure to the air for two or three days.

Heat is an excellent disinfectant, but for its application to clothing and bedding it requires a special apparatus. The temperature requires to be higher than can be obtained in an ordinary household. Lower degrees of heat are also serviceable if kept up for a lengthened period. Heat may therefore be employed as an auxilliary measure. The boiling of clothing, or the exposure of articles before a strong fire for a lengthened time, is of service.

In the presence of infection it is the duty of all to guard against conveying the disease to others. The whole community are at the mercy of those who are dealing with the infection. All the diseases are really propagated by carelessness and culpable negligence of the duty which each one owes to his neighbour. When infection is present no article should be sent out of the house to another without being disinfected. A dress has carried infection from the dressmaker's. Much more frequently has Scarlet Fever and Typhoid been spread in the milk supply. Care should likewise be taken as to where clothes are sent to be washed. Washerwomen's families have been infected in this way from houses of the rich. A woman hired in to wash, should not be employed if she has not had the disease herself. She runs great risk of taking the affection. Infected clothing should never be sent to a public laundry.

What are people to do in many cases? may well be asked. The only means of security is that the Local Authority in each district should supply a laundry and public disinfection establishment, where every family who is visited with an infectious disease should be compelled to send their clothing to be washed, and the bedding to be disinfected.

Another important duty devolving upon all is that the period of isolation should be extended till all danger of infection be removed. This is constantly unheeded. So soon as a child is able to be out of bed, he is often allowed to associate with his companions. An adult will return to work as soon as his strength permits. The rich are often found to seek convalescence in the country long before they can be free of infection. It is in Hooping Cough, Scarlet Fever, and Measles that the greatest mischief is done in this manner. In scarlet fever the *shortest*

time that the body of a patient can be considered free of infection is six weeks, in measles four weeks, and for hooping cough no period can be assigned, it being dependent upon the amount of catarrhal mischief present. In scarlet fever especially, it is a mistake to suppose that because the attack has been slight, there is less risk of infection. Much hardship, no doubt, is thus imposed upon those who have been attacked, but it is slight indeed compared to the evil which they may do by neglecting the duty laid upon them. Every one has a right to demand protection ; to insist upon it, that his life shall not recklessly be placed in danger ; but this right implies, or involves, a *duty*, that, when he himself is the infected, he shall use every precaution that he does not endanger the lives of others.

NOTES ON THE INFECTIOUS DISEASES.*

TYPHUS FEVER.—The symptoms of this disease need only be referred to in general terms to show its distinction from Typhoid. After a few days of languor and weariness, it begins with chillinesss and frontal headache, pains in the limbs, and complete prostration. There is great sluggishness of the intellect and confusion of thought, passing into stupor and sometimes insensibility. The disease lasts about a fortnight. Convalescence, once begun, is generally rapid and satisfactory. There may be complications, but no danger of a relapse. "What appears essential to the development of typhus is over-crowding of human beings, with deficient ventilation, aided by whatever tends to debilitate the constitution." It is highly contagious, the poison is diffused in the atmosphere around the patient, yet it is readily destroyed by free ventilation. "From all experience it follows, that if a typhus patient be placed in a large, well-ventilated apartment, the attendants incur little risk, and the other residents in the same house none whatever. There are likewise no grounds for the popular belief that typhus may be propagated through the atmosphere from a fever hospital to the houses in its neighbourhood." Sufficient isolation cannot be obtained in the houses of the poor; an infected person should therefore be at once removed to an hospital. It is thus alone that the spread of the disease can be checked. On this subject Professor Alison

* The following remarks are intended only as *notes*—what everyone should know regarding the various diseases—not as anything like a detailed account of them.

observes—"We should have little difficulty in pointing out above a hundred houses, where a single case of fever has occurred, where the patient has been speedily removed, and where there has been no recurrence. But we should hardly find five houses in all the closes of the old town in which a patient in fever has lain during the whole or even half the disease, and in which other cases have not speedily shown themselves."

The typhus poison adheres very readily to clothes; careful disinfection is absolutely necessary. Too little care in this respect is paid to this most frequent means of transmitting the disease. The poison also readily adheres to furniture, and is absorbed by the ceilings and walls and beams of wood. It may thus be preserved for years. "In a private house, after the patient's recovery, the walls and ceiling of the room ought to be *scraped* and whitewashed or re-papered, the floor and furniture washed, first with some disinfectant and afterwards with soap and water, and the doors and windows kept open night and day for a week. At the end of this time the room may be re-inhabited with safety." I would commend these words of Dr. Murchison to the attention of our municipal health committees. What they deem necessary and perform often falls in many cases far short of what is here indicated. Imperfect work is doubly bad, it is altogether wasted because ineffectual, and it begets a false security. Typhus still exists, because it is not thoroughly dealt with when found.

The period of incubation is usually about twelve days, frequently shorter, but rarely longer. There are also authentic cases where there has been scarcely any latent period at all, either from the poison having been so concentrated, or the system so susceptible to its action. Dr. Murchison is of opinion that the disease is really most

contagious from the end of the first week up to convalescence; and that the body ceases to give off the poison as soon as the fever subsides and the appetite and digestion are restored. The infection, however, may be retained in the clothes. During the first week there is little danger; when the patient is removed within this time the disease rarely spreads.

TYPHOID OR GASTRIC FEVER.—The symptoms of this disease are very variable. The beginning is rarely well marked, the feverish symptoms are often slight and remittent; the patient, although feeling ill, rarely takes to bed during the first week, prostration is later than in typhus. There is usually severe diarrhœa with abdominal pain. As the disease advances prostration becomes very great; there is stupor and delirium, but the mind may remain clear throughout; there is frequently bleeding from the bowels. The fever continues for three weeks, frequently longer; there is great danger of a relapse, and convalescence is always slow. The greatest care is necessary when getting well; a relapse, and a fatal result may be brought on by an error in diet, or getting out of bed too soon. The milder forms of the disease are as liable to go wrong at the end as the more severe. The danger lies in the affection of the bowel; there may be little or no diarrhœa, yet the changes which lead on to ulceration of the bowel, profuse bleeding, or perforation with inflammation, may be present to a large extent.

"No acute disease presents itself under a greater variety of forms than enteric fever." This fact, or rather the ignorance of it, often leads the popular mind astray, in comparing one case with another. At one time it assumes the form of a *low nervous fever*, in others the

nervous symptoms are acute, and it may be called "*Brain fever*"; in one case the abdominal symptoms preponderate, in another the gastric. In children it often has "a *remittent*" character. An *insidious or latent* form may occur where a patient, though feeling ill, is able to continue at his employment until a few hours of some serious and even fatal complication.

"The prevalence of enteric fever is independent of over-crowding and deficient ventilation, nor does destitution predispose to it. The disease prevails without distinction, not only in the most dense, but also in the least populous districts of large towns, and is of common occurrence in country districts, and even in isolated houses."

A person who has but recently come to reside in an infected locality is specially prone to take the disease, when those who have resided for a length of time in the district have resisted the infection. "Many illustrations of this fact," says Dr. Murchison, "have come under my notice in private practice; and I have also met with several instances where successive visitors at the same house, at intervals of months or even years, have been seized shortly after their arrival with enteric fever, or with diarrhœa, from which the ordinary residents have been exempt. These considerations point to the dependence of enteric fever on some local cause, to which the system becomes habituated by constant exposure." They also explain what frequently is observed, a family removes in summer to the country, and shortly some of the members are laid down with typhoid fever, although no case of the disease has occurred among the ordinary residents of the district for some months or it may be years.

The nature of the typhoid poison has already been

described (see p. 13). Whether it can arise *de novo* or not, need not here be discussed. Whether a previous case is necessary or not, the disease is always due to the contamination of the air, drinking water, milk, or other ingesta, with decomposing organic matter. It may be communicated by the sick to persons in health, but not directly; the poison as given off by the body is further developed by the decomposition of the excreta after their discharge.

"There are no data for forming an accurate opinion as to the stage at which the disease is most communicable. There is no proof that enteric fever can be communicated by the dead body."

MEASURES FOR PREVENTING TYPHOID FEVER.*— Instead of cutting off thousands annually, enteric fever would be a rare disease, if we could prevent the products of fœcal fermentation entering our houses, and polluting our drinking water. The chief rules to be attended to are these:

1. The cisterns aud water-butts in every dwelling ought to be scrupulously cleaned from time to time, and care must be taken that the wastepipe of the cistern does not pass down directly into a drain, and thus become the means of ventilating the drain into the cistern. When drinking water is derived from surface wells or running streams, there must be no cesspool, drain, or other nuisance in the vicinity, from which organic impurities may percolate through the soil into the water. Drinking water ought to be tested from time to time to discover

* The following rules are taken from Dr. Murchison's valuable work on Fevers, which has above been frequently quoted from. Whilst they are given under Typhoid, the precautions are valuable and indeed essential for the maintenance of health generally, and diminishing the susceptibility to all infectious poisons.

if there be any organic taint.* All that is necessary is to add to a tumblerful one or two drops of Condy's (crimson) Fluid, which will give it a very faint pink hue. If, after standing for half an hour, the pink colour has gone or turned to yellowish, the water is tainted and cannot be drunk with safety; but if the pink hue maintains itself, it is free from organic impurity. When no filter is within reach, it is a good plan to add to any suspicious drinking water a drop or two of Condy's Fluid.

2. Care must be taken to keep all house-drains in good order, free from leakage and obstruction, and with all water-closets, sinks, and other openings into them properly trapped. It must be remembered also that the trapping may be perfect, and yet effluvia may escape from drains if the supply of water be deficient, or if the drain beyond the trap be not properly ventilated. The waste-pipes of baths, basins, and sinks ought, therefore, to be disconnected from the main drain, as well as trapped; while the drain pipes of all closets before entering the main drain should be ventilated and deodorized. When bad smells escape from sinks or drains, chemical disinfectants ought to be used, and thorough house ventilation carried out, until the cause of the escape is investigated and removed; but it must not be forgotten that the poison of enteric fever, although often accompanied by bad smells, may be itself inodorous. It is a good precaution to flush all house-drains, and scrub and cleanse all sinks, once or twice a week, with an abundance of water containing some disinfectant. No cesspool ought to be tolerated within the walls of any dwelling-house.

3. When the drains or cesspools of a house are opened

* It would be well were this precaution always adopted when a family removes to country quarters in summer, where the water supply is from wells.

for the purpose of repair or cleansing, chemical disinfectants ought to be applied freely to their contents, and thorough ventilation enforced, and the residents will do well to absent themselves while these operations are going on. From neglect of this rule, enteric fever has often broken out in consequence of the measures resorted to for its prevention.

4. The best chemical agents for preventing fœcal fermentation are carbolic acid, copperas or sulphate of iron, Burnett's Fluid (which is a solution of chloride of zinc), and the chloride of lime. The liquid carbolic acid may be diluted with water in the proportion of one in forty, or it may be mixed with sand or sawdust. Copperas is to be used in the proportion of two ounces to the pint of water. Condy's fluid is also a good disinfectant. It acts by liberating a large amount of oxygen, which combines with and destroys the products of decomposition, but it is not an anti-septic ; (?) and the same remark applies to Chloralum and charcoal, which absorb the volatile products of decomposition.

DIPHTHERIA is not a new or recent affection, as is popularly supposed ; it is one of the oldest of epidemic diseases. Is is only since 1821 that it has been clearly distinguished from other diseases, but it can be traced back in medical writings to the beginning of the second century. After a long-continued absence in anything like a general form, it became prevalent in this country in 1855, and since that time it has forced itself prominently into notice by the frequency and alarming nature of its epidemics. Whilst at times it prevails so generally as to be regarded as epidemic, yet it more frequently occurs as an endemic affection, that is due solely to local condi-

tions, limited, and at times markedly so, to a district, and even village or hamlet.

Many questions regarding it are still subjects of discussion, but one point is well determined, that its existence is dependent upon decomposing animal or vegetable matter, and that it is communicated by the air, water, or food becoming befouled by the contagium. Sewer-gas, accumulations of filth, soakage of excremental matter into the soil, and from thence into the drinking water, will not of themselves cause diphtheria, but the poison does not arise, whether *de novo* or otherwise, without some one of these conditions. When once diphtheria has got a foothold, it lurks tenaciously about, and is most readily diffused by indirect means (clothing, water, &c.). It may also be communicated directly ; but with free ventilation and proper precautions (see p. 15), its direct contagious nature is very limited.

The recent occurrence of this disease in the Grand Ducal Family of Hesse Darmstadt has directed public attention to the subject of the propagation of diphtheria. From the peculiar circumstances of this terrible disaster, several important points have been brought prominently forward. The source of the infection has not yet been discovered ; but that the hygienic arrangements were not at fault, rests not only on the opinions of most eminent physicians, but is supported by the fact that " not a single member of the Grand Ducal household (which amounts to sixty persons) has been attacked by the disease". On the other hand there is " the sad occurrence of diphtheria, in a very severe form, attacking *seven* members of a family living under the most favourable sanitary conditions". The first fact confirms the opinion that the attendants on the sick, with proper precautions, do not incur any great risk. But the

explanation advanced for the second fact, "that, with the exception of the first infected, Princess Victoria, the disease has been communicated to the individual members of the Grand Ducal family *by kisses*," has received too great prominence. There is no doubt the affection has been, in other instances conveyed in this manner, but in the present sad instance there is another and equally important factor to be taken into account, mentioned by the physicians, which bears a pregnant caution. "They were in fact predisposed, not only in five of the seven cases by their age, and perhaps in all cases by a certain *family susceptibility* (upon which circumstance Sir William Jenner and most of the best observers lay a deserved stress) but especially by the fact that 'they all had suffered very frequently from acute and chronic affections of these parts (viz., the pharynx and tonsils)'." With regard to the case of our much-beloved Princess Alice, "it may be observed she had passed through conditions which may be considered to have rendered her particularly susceptible to the contagion, and likely to suffer severely if it made good its hold. She had nursed her children and husband through long and serious attacks, and had endured the anxieties and fatigues incident to so trying and protracted an ordeal. An affectionate mother, a devoted wife, and unflinchingly brave in the performance of all the offices of nursing, she had encountered every danger. The prior, continued, and long exposure of a patient to contagion has been before pointed out by Sir William Jenner as one of the conditions which unfavourably influence the development of infectious disease, when it attacks the person so exposed."*

But another deduction may be drawn from this sadly

* *The British Medical Journal.*

interesting occurrence of diphtheria. Suppose some defect in the drainage had existed in the castle, it would certainly have been assigned as the cause of the outbreak. It might have been coincident, but independent of the disease. We are too apt to rest content when an apparently satisfactory cause has been discovered. A defective drain, or bad arrangement of pipes, is only one factor, but not the only one!

In a Government report just published on a recent epidemic of Diphtheria in North London, an important communication to our knowledge of the source and means of propagation of the disease has been made. "Defects in the drainage of the infected area were found, of a nature to do injury to health, and very much localised in the particalar area of the epidemic. It is not therefore to be wondered at that popular opinion ascribed the latter to the sewer defects of the district. But the inspector, Mr. Power, whilst not denying that these conditions may have had concern in predisposing to and intensifying the outbreak, is able to show very conclusively that, if they have held any part in its causation, they have not held the primary place." The true cause lay in the milk supplied by one dealer. No source of contamination of the milk could, however, be discovered, and the important question has been raised, whether any affection in the cow can by transmission in the milk produce Diphtheria in the human subject. Whether this is so or not, after a perusal of the report, Dr. Murchison, one of the greatest authorities on the subject, has expressed his opinion "that the connection of this Diphtheria epidemic in the north of London with milk has been made out as certainly as such a matter could be".

In many instances it has been observed that both before and during the prevalence of diphtheria in a

district, sore throats, without any diphtheritic character about them, have been very prevalent. It would be well, therefore, if on all occasions when there seems to be an epidemic or great prevalence of sore throats, and occasionally diphtheria, such cases were to be regarded in a more serious light than at present is the case, and special precautions taken to more carefully isolate the sufferers, both in the family and otherwise, and certainly not to allow any child suffering from sore throat to attend school, either during the attack or *for a longer period after* than is considered necessary for ordinary inflammation of the tonsils. These precautionary measures become more necessary whenever any sore throat is associated with marked lassitude and depression of strength—either before or after an attack.

SCARLET FEVER varies greatly in different cases, even in members of the same family, and at the same time; in one it may be very severe, in another very mild. The appearance of the rash may be the only indication that the child has the disease; this even may escape notice, and the appearance of some of the after-effects of scarlet fever be the first indication that he has caught the infection. A slight attack must be considered equally infectious as a severe one; the cases arising from it may be as severe as it was slight. The illness begins suddenly; the usual symptoms are vomiting, headache, great heat of skin, and some sore throat. There is frequently much disturbance of the nervous system, causing great restlessness, talking in the sleep, and even convulsions. The eruption begins at the end of the first day, and is first seen on the neck, chest, and cheeks, in the form of numerous small red points situated close together. When fully developed the surface of the body presents

a uniform scarlet colour, with darker red points scattered throughout. The duration of the eruption is very variable ; in mild cases it may be but a few hours, or a day ; in general it lasts four to seven days. There is no danger in a rapid disappearance of the rash, as is generally supposed, provided the heat of skin diminishes at the same time. There is no danger in sponging the body with water, if care be taken to avoid long exposure. Peeling of the skin, called desquamation, begins soon after the disappearance of the rash. Its degree and duration varies greatly ; it may be completed in a week or extend over three or four weeks. The infective period is considered by many to be over when desquamation is completed, but this is by no means a certain criterion ; if the peeling has been rapid the person may still be infective. If a child's hands are observed to be peeling, there is grave suspicion that he has passed through an attack of scarlet fever, even although he has not shown any other symptoms of illness ; and he should be protected from the after-effects, as well as regarded capable of infecting others. A person protected by a previous attack may, if exposed to infection, be affected a second time. Frequently there is only a sore throat and feeling of illness without any rash. Such a person may be the means of infecting others with fully developed fever, even of a severe type. All necessary precaution should therefore be taken.

This fever is apt to be followed by serious disturbances of health, or *sequelæ*, as they are called, the chief of which are kidney disease and rheumatism. They usually begin within the third week from the beginning of the fever ; no child can be considered safe within this period, even after the mildest form. The only safeguard is to confine the patient to bed, however slight the attack,

till after the twenty-first day, with careful attention to diet and the action of the bowels.

The period of incubation is from three to six days. The disease must be regarded as infectious from the first, although it is probable the risk is less during the first two days. The body may be infective for a period of six weeks, and no scarlet fever patient should be allowed to mingle with others till after this period. The clothes he has worn during convalescence must be included in the process of disinfection, a point frequently neglected. The poison diffuses itself throughout a room or house, and adheres readily and tenaciously to any article, especially woollen stuffs. Everything, however small, must be disinfected and left freely exposed to the air for a day. Great caution must be exercised throughout the whole time that nothing which may have become infected be laid aside or shut up in a drawer, and thus escape purification. It is often in little things the greatest danger lies.

MEASLES.—Usually the febrile symptoms in measles are slight during the first two or three days, but they may be severe from the beginning. At first there are signs of a cold, of more or less severity, cough, running at the eyes and nose. Sensitiveness of the eyes to light, with slight redness, should always be viewed with suspicion during the prevalence of measles. The eruption, in the regular form of the disease, shows itself towards the end of the third or beginning of the fourth day, first on the face, neck, and arms, on the following day the trunk, and afterwards on the legs. It fades somewhat in the same order, lasting six or seven days, and the duration of the disease is from nine to twelve days. In milder forms it may be much shorter. The eruption consists of

numerous circular spots or blotches, often running together in a semi-lunar form, slightly raised, and of a pinkish red or deep raspberry hue. After its disappearance the skin often comes off in floury scales.

The popular notion that " measles should not be wet " is wrong and injurious. The body may be sponged, if carefully done. It is also a mistake to load the body with clothes, under the idea of keeping the eruption out. The air of the room must be kept fresh although warm.

The colded condition (catarrh) is liable to descend into the chest and cause bronchitis or inflammation of the lungs. Sore throat is sometimes met with. Diarrhœa is also frequent sometimes at the beginning, oftener at the end of the disease.

The period of incubation is from ten to fourteen days, according as it is reckoned from the beginning of the affection or the appearance of the eruption. The disease is infectious before the eruption, (see p. 19) The poison is readily diffused throughout a room and is very tenacious, especially in woollen clothes. A person who has had the disease should not mingle in society for four weeks at least. The infection is propagated by persons and by clothing.

HOOPING COUGH—begins as an ordinary cold or cough, there is nothing to distinguish its special character. The child may be feverish, oppressed, and ill, others appear well, and the health but little disturbed. This first stage lasts from one to two weeks ; gradually the cough becomes more and more severe, and finally assumes its peculiar spasmodic and paroxysmal nature with its characteristic hoop or kink. A child may pass through hooping cough without any hoop during the whole course of the affection, the cough being only par-

oxysmal. The frequency of the attacks increases especially during the night, for, on an average, three weeks after the hooping has begun, when the affection is regarded as at its height. As gradually it declines. The first evidence of improvement is a diminution in the frequency of the attacks during the night; they may continue quite as severe as before, but there are fewer of them. There is no fixed limit to the disease, its duration depends upon the amount of complications, which are so liable to occur, and the degree in which the general strength of the patient has suffered. It is therefore very difficult to assign limits to the infective period. Cases which have come under the observation of the writer, leave little doubt that the disease is infectious before its true nature can be determined; on the other hand there is no reason to suppose that the contagion lasts as long as the cough and hoop, when these are unduly prolonged beyond the ordinary period of the disease. It is equally difficult to determine to what distance the poison may be conveyed through the atmosphere. Certainly a child living under the same roof, or visiting a house where there is Hooping Cough, runs a great risk of taking the infection, even if he does not come in contact with the patient. But the poison is not tenaceous, it does not seem to remain about a house. It is not readily carried in the clothes unless these have received some of the expectorations of the child, there is little or no risk of carrying the infection away from a house. It may, however, be sent in the clothing worn by a patient.

Too little attention is paid to limiting the spread of Hooping Cough. It is still regarded as a disease which children must take sometime, and to be beyond human control to diminish its prevalence. It is certainly dependent to a large extent upon general epidemic

influences, atmospheric and otherwise, but it in no way differs from the specific infectious diseases. Greater care in the isolation of cases, not allowing the affected to mingle at play with the well, would certainly do much to limit its extent. The one great difficulty is the infectious character of the disease before its nature is known. It is this which causes schools to be the frequent place of infection. When hooping cough shows itself in a family none of the children who have not had the disease should be sent to school; this is not generally attended to. It is not necessary to keep at home members who have had the affection on a previous occasion, but all due care should be taken to keep them apart from the affected as much as possible. When hooping cough is prevalent in a district, no child who has not had the disease should be sent to school, if suffering from a cold or cough however slight. During the period of convalesence, or in seeking change of air, equal care should be taken to keep the affected apart. This is not done. Surely greater attention might be paid to limit this disease. Scarlet fever is more dreaded, and yet hooping cough is more fatal, but it is so common, is looked upon as a necessary thing a child must take sometime, that the public have become indifferent to it. If duly attended to it might be as readily controlled as any other of the infectious diseases.

GERMAN MEASLES, OR RUBEOLA.—From the close resemblance of the symptoms of this disease, particularly to Measles, and at times to Scarlet Fever, its recognition must ever be difficult even to medical men. The eruption resembles in part both diseases, usually, however, it makes its appearance at once all over the body. Sore throat is more frequent in this affection than in measles. Desquamation is not so extensive or general as in scarlet

fever. It may be followed by dropsy or inflammatory affections of the chest, and therefore requires the same caution as the other diseases during convalescence. It has the same period of incubation as measles, and is probably like it infectious before the eruption comes out. Although so closely resembling measles, it is nevertheless distinct from it. See p. 8.

SMALL-POX AND VACCINATION.—It is needless to advance proof of the benefit which vaccination has been to the world. Those who still dispute it must be devoid of the power of judging the simplest and plainest evidence. There are many, however, who, whilst believing in the good of vaccination, still entertain the dread lest by this means other diseases may be communicated to their children. The fear is groundless, there is no such danger, if the operation be performed carefully by a competent person. Erysipelas may follow it, as it may a simple scratch or slightest wound. Vaccinia affects the constitution ; did it not it could do no good. It may be followed by derangements of health, but the cause is not in the vaccine matter, but inherent in the body of the person vaccinated. Scrofula and other constitutional affections are not introduced in vaccine lymph. If such were the case, the medical profession, from its acknowledged disinterested spirit, love of truth, and zeal to prevent disease, may be trusted to have proclaimed the fact.

The following quotation is taken from a memorandum on RE-VACCINATION, issued by the Medical Department of the Local Government Board :—

"By vaccination in infancy, if thoroughly well performed and successful, most people are completely insured, for their whole lifetime, against an attack of

small-pox; and in the proportionately few cases where the protection is less complete, small-pox, if it be caught, will, in consequence of the vaccination, generally be so mild a disease as not to threaten death or disfigurement. If, however, the vaccination in early life have been but imperfectly performed, or have from any other cause been but imperfectly successful, the protection against small-pox is much less satisfactory; neither lasting so long, nor while it lasts being nearly so complete, as the protection which first-rate vaccination gives. Hitherto, unfortunately, there has always been a very large quantity of imperfect vaccination; and in consequence the population always contains very many persons who, though nominally vaccinated and believing themselves to be protected against small-pox, are really liable to infection, and may in some cases contract as severe forms of small-pox as if they had never been vaccinated. Partly because of the existence of this large number of imperfectly vaccinated persons, and partly because also even the best infantine vaccination sometimes in process of time loses more or less of its effect, it is advisable that *all persons who have been vaccinated in infancy should, as they approach adult life, undergo* RE-VACCINATION. Generally speaking, the best time of life for re-vaccination is about the time when growth is completing itself, say from 15 or 18 years of age; and persons in that period of life ought not to delay their re-vaccination till times when there shall be special alarm of small-pox. In proportion, however, as there is prevalence of small-pox in any neighbourhood, or as individuals are from personal circumstances likely to meet chances of infection, the age of 15 need not be waited for; especially not by young persons whose marks of

previous vaccination are unsatisfactory. *In circumstances of special danger, every one past childhood, on whom re-vaccination has not before been successfully performed, ought without delay to be re-vaccinated.*

"Re-vaccination, once properly and successfully performed, *does not appear ever to require repetition.* The nurses and other servants of the Small-Pox Hospital when they enter the service (unless it be certain that they have already had small-pox) are invariably submitted to vaccination, which in their case generally is re-vaccination, and is never afterwards repeated; and so perfect is the protection, that though the nurses live in the closest and most constant attendance on small-pox patients, and though also the other servants are in various ways exposed to special chances of infection, the Resident Surgeon of the Hospital, during his thirty-four years of office there, has never known small-pox affect any one of these nurses or servants.

"It is important for the Public to observe that Re-vaccination on a large scale is not easily conducted unless in a thoroughly systematic manner, and that individual difficulties in finding lymph for re-vaccination are inseparable from the too general practice of deferring re-vaccination to periods of panic, instead of having it proceed, as it should, regularly and uniformly, in proportion as successive numbers of population reach the proper age for its performance."

CHICKEN-POX.—This affection generally disturbs the health so little that the appearance of the eruption is often the only evidence of illness; yet at times it is preceeded by distinct feverishness for 24 to 36 hours, chiefly in children who are teething. The eruption consists of more or less numerous small blisters or watery heads filled

with a clear fluid. The period of incubation is 14 days; isolation and ventilation readily control the infection.

MUMPS also is a disease which rarely causes danger, but is accompanied by much suffering. It generally sets in with feverishness, or feeling out of sorts, for twenty-four hours, followed by a stiffness of the neck, and pain and swelling at the angle of the lower jaw extending towards the neck. There may be light-headedness and talking in the sleep. The swelling lasts a variable time, three or four to ten days. The period of incubation is 14 to 21 days, the infection can be readily controlled.

These latter two affections from their mildness and freedom from danger, are generally regarded as trifling, and little attention paid to them. Yet as they are constitutional affections, it should ever be borne in mind that they may, especially the latter, impair the general strength and develop any special tendency to disease which is inherent in the system. Children, and boys and girls about fifteen, should be carefully protected from cold and fatigue in the attack and during convalescence.

NOTES ON THE VARIOUS DISINFECTANTS.

FRESH AIR.—The most serviceable, and the most reliable ; upon it alone, by means of free ventilation, can we depend to purify the atmosphere of rooms that are occupied, and of the house generally. All articles that have been otherwise disinfected should afterwards be freely exposed to the air. Other means are in many cases necessary or advisable, but they do not supersede the action of the air. When possible, the exposure should extend over several days. If a member of a family returns home from an infected house, or after having had fever, the boxes should be opened outside the house, and every article freely exposed to the air. After disinfecting a room with sulphur the windows should be kept widely open for several days.

HEAT.—To act rapidly it must be from 230 to 300 degrees ; but this requires a special apparatus, which is not attainable in ordinary households. But lesser degrees will destroy the germs, only the duration of the exposure must be proportionately increased. The readiest domestic means of using heat is prolonged boiling ; for clothing soda should be added. If water or milk is suspected, boiling before using will remove the danger. Letters have been supposed to have been the means of conveying infection. It is possible. Heat can be readily used in such cases where there is any suspicion.

SULPHUROUS ACID GAS, obtained by burning sulphur (see p. 37), is the most effectual, readiest, and cheapest for the disinfection of rooms and clothing which

cannot be washed. They must afterwards be freely exposed to the air. Although its action is less certain when used in small quantity, sufficient to allow the air being breathed, as in a room which is occupied, it is the safest and most reliable which can be used in this manner. A considerable quantity may be diffused in a room without discomfort or inconvenience; whenever it is felt to be too strong, the flower-pot need only be placed in the fire-place. The writer has frequently employed it in this manner, in schools and in hospital wards. In both he has had repeated experience of an occasional case of both scarlet fever and measles appearing, without the other occupants of the dormitory or ward being infected. Whether the use of the sulphur in this mild form contributed to the result or not, it is certainly the disinfectant which is most to be relied upon; in the dilute form it is more active than chlorine, whilst carbolic acid in the form of a dilute vapour is probably inert upon specific germs.

CONDY'S FLUID is useful for washing the hands, or for sponging the body. It should be used of sufficient strength to *deeply* colour the water. It may also be used to render any vessel sweet after washing. For clothing, carbolic preparations are to be preferred, as Condy's fluid stains. The stains may be removed with salts of sorrel. Saucers or basins of the fluid, so often seen, are useless to purify the air of a room. It can only act on substances brought in contact with it. When once it has lost its colour and become reddish brown it is useless. From the readiness with which it is decomposed by any organic matter, it is not so useful as other preparations for disinfecting excreta, or pouring down soil-pipes, unless used in large quantities.

CARBOLIC ACID.—There are sufficient grounds to doubt the efficiency of the vapour of carbolic acid as a disinfectant when diffused in the atmosphere of a room; the odour also soon becomes disagreeable. For domestic purposes, it is useful only in solution. In the sick room and for personal use, the pure acid should be used. It is better to get it from the druggist in solution of the strength of one in ten. It can then be diluted to the strength required for use. It may be employed for the same purposes as Condy's fluid. For washing the hands or sponging the body, it should not be weaker than one in forty (1 of the solution to 3 of water). The same strength or stronger may be employed to disinfect articles before washing them. It may also be used for washing the floor or articles of furniture. Calvert's Carbolic Powder, obtained in tins, is of service to disinfect excreta; it should be put in the utensil before using. For sinks and drains the impure, cheaper acid may be used. (For detecting flaws in pipes, &c., see p. 31.) As the efficiency of carbolic acid is dependent upon the strength of the preparation used, carbolic soap is useless to destroy germs, whatever advantage may otherwise be gained.

CHLORINE GAS is an efficient disinfectant, but from the greater difficulty and expense in its preparation, and also its injurious properties, it is not so useful as sulphurous acid gas for domestic use. The latter is for all purposes to be preferred. *Chloride of Lime* is dependent for its disinfectant properties on the chlorine which is given off from it. It has been a popular remedy, but its ordinary use when exposed in saucers or plates about a house, is really very inefficient, and often begets a wholly false security. For clothing it is objectionable, owing to

the destructive tendency on the texture of the articles. Carbolic preparations are certainly to be preferred. It may be used for sinks and cesspools ; but it must always be remembered that its action is only temporary, that it soon becomes exhausted, and requires frequent renewal. When once it ceases to evolve gas it is inert. In this useless condition it is often to be seen in plates about houses, under the delusive idea that a disinfectant is being used.

COPPERAS, or SULPHATE OF IRON, is not so largely used as it merits. Its cheapness, combined with its efficiency, should recommend it. A pound and a-half dissolved in a gallon of water makes a cheap and useful disinfectant fluid. It is to be used for excreta and soil-pipes. At least half a pint should be poured down at a time. It cannot, however, be used for washing purposes or for clothing.

Many other disinfectants have been introduced to public notice, some of which may be yet found to be of service ; but, however useful they may be in destroying effluvia, and preventing putrefaction, they have still to be proved as effectual against specific germs, and it is better in the fight with infection to rely upon the means which direct experiment has already proved to be efficient.

SANITARY LAWS

IN REFERENCE TO INFECTIOUS DISORDERS.

The following provisions against the "Infectious Diseases" exist in our Laws, it would be well were they more frequently enforced than has yet been the custom; many are ignorant of all or part of them:—

"1. The owner or occupier may be required to cleanse and disinfect any house or room, or the cabin or berth of any ship or vessel, and the articles contained in it likely to retain infection—where infectious disease has existed—under a penalty not exceeding 10s. a day for neglect.

"2. If any person, suffering from any dangerous infectious disorder, shall enter a cab or other public conveyance, without informing the driver thereof that he is so suffering, he shall be liable to a penalty not exceeding £5.

"3. Any person suffering from any dangerous infectious disorder—such as fever, scarlet fever, small-pox, &c.—who exposes himself in any street, school, church, chapel, theatre, or other public place; or in any omnibus or other public conveyance; and any person in charge of one so suffering, who so exposes the sufferer, shall be liable to a penalty not exceeding £5.

"4. Any person who, without previous disinfection, gives, lends, sells, or moves to another place, or exposes, any bedding, clothing, rags, or other things which have been exposed to infection, becomes liable to a penalty not exceeding £5.

"5. Any person who lets a house, room, or part of a house, in which there has been infectious disease, without having such house or room, and all articles therein liable

to infection, disinfected to the satisfaction of a qualified medical practitioner, is liable to a penalty not exceeding £20. This applies to public-houses, hotels, and lodging-houses.

"6. If any person who lets, or shows for hire, any house or part of house, makes any *false statement* as to the fact of there being then in such house, or having within six weeks previously been therein, any person suffering from an infectious disease, such person *answering falsely* shall be liable to imprisonment, with or without hard labour, or to a penalty not exceeding £20."

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