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THE CAUSES OF TYPHOID FEVER AND THEIR BEARING UPON SANITARY REGULATIONS.

GEORGE WRIGHT, M.A., M.B., DEMONSTRATOR OF ANATOMY, T. S. M.

The causation of typhoid fever is one of those subjects upon which there has been as extensive and varied an expression of opinion among prominent members of the profession during the past few years, as upon any other in the entire range of medical science. This is only natural. A disease that has become so prevalent amongst us, and that has contributed so largely towards swelling the mortality list everywhere throughout the entire civilized world, must of necessity attract the attention of the keenest and closest observers.

But there seems to be as great a conflict of opinion among medical men upon this subject, as there is variety and extent of observation. No two opinions seem to harmonize. We find men, for instance, of the celebrity of Dr. W. Budd, declaring most positively that typhoid fever is propagated, like scarlet fever, small pox, measles, &c., by contagion and by contagion alone. With equal confidence Dr. Murchison asserts that the disease frequently arises from bad drainage, independently of communication with typhoid cases in any shape. He

even goes so far as to state that there is no evidence that the stools of enteric fever are of such a virulent type as has been stated. Others, again, of whom Sir Wm. Gull is the leader, think that, as yet, there is *no scientific* theory, but a very good *working* theory, namely, that the disease originates some how or other in imperfect drainage; that it may very properly be called the filth fever; and that, to get rid of the filth, is to get rid of the fever. The last view of the subject comes nearest to my own conception of what is correct. We do not seem to have reached a philosophical solution of this very vexed question. There is little doubt, however, that, acting upon this idea as to the causes giving rise to typhoid fever, and regulating our sanitary affairs accordingly, we would find at least a marked diminution in the frequency of its occurrence as well as in the severity of its attacks.

The evidence which has been brought to bear upon the view that the disease may be provoked by the poison emanating from defective sewerage; that it may be conveyed by surface drainage into wells, thus infecting the water; and that the miasm rising from filthy accumulations in neglected yards, may impregnate the air and so contaminate whatever it touches, seems to be almost overwhelming. That this poison is specific, and must have had an origin by being imported from one locality to another is the question which does not as yet seem to have been conclusively proved. There seems to be scarcely a doubt that the disease may propagate itself by means of the evacuations from the bowels, although even this much is doubted by many able men. But there are many circumstances pretty conclusive of the fact that the disease may originate without *any specific* cause. Numerous instances are recorded of outbreaks having occurred in localities never before visited by the disease, and for the origin of which no possible explanation could be offered except that of defective drainage or drinking-water contaminated by decaying animal or vegetable matter. Few men of any considerable experience will have failed to come in contact with cases of this kind.

Dr. Flint, in his excellent treatise on the Practice of Medi-

cine, has given one striking example illustrative of the fact that the disease may reproduce itself unmistakeably. The locality which was the scene of the occurrence is called New Boston, a small settlement consisting of nine families, about eighteen miles from Buffalo. A stranger travelling from New England reached the hotel in this place sick. His illness in a few days developed into unmistakeable typhoid fever, and he died. There had not previously been any case of the kind in the settlement. Other cases afterwards occurred in the landlord's family; and in each of the other houses except one, the inmates of which had not come in contact with the stranger in any way, there were unequivocal cases of typhoid fever. There was a common well for all these houses: but in consequence of a difference between the landlord and the occupant of one house, the latter was obliged to dig a well for his own use, and was excluded from all intercourse with the other families. In a month, Dr. Flint says, after the arrival of the stranger, more than one half of the population of this place, numbering 43 cases, had been affected, and 10 had died. This one family before referred to escaped without the occurrence of any cases. Dr Flint also states that, by a careful examination of the body of one of those who died, he satisfied himself thoroughly as to the character of the disease. Now, on the supposition that the disease is due to defective sewerage *alone*, as Dr. Murchison has stated, the occurrence of this local epidemic is utterly inexplicable. On the supposition, however, that typhoid evacuations may be *a* cause of the reproduction of the disease, without admitting even its contagiousness, we have a most rational explanation of the cause of the outbreak.

Then, again, few of us who have observed at all closly, have failed to see numbers of cases the occurrence of which could only be explained upon the supposition that defective drainage or water contaminated by the products of animal or vegetable decomposition *can* give rise to the disease. Cases of this nature are, moreover, so numerous that the conviction is irresistible that the disease may be produced and propagated from this source.

While it seems most reasonable, therefore, to admit the fact that typhoid fever may reproduce itself by the evacuations from the bowels introduced into the system through various media, it is no less certain that it may originate *de novo* from defective sewerage, decaying animal and vegetable matter, either in drinking water or in stagnant pools, and, as has recently been discovered, from milk contaminated from the same source. To attribute the production of the disease simply to a distinct typhoid poison, is to leave a large proportion of cases involved in profound mystery. To illustrate, for instance, a man living in one of our rural districts, takes typhoid fever of the most malignant form, sinks rapidly and dies. He has not been off his own farm for weeks before the commencement of his illness, and therefore, could not have contracted the disease in this way. The disease had not been previously known in the neighborhood. His mother and sister are afterwards attacked, and they also succumb to the virulence of the disease. Careful inquiry into the surroundings disclosed a neglected cistern in the back kitchen of the house, in which the water had become so putrid as to be intolerable to one coming near it; and in the bottom of this cistern there was a considerable quantity of decomposed vegetable matter that had doubtless been conveyed there by the conducting pipes. Now the disease spread in this family until this source of contamination had been removed and no longer. How can this attack be explained unless upon the possibility that the disease may be generated *de novo?*

What then is the duty of the profession as regards sanitary precautions? Is a medical man justified, in the presence of even grave doubt, in omitting to recommend the adoption of such precautionary measures against the spread of the disease as would be considered paramount in the case of diseases unequivocally due to specific influences? It seems to be only reasonable that, so long as there is any hesitation whatever as to the doctrine which is to be accepted regarding the causation of typhoid, we are incurring grave responsibilities in neglecting to advise such precautions as may be thought desirable to

prevent its spread. Here, however, we are frequently involved in difficulty. The mere mention of the possible spread of a disease until it has gone through the entire family into which it has entered, is often the occasion of such intense alarm that those who have, up to this point, enjoyed immunity from its attack, may be rendered more susceptible through fear. Many cases are recorded in which persons have been attacked by contagious diseases in consequence of their uncontrollable dread of those diseases; and if we admit the intimate sympathy existing between mind and body, we can conceive such an event to be quite within the bounds of possibility. While, therefore, it may be the plain duty of the professional attendant upon a case of typhoid fever not to assume the responsibility of giving a negative reply as to the spread of the disease, it is no less incumbent upon him to announce the possibility of such an event with such qualifications as will not excite undue alarm.

Then, even supposing the opinion as to the production of the disease by influences other than specific, to rest upon only partial proof, it is no less the duty of the profession to recommend such sanitary precautions as will result in the effectual removal of only a doubtful source of its origin and propagation. If, as an illustration of this point, it is found, on examination of the premises where a case has occurred, that there is stagnant water under the house or in the neighborhood, or that the water of the well gives unmistakeable evidence of impurity, or that there are accumulations of filth in the yards connected with the premises, such as are emitting loathsome and pernicious odors, calculated to contaminate the air of the locality, it would be our plain duty to see that all such influences should be removed as speedily as possible. These precautions are often overlooked; and until the profession and the public generally become more fully impressed with their importance, we must expect to see a large amount of suffering which by a judicious observance of sanitary measures, might be avoided. It is gratifying to observe that the preventible causes of disease have recently been occupying a much larger

share than heretofore of the attention of the profession everywhere. There is no doubt upon one point at least. If we cannot absolutely stamp out certain forms of disease by well-regulated sanitary measures, we can certainly greatly mitigate their severity and save many lives that are now lost. We should, therefore, be particular to see that the evacuations should be so disposed of as to preclude the possibility of their incurring any subsequent damage. Defective drainage, if it exists, should be remedied as speedily as possible. The water in which the patient's clothes have been washed should not be thrown carelessly into the yards attached to his residence. In short, all the sanitary precautions recommended by men of eminence in the profession who have written upon the subject should be closely observed.

PRACTICAL NOTES AND EXTRACTS ON HYGIENE.

BY THE EDITOR.

The Air-Ventilation—Quantity of Air Required.

We propose to give in this and in succeeding numbers of the SANITARY JOURNAL practical notes and extracts on hygienic subjects, especially on air and the water supply.

An adult man, in ordinary work, gives off from the lungs in 24 hours from 12 to 16 cubic feet of carbonic acid gas, besides an undetermined quantity of the same by the skin. On an average he may be considered to give to the atmosphere ·6 cubic feet of carbonic acid every hour, while by the same channels, the skin and lungs, pass off in 24 hours 25 to 40 oz. of watery vapor.

"Organic matter is also given off from the skin and lungs," says Dr. Parks,* "the amount of which has never been precisely determined. Nor is it possible, at present, to estimate it correctly. This organic matter must be partly suspended, and is made up of small particles of epithelium and fatty matters detached from the skin and mouth, and partly of an organic vapour given off from the lungs and mouth. The organic matter from the lungs, when drawn through sulphuric acid, darkens it; through permanganate of potash, decolorises

*Practical Hygiene.

it; and through pure water, renders it offensive. Collected from the air by condensing the watery vapour on the sides of a globe containing ice (as by Taddei in the wards of the Santa Maria Novella), it is found to be precipitated by nitrate of silver, to decolorise potassium permanganate, to blacken on platinum, and to yield ammonia. It is therefore nitrogenous and oxidisable. It has a very fœtid smell, and this is retained in a room for so long a time, sometimes for four hours, even when there is free ventilation, as to show that it is oxidised slowly. It is probably in combination with water, for the most hygroscopic substances absorb most of it. It is absorbed most by wool, feathers, damp walls, and moist paper, and least by straw and horse-hair. The colour of the substance influences its absorption in the following order:—black most, then blue, yellow, and white. It is probably not a gas, but is molecular, and floats in clouds through the air, as the odour is evidently not always equally diffused through a room * * * *

"The carbonic acid which an adult man adds, to the extent of about $\frac{6}{10}$ths of a cubic foot in an hour, is not within certain limits an important impurity, but as it is practically in a constant ratio with the more important organic matter of respiration, and as it is readily determined, it is taken as a convenient index to the amount of the other impurties.

"Taking the carbonic acid as the impurity of the air vitiated by respiration (and by respiration alone), we have to ask, What is to be considered the purity of air in dwelling-rooms? We cannot demand that the air of an inhabited room shall be absolutely as pure as the outside air; for nothing short of breathing in the open air can ensure perfect purity at every respiration. In every dwelling-room there will be some impurity of air.

"The practical limit of purity will depend on the cost which men are willing to pay for it. If cost is disregarded, an immense volume of air can be supplied by mechanical contrivances, but there are comparatively few cases in which this could be allowed.

"Without, however, attempting too much, it may be fairly assumed that the quantity of air supplied to every inhabited room should be great enough to remove all sensible impurity, so that a person coming from the external air should perceive no trace of odor, or difference between the room and the outside air in point of freshness. Taking the carbonic acid as the index of impurity, it appears, from experiments made by Dr. de Chaumont and myself, that the organic impurity of the air is not perceptible to the senses until the carbonic acid (*i.e.*, the

initial and the respiratory carbonic acid) rises to the ratio of 6 per 1000 volumes, or 0006 in each cubic foot. Occasionally air may seem pure to the senses when the carbonic acid is 7 or even 8 per 1000 volumes, but the usual rule seems to me that when it exceeds 6, the air commences to become perceptibly impure. When the carbonic acid reaches 9 or 1 per 1000 volumes, the air is what is called close and fusty; above this, it becomes disagreeable. In order to perceive the smell of the organic matter, the room should be entered from the fresh outside air, as after the observer has been a few minutes in the room the odour becomes imperceptible.

"Pettenkofer has now adopted the limit of 7 measures of CO_2, and Degen 66 measures per 1000 as the amount when the organic matter simultaneously present becomes perceptible. I would propose, then, to adopt the amount of 6 cubic feet per 1000 volumes of total carbonic acid (initial and respiratory) as the limit of impurity. I admit that I am not able to show by direct evidence that impurity indicated by 7 or 8, or even 1 volume of carbonic acid per 1000, and organic impurities in proportion, is injurious to health. We possess no means of testing the effects of such small quantities. Such a standard must be adopted, first, on the general evidence that large aerial impurities are decidedly hurtful, and that smaller amounts may be presumed to be so in proportion, although we cannot measure the action; and secondly, on the fact that we have an obvious and simple measure in the effect produced on the senses, which gives us a practical line of demarcation we could not otherwise obtain.

"Adopting, then, this standard as the measure of the permissible maximum of impurity, the next point is the quantity of pure external air which should pass through the air of a room vitiated by respiration per head per hour, in order to keep the carbonic acid at this ratio."

Dr. Parks then shows that in order that the air in an inhabited apartment shall not contain impurities in excess of this standard, there must be a supply of at least 3,000 cubic feet of fresh air per head per hour, in all cases, in which the diffusion of the contained air is uniform.

"If the standard of practicable purity, viz., 6 of carbonic acid per 1000 volumes (of which 2 is derived from respiration) is considered too high, as involving too great a cost, and if 7, 8, or 9 be taken, the amount of air required per head per hour will be 2000, 1500, and 1200 cubic feet respectively. If the emission of carbonic acid is taken, not at 6 cubic feet per hour, but as something less, as in the case of women and chil-

dren, a less amount of air would suffice, and can be calculated out at once from the formula.

"The amount of fresh air thus determined by calculation is in accordance with that determined by actual experiment. I have measured the air passing out of barracks and hospital wards, and found that when 1200 or 1400 cubic feet per head per hour only were given, the carbonic acid reached ·7, ·8, or ·9 per 1000 volumes, and that more than 2000 cubic feet were necessary to keep the air pure to the senses. Dr. de Chaumont's analysis agree closely with this; so also the older experiments by Grassi, in Paris, at Mazas, and the later observations of General Morin, as well as the observations and calculations of others, all fairly agree in this respect.

"General Morin, from analysis of all the observations made in Paris, and from experiments of his own, gives the following amounts:—

"Amount of fresh air to be supplied per head per hour in temperate climates in the following circumstances:—

"In barracks,=30 cubic metres by day=1059 cubic feet; 60 by night=2118 cubic feet. Workshops,=60 cubic metres =2118 cubic feet. Schools,=30 cubic metres=1059 cubic feet. Hospitals,=80 cubic metres day and night=2825 cubic feet (in epidemics, 160 cubic metres).

"Ranks, in his late work on Physiology, fixes the quantity at 60 cubic metres (2118 cubic feet) as the necessary minimum amount.

"Roth and Lex adopt the maximum of ·6 per 1000; but as they estimate the expired CO_2 as 20 litres, or ·706 cubic feet (Eng.) per hour, they give the hourly quantity of air as 100 cubic metres, or 3500 cubic feet.

"In mines which are thought to be well ventilated, not less than 1400 cubic feet are given per head per hour, and if there is much fire-damp, as much as 6000 cubic feet have been supplied. A horse requires 2450 cubic feet per hour at the least. Marcker has lately given the following amount from experiments—For big cattle of 1000 lb. weight, 30–40 cubic metres (=1059–1412 cubic feet); for little cattle of the small weight, 40–50 cubic metres (=1412–1765 cubic feet).

"Although, in order to give precision to the subject, it is necessary to attempt to define the minimum quantity which is necessary, there is no doubt it is advantageous to have a larger amount. Wherever practicable, we should be contented with nothing short of an almost unlimited supply.

Quantity of Air required for Lights.—Air must be also supplied for lights if the products of combustion are allowed

to pass into the room. Wolpert has calculated that, for every cubic foot of gas, 1800 cubic feet of air must be introduced to properly dilute the products of combustion; and this is not too much if we remember that a cubic foot of good coal gas produces about 2 cubic feet of carbonic acid, and that sulphuric acid and other substances may be also formed. A common gas burner will burn nearly 3 feet per hour, and will consume 10 or probably 12 cubic feet in an evening (4 hours), and therefore from 18,000 to 21,600 cubic feet of air must be introduced for this purpose alone in the 4 hours, unless the products of combustion are removed by a special channel. The power of illumination being equal, gas does not produce more carbonic acid than candles (Odling), but usually so much more gas is burnt that the air is much more deteriorated; there is also greater heat and more watery vapour. The products should never be allowed to escape into the air of the room. Weaver has shown how important a source of impurity this is; and the bad effects of breathing the products of gas combustion are well known.

"A lb of oil demands, for complete combustion, 138 cubic feet of air; and to keep the air perfectly pure, nearly as much air must be introduced for 1 lb of oil as for 10 feet of gas. In mines, 60 cubic feet per hour are allowed for each light; the lights generally are dim, and the amount of combustion is slight; but this seems an extremely small amount.

"If gas is not burnt in a room, or in a very small amount, or if only candles or oil lamps are used, it is seldom necessary to take them into account in estimating the amount of air.

Quantity required for Sick Men.—"With regard to sick men, it is impossible to say what quantity should be given. In some diseases, so much organic substance is thrown off, that scarcely any ventilation is sufficient to remove the odour. At the Hospital Beaujon in Paris, is was shown, as long ago as 1847, that 60 cubic metres (=2118 cubic feet) per head per hour did not remove all odour from the surgical wards after dressings. Grassi mentions that a perceptible odour diffused from a case of cancerous ulcer in a ward in the Hospital Necker at Paris, although the ventilation at the time was 3600 cubic feet per head per hour; but bad odour will perceptibly taint an hospital ward with a greater allowance of air even than this. Dr. Sankey found the wards in the London Fever Hospital to be not free from odour when 3720 cubic feet per head per hour were passing in. In the new Hotel Dieu at Paris, it is intended to give at least 100 cubic metres (3500 cubic feet) per head per hour; but it is questionable whether this is suffi-

cient. Dr. Sutherland believes that at least 4500 cubic feet per head per hour must be allowed when there are many bad cases, and especially surgical cases with open wounds; and during epidemics, or when hospital gangrene, pyæmia, erysipelas are spreading, 6000 feet at least must be given; or, in other words, the supply must be almost unlimited. The best surgeons now consider an almost complete exposure of pyæmic patients to the open air the best treatment; and it is well known that in typhus fever and (to a less extent) in typhoid, and also in smallpox and plague, this complete exposure of patients to air is the first important mode of treatment, before even diet and medicines."

ON THE DISINFECTING PROPERTIES OF CERTAIN SUBSTANCES IN EVERY-DAY USE.

BY JOHN DAY, M.D.

I have undertaken to deliver a short lecture "On the Disinfecting Properties of Certain Substances in Every-day Use, with a few remarks on their value in the Preservation of Health," and I hope it may be my good fortune to make it both interesting and practically useful.

I need hardly say that disinfectants are among the principal weapons with which we do battle against the spread of infectious diseases. If, then, I can clearly prove, by reliable chemical tests, that many of the substances by which we are daily surrounded, and which are in very common use, are possessed of the property of spontaneously generating a disinfecting principle, which renders them potent destroyers of zymotic poisons; and if I can also show how, with the greatest ease and simplicity, their use may be directed against the spread of infectious diseases, the trouble I have gone to in preparing this lecture will be amply repaid.

Now some, before I proceed, may, perhaps, wish to know what constitutes a disinfectant. Well, I think I may say that nearly all disinfectants, certainly all the most powerful, are oxidizers, that is, they act as disinfectants by virtue of the oxygen they either contain in themselves or set free from other substances, and it is to be considered of disinfectants of this class that I shall confine myself.

In the strict sense of the word, a disinfectant is a substance

which possesses the power of arresting the spread of infectious diseases; but it is so common a practice to speak of those substances which destroy the offensive products of decaying organic matter as disinfectants, that I shall for convenience sake, rank them as if they were one and the same thing; indeed, in point of action, they are precisely similar, for they all act as oxidizers, or, in plain English, burners up and destroyers of both the poisons by which the infectious diseases are propagated and the foul-smelling organic matter and its noxious products with which the atmosphere of crowded, ill-ventilated, or ill-drained localities is invariably charged.

The disinfecting and purifying properties of the atmosphere are solely due to the oxygen it contains, which constitutes about one-fifth of its bulk. Common atmospheric oxygen, however, is not in itself a very active oxidizer; but under certain conditions, such, for instance, as electric discharges, it acquires increased chemical activity. In this condition it is known as ozone, and is supposed to be the principal agent by which Nature purifies and disinfects the atmosphere. Ozone may be considered to be oxygen in a state of condensation, Sir Benjamin Brodie having recently shown that it is one and a half times denser than ordinary oxygen. Next in potency is that condition of oxygen known as antozone, or peroxide of hydrogen. It is only within the last few years that the presence of oxygen in this state has been recognised in the atmosphere. Schonbein, the discoverer of ozone, considered that antozone exists in the form of peroxide of hydrogen; but as it has not yet, like ozone, been isolated, I shall speak of it throughout this lecture as peroxide of hydrogen. This substance was discovered by Thenard, 1818, who named it oxygenated water. It is now commonly known as peroxide of hydrogen, although its more modern name is hydrogen-dioxide. It is remarkable for the facility with which it gives up half its oxygen, and this property constitutes it a powerful deodorizer and disinfectant. Its great value, however, for these purposes is only just beginning to be understood. Indeed, so little have its nature and properties been studied, that Professor Roscoe, in his well-known "lessons in Elementary Chemistry," published in 1871, states that hydrogen-dioxide is a substance which does not occur in Nature. Now, I claim to have discovered its presence, spontaneously generated, in a vast number of substances which are in almost every-day use, such as all fats and fatty or expressed oils, nearly all perfumes, most, if not all essential oils, kerosene, gasoline, and benzine, and certain kinds of wood.

On the table before us are a number of specimens of the substances I have named, as well as many others, and I am prepared to show you that they are all charged, more or less, with spontaneously generated peroxide of hydrogen. You will find among them the fat of beef, mutton, and pork, mutton and beef tallow, prepared lard, butter, cod-liver, olive, almond, linseed, cocoa-nut, and palm oils, stearine candles, kerosene, gasoline and benzine, eau de Cologne, eucalyptus oil; the essential oils of juniper and lavender, pieces of Baltic deal, shavings of red deal and American pine, and a bottle of disinfecting furniture polish, composed of linseed oil, oil of turpentine, and eucalyptus oil. I could add largely to this list if it were necessary.

Here is a piece of wood to which the furniture polish has been applied, and, as I think very highly of it as a means of preventing the spread of infectious diseases, I will select it for our first experiment. I may observe that one or two pretty free applications will render furniture, or any other article to which it may be applied, disinfectant for at least six months. Every ingredient in this polish is possessed of disinfecting properties, but the turpentine possesses it in the highest degree. I must not fail to acknowledge that Schonbein was the first to observe that oil of turpentine could generate peroxide of hydrogen. I am not aware that he had recognized it in any other substance, with the exception of alcohol, in which I have failed to detect it.

What is known as the guaiacum process is a perfectly reliable test for peroxide of hydrogen. The peroxide alone, although a powerful oxidizer, is incapable of oxidizing and turning blue the resin of guaiacum; but in the presence of either blood or pus it acquires higher oxidizing powers, and does so readily. So on one part of this specimen I will put a few drops of tincture of guaiacum (made by dissolving guaiacum resin in absolute alcohol), and you will find that it will retain its natural colour. I will next apply to another part of the specimen a little watery solution of the colouring matter of blood, and then pour over it some tincture of guaiacum, when you will perceive that the guaiacum resin will be quickly oxidized and turned blue, thus showing the presence of peroxide of hydrogen—in this case supplied by the furniture polish.

Another test for peroxide of hydrogen, but not as reliable, is iodide of potassium, which is a colourless salt, but when it is brought into contact with peroxide of hydrogene, decomposition occurs, and the iodine, which is of a bluish-black colour, is liberated.

As it occupies a good deal of time to apply these tests, and obtain their full reactions, I thought it advisable to prepare, some of the specimens ready for demonstration before commencing my lecture. I will, however, single out for special experiment and consideration the following substances, simply because they strike me as possessing a good deal of interest, viz., cod-liver oil and olive oil, beef fat and mutton fat, eau de Cologne, eucalyptus oil, gasoline, and Baltic deal and deal shavings.

Now, our knowledge of the presence, which until recently was quite unsuspected, of a highly purifying and disinfecting principle in all fats and fatty oils, whether derived from the animal or vegetable kingdom, may help to explain why one of the earliest symptoms of consumption is dislike to fat and inability to digest it, and why cod-liver oil, which is more easily assimilated than any other fat, is often of so much use in the treatment of this disease. It may also afford a clue to the comparative immunity which it is well known the Jews enjoy from consumption, for they use large quantities of olive oil in their food. Dr. Edward Smith, in his excellent little work on "Health," written specially for households and schools, say :—"It is not a sign of a good health to refuse to eat fat generally, for fat is necessary, and we should eat probably from one to three ounces of it daily."

We now come to eau de Cologne, of which there are two specimens on the table, and I will show you that they are both pretty highly charged with peroxide of hydrogen, and consequently are possessed of purifying and disinfecting properties. In this respect they merely represent perfumes in general, including those given off from flowers. We will at the same time examine the palm and coca-nut oils, and shall find that they, also, contain peroxide of hydrogen. Now, it is a remarkable fact that men and women in every part of the world, from the highest type to the lowest, appear to possess an instinctive desire for the use, in some form or other, of those substances which generate this purifying principle. Europeans, for instance, commonly use them in the form of perfumes, whilst our African brethern prefer their use in the form of palm or coca-nut oil.

We must not pass over the eucalyptus oil without a few remarks. Here is a specimen obtained from the far-famed blue gum, the *eucalyptus globulus*. It is the only one I have brought with me, but I have ascertained that the oils from any of the eucalypti will give the same reactions.

Now, I will pour one single drop of this oil on a piece of

paper, and ask you to observe its highly volatile character. In an instant it will be diffused through every part of the room, imparting increased activity to the oxygen in the air, and rendering it more capable of purifying and disinfecting it.

When we consider that large forests of eucalypti abound in Australia, and that they are incessantly giving off from their evergreen leaves volatile essential oils which possess, in a very remarkable degree, the property of diffusing themselves through the atmosphere, and transforming a portion of its oxygen into peroxide of hydrogen—a purifying and disinfecting agent of recognized power—we may cease to wonder that our climate should have become so proverbial for its salubrity.

I will now say a few words in favour of gasoline as a disinfectant. Kerosene and benzine are chemically nearly allied to it, and possess equal powers of generating peroxide of hydrogen, but kerosene is dirty and benzine has an offensive odour. I look on gasoline as being in many respects the best disinfectant with which I am acquainted.

All disinfectants, to be of much value, should be volatile and capable of freely diffusing themselves through the air of a sick or infected room. Now, gasoline, as you all know, is highly volatile, and this property constitutes it a good atmospheric disinfectant, but it possesses another property, the exact nature of which it is very difficult to explain. For long—very long—after all evidence of its presence has passed away, it either continues to generate peroxide of hydrogen, or else it originally forms it and stores it up until it is brought into contact with any of those oxidizable substances for which it has an affinity. I am unable to say which of these two actions takes place, but certain it is that when unglazed paper or any other porous substance is brushed over with gasoline, it will at once give the reactions of peroxide of hydrogen, and continue to do so for a year or more. Therefore, gasoline, unlike all ordinary disinfectants, may be considered to be persistent in its action, and this gives it immense value as a disinfectant.

Here is a sheet of French note paper, which I brushed over with gasoline in June, 1873, exactly two years ago, and it still gives the reaction of peroxide of hydrogen, although rather feebly. Here, again, is a sheet of the same kind of paper which I brushed over with gasoline four days ago, and you will see when I apply the tests that the reactions will be both rapid and well marked.

It is well-known that the poison-germs of scarlet fever and other infectious diseases are sometimes conveyed in letters, and these papers were prepared for the purpose of showing that it

is quite possible to do away with this source of infection by simply brushing over the paper with gasoline before writing on it in infected houses; or, in case of a letter coming from a suspected source, adopting a similar procedure before reading it. Books, journals, and newspapers, which have been used by fever patients, or kept in their apartments, may be disinfected in the same way without being in the slightest degree injured. Here is a proof. This little book has been perfectly saturated with gasoline, and every leaf is capable of oxidizing and destroying any organic poison that may fall on it, and yet it is not in the slightest degree soiled or stained. The most delicate wall paper may be brushed over with it without injury, and so may articles of wearing apparel of every description. This property suggests a ready and efficient mode of disinfecting the clothing of doctors and nurses when they are in attendance on persons suffering from infectious diseases. The hands, also, may be disinfected by sponging them over with gasoline and allowing them to dry in the air.

My common plan of using it is to have it exposed in open vessels—saucers answer very well—in every room in houses in which infectious diseases prevailed. About a wine-glassfull is sufficient to be used at a time, and this may be repeated three or four times in the course of the day. The only precaution that is necessary is to guard against using it near a fire or light, and this, on account of its highly inflammable nature, must never be forgotten. I may say that during the last two years I have had abundant proof that peroxide of hydrogen, when properly applied to the surface of the body, is capable of destroying the poison germs of scarlet fever, and thus arresting the spread of the disease.

All the disinfectants to which I have directed your attention this evening possess the property, in common with gasoline, of not only generating peroxide of hydrogen when first exposed to the air, but of doing so continuously for a period extending over months and sometimes years. By way of illustration, I will show you a sheet of demy paper which was brushed over with eucalyptus oil obtained from the *Odorata* species, on April 22nd, 1874—more than a year ago—and a sheet of paper brushed over with kerosene on the same date. The tests have been applied to them, and you may see that their reactions have been most vigorous.

In conclusion, I will show you that certain kinds of wood, more particularly those of the pine species, are possessed of disinfecting properties. This is due, I have little doubt, to the turpentine they contain. It has been shown on many occa-

sions, but in a marked manner at the Leipzig Hospital, that surgical cases do much better in wooden hospitals than in either stone or brick ones. For some years in the Leipzig Hospital from forty to fifty patients who had undergone amputations died annually from pyœmia. At length it was decided on erecting wooden sheds on either side of the hospital for surgical purposes, and the report for the first year informed us that 266 very serious operations were performed without the loss of a single case from pyœmia. This marvellous success led me to examine different specimens of wood, such as would be used for hospital construction, and I found, to my surprise, that they all possessed the property of generating peroxide of hydrogen, the very name of which, you are, I am afraid by this time, quite tired of hearing. I thought so much of this saving of life by the mere substitution of wood for the usual materials in the constructien of hospitals, that I drew up a paper on the subject for the Medical Society, and cannot, perhaps, do better than read to you a few of the remarks I then made in favour of wooden hospitals. They are as follows:—"I would claim for wooden hospitals the following advantages: 1st. That, instead of requiring constant purifying and disinfecting, as other hospitals do, they purify and disinfect themselves. 2nd. That peroxide of hydrogen, the disinfecting agent they generate, contains oxygen—Nature's disinfectant—in a highly condensed and active form, which, moreover, is intensified in the presence of either blood or pus—a property which renders it pre-eminently adapted for hospital disinfection; for it is beyond doubt that pus-cells, in combination with other organic matter, are largely concerned in the causation of those sceptic diseases which are so destructive to life in ordinary hospitals. 3rd. That, in consequence of the above-named conditions, the inmates of wooden hospitals enjoy almost, if not perfect immunity from hospital gangrene, erysipelas, pyœmia, and puerperal fever."—*Public Health.*

Dangers of Foul Water.—In a lecture on sanitary matters, in London, Dr. de Chaumont said that his experience of water contaminated with organic matter and albuminoid ammonia coincides with that of almost every other observer, that in all epidemic visitations of enteric fever, diarrhœa, etc., the water is the chief element in the propagation of filth-disease; that houses which have unguarded drainage communications with cesspools or sewers may receive through such communication the same filth-infection as if the excrementitious matter stood rotting within their walls; and that public

or private reservoirs or water conduits, giving accidental admission to filth, will carry the infection of the filth whithersoever their outflow reaches. Numerous conclusive illustrations of this truism were given, and which the lecturer had ably traced out to their source.—*Med. and Surgical Reporter.*

THE FIRST LAW RELATING TO PUBLIC HEALTH was passed so long ago as the year 1388. (12 Richard II., cap. 13.) It imposes a fine of no less sum than £20, upon "all who cast annoyances, garbages, entrails, &c., in ditches and rivers." The mayors and bailiffs of the cities and towns were charged with the execution of this Act. It is interesting to observe that, even at this early period, the local governing bodies were intrusted with the care of the public health. About a hundred years later we find an Act (4 Hen. VII., cap. 3) to prohibit the slaughtering of cattle in cities, and boroughs, "lest sickness might be engendered unto the destruction of the people.—*Furlong on Sanitary Legislation.*

THE TRUE PRINCIPLE OF SANITARY LEGISLATION is that the Government should help the people to do, *not* what they *can* do, but what they *cannot* do. It should strive to ascertain what hindrances there are in the way of the people's health, and to remove those they cannot remove themselves.

If people want to live in dirty houses let them, so long as thereby they do not affect their neighbours; but let it not be impossible for them to have clean houses.

The laws should aim at securing to all whatever is *necessary* to health. Nothing is too minute for the attention of the Legislature, provided the minute point is *essential.—Dr. Acland.*

FLOATING.—Men are drowned by raising their arms above water, the unbuoyed weight of which depresses the head. Other animals have neither motion or ability to act in a similar manner, and therefore swim naturally. When a man falls into deep water, he will rise to the surface, and will continue there if he does not elevate his hands. If he moves his hands under water, in any way he pleases, his head will rise so high as to give him free liberty to breathe; and if he will use his legs, as in the act of walking (or rather walking up stairs), his shoulders will rise above the water, so that he may use the less exertion with his hands, or apply them to other purposes. These plain directions are recommended to the recollection of

those who have not learned to swim in their youth, as they may be found highly advantageous in many cases.—*Sanit.*

PRESENCE OF MICROCOCCUS AND BACTERIA IN THE WALLS OF HOSPITAL WARDS.—The analyses of the air, and other experiments made by Pasteur, for the purpose of investigating the doctrine of spontaneous generation, have demonstrated that the germs of inferior organisms—micrococci, bacteriæ, etc,—are everywhere present in the air. In a hospital the air contains a greater number of these elements, and in addition certain special bodies, such as pus-globules, spores of epiphytic parasites, which emanate from diseased organisms, and, owing to their volatility after desiccation, are susceptible of hovering in the atmosphere. In 1865, M. Broca discovered pus-globules in the liquid expressed from the sponge with which the walls of one of the wards of the St. Antonio Hospital had been washed. In 1860, M. Chalvet was inclined to attribute the blue coloration which is often observed in the vicinity of wounds to the presence of microscopic algæ of the species *Palmella*. In 1861, Dr. Eiselt, of Prague, placed an instrument, analogous to the aeroscope of Pouchet, between two beds, in a ward occupied by thirty-three children with purulent ophthalmia; the apparatus consisted of a glass plate coated with glycerine, and pus-globules were distinctly seen. To the above analogous facts, which are recorded in the dissertation of Dr. Deville (Strasbourg, 1860), are to be added the recent experiments of Dr. Nepven, of Paris. One square metre of wall in the surgical ward of La Pitie having been washed after neglect for years, the liquid expressed from the sponge (about thirty grammes) was examined immediately afterward. It was black, and showed micrococcus in large amount, several microbacteriæ, epithelial cells in small number, several pus-globules, several red globules, and, lastly, irregular, blackish masses and oviod bodies of unknown nature. The experiment was conducted with all possible precautions. The above facts furnish an indication concerning the constituent elements of the so-called nosocomial poison. We can comprehend how the air of hospitals may contain the germs of a great number of maladies, and easily become the true centre of infection. In private practice the same conditions may obtain, though in a minor degree, especially in winter, from the prolonged confinement of patients in rooms with insufficient ventilation.—*Revue med. de l' Est, Revue de Therapeut.—Trans. N. Y. Med. Journal* November, 1875.

LECTURING ON HEALTH.

To the Editor of the SANITARY JOURNAL.

DEAR SIR,—To continue the few crude remarks I offered in your journal in its last issue, I would go back to the premises I assumed, viz.: That the responsibility for the health of the community should rest on the shoulders of the Government. It is a well known fact that disease is propagated and intensified by the ignorance, and in some instances, prejudice of those, who, void of education, may perchance be exposed to its influences—the first principles of Hygiene are totally unheeded and unknown. This condition of the general public mind is more prevalent than most people imagine. Superstition moreover, even in the families of many gifted with comparative wealth, but possessed of little education or common sense, even now, seems as rife almost as it was a hundred years ago. In some instances the absurd conclusion may be perfectly harmless in character, in others excessively pernicious. I may point particularly to the power of vaccination, which at present is disputed and combated by a large proportion of the community, and among its opponents we find some of the misguided but enlightened members of our profession.

In speaking thus of the prevailing ignorance of that which socially pertains to the health of man, I would suggest that it be made statutory and not permissive, that in thickly populated districts the health officer appointed by the Government should give a certain series of popular lectures in localities where they are most needed—where disease is most likely to be prevalent, viz., where squalor, filth, ignorance and poverty are most seen—lectures of a popular character, illustrating forcibly the ordinary laws of nature and the means that are naturally within their compass of comprehension and appliance—to teach them the effect of pure air, the effect of light, and the effect of cleanliness on the human economy. It is a mystery to me that this has not yet been done by municipal or Government interference. One example, and a noble one, we have in the memory of Dr. John Brown, who so ably and

philantrophically combined wholesome hygienic truth with exhortations from our Saviour's mouth; but it should not be left to pure philantrophy, it should be the duty of the people through the Legislature to see that it is done.

The Missionory Societies of various denominations have so far identified this principle that they encourage all young aspirants to the ministry to study medicine, believing properly that their usefulness would be doubled; caring anxiously for the welfare of the soul, at the same time devoting their medical knowledge to the prevention or alleviation of disease.

If I recollect rightly, the professor of agriculture in University College was deputed by the Government to instruct farmers as to the character of crops, and nature of the soil of different districts, the best means of ensuring the largest possible amount of benefit from the same—if Government moneys could be thus righteously devoted to this object, then I say—a *fortiori*—should they by proper legislation provide for the body of man, for which the fruits of the soil are thus cared for.

It may be argued that the teaching of physiology in our public schools should be sufficient to this end—that would be absurd—it requires the experience and careful observation of a medical practitioner to fulfil this duty.

In conclusion, I would say, sir, on this point of sanitary precaution and prevention of disease—that internal supposed ideas of economy—internal dissensions in municipal bodies, will always prevent this measure being faithfully carried out—it must be enforced by higher authority—it is my opinion that in many instances much more could be embodied in a Statute than in the loose Bye-laws that the Statute gives the municipality powers to make.

When God put words into the mouth of the inspired Moses for the guidance of His people, He did not forget the health of the body, any more than the health of the soul. I trust he may be a Divine type for our present counsellors.

I am, sir, yours, &c.,

C. V. BERRYMAN, M.A., M.D.

THE SANITARY JOURNAL,

DEVOTED TO PUBLIC HEALTH.

VOL. I. TORONTO, DEC. 1ST, 1875. NO. 12.

END OF VOLUME ONE.—This number completes the first volume of the SANITARY JOURNAL. Once more, we must remind a large number of our readers that we cannot possibly continue to send them the Journal unless they remit the amount of subscription to pay for publication, in which we are incurring, and have incurred for about eighteen months, great expenditure. We trust, as this is near the end of the year, this reminder will meet with a more general response.

ANNOUNCEMENT.—We are pleased to be able to announce, while our readers will be glad to learn, that W. Canniff, M.D. M.R.C.S.E., Visiting Surgeon Toronto General Hospital, whose writings are known to most readers in Canada and to many in the United States, will in future write regularly, Editorials and Reviews, for the SANITARY JOURNAL; commencing with the January number.

DR. JOSEPH WORKMAN, late Superintendent Asylum for the Insane, Toronto, has promised, for the January number of this Journal, an article relative of his experience in sanitary matters, which will, from a writer so well known, undoubtedly, be looked forward to with interest.

PUBLIC HEALTH LEGISLATION.

The Dominion Parliament will assemble before many weeks, it is to be supposed, and the Legislative Assembly of Ontario has already met and commenced business. Is there to be any direct legislation on the matter of Public Health in either House? Mr. Disraeli declares it to be the first duty of the state to attend to the health of the subject. We were promised in the speech from the 'Throne,' on Thursday last, that a measure would be submitted for securing a complete system of vital statistics; and the seconder of the address, in reply to his Honour's speech, implied by his remarks that the House and

country take a deep interest in this matter; which, if sufficiently comprehensive, as regards cases of sickness, their history, &c., will be of great service, and will form a basis for further sanitary legislation. However ineffectual may be our humble efforts to fix the attention of the public and our legislators upon this matter and to show that a compulsory Public Health Law is absolutely essential to the well-being of the people, we shall not, if possible, cease our efforts in this behalf until an efficient one, comprising provisions for registering causes of sickness, &c., is enacted. As we have before said, it does not seem that a Government should necessarily wait until the people demand legislation upon certain matters before acting; but Governments, it appears, very commonly do so wait, and it is perhaps better that they should, for such legislation, and the carrying of the Acts into operation, cost money, and this the public must pay. Are our Legislators or the Governments waiting for the people to press this matter under consideration? We have no reason to doubt that either the Government of the Dominion or that of Ontario would take decided action in it if they believed that the people wished it and required it of them. Do the people desire legislation having for its object the prevention of disease? If they believe that by means of such legislation any large proportion of disease may be prevented, it may be taken for granted that they do desire it. And we can hardly believe that there are any number of people of ordinary intelligence who can doubt that a large proportion of prevailing disease may be thus prevented —that, as a matter of dollars, no other legislation will yield so large a return, will pay so well. We have endeavoured on previous occasions to show this. The leading daily papers, one in particular, speak plainly and convincingly on this point; though we are grieved that we do not find any one of them urging legislation of this nature, and we have looked in vain for it. Seemingly in almost every civilized country except Canada, laws for the prevention of disease are being enacted, and carried into operation. In Great Britain especially, much is being done in this way. And now the rate of mortality in that vast city of London is very considerably less than in the city

of Toronto, if we accept the figures of last year. To what is this owing but chiefly to the sanitary state of the cities? It can hardly be explained except upon this ground. Yet Toronto will probably compare favourably in this respect with any other city or town in the Dominion. While it is of the first importance to educate the masses in sanitary matters, and as far as possible to constitute "every man and every woman in his or her own household, an officer of health," health laws, which may be practically and efficiently carried out, are indispensible to good sanitary conditions. Do the people then, as a whole, not wish for efficient sanitary legislation? If they do, it is high time they should make their wishes strongly manifest. Let them hold meetings, or even circulate petitions if necessary expressive of their wishes, and we have no doubt the result will be all that can be desired.

What we want is not "dead-letter," permissive measures, such as we have at present, but imperative, compulsory ones. While a Central Board or Bureau might be established at Ottawa for the entire Dominion, Provincial Boards and Local Boards will be required also, and we see no reason why the latter might not be established at once, pending the deliberations and action of the Dominion Government. In the United States, sanitarians are striving for a Central Bureau at Washington, though the separate States are forming State Boards. Georgia and Alabama each have quite recently formed a State Board. Massachussetts and Michigan have for years had active Boards, which meet from time to time, discuss matters effecting the public health, have hundreds of thousands of papers or tracts for instructing the masses distributed, adopt and distribute rules and regulations for Local Boards, &c., &c. Why should Ontario be years behind these States in matters so vital?

THE REPORTS OF THE HEALTH DEPARTMENT of the Social Science Congress held at Brighton last month have been late in reaching us. It appears that there was but a meagre attendance of members. Bad construction of our houses, and bad water-supply, seem to have been the most important subjects of discussion. We shall probably notice some of the more important points under discussion in our next issue.

HYGEIA, A MODEL CITY.

A somewhat remarkable address, and one which has attracted a great deal of attention, the *Times* and other journals noticing it most favourably, was delivered at the recent Social Science Congress at Brighton, by B. W. Richardson, M.A., M.D., F.R.S., &c. He depicts a model city of health, which he names Hygeia, the population being 100,000, living in 20,000 houses, built on 4,000 acres of land. The mortality, he believes, would be 5 per 1,000 annually, or perhaps less. He depicts "nothing, whatever, but what is at this present moment easily possible." The address contains a good deal that is quite original, and gives a reflex of certain views held at the present time respecting some interesting problems of social economy. It consists chiefly of a description of the manner in which a city ought to be built with the view of ensuring the health of the citizens. The houses in this Utopian abode are built on arches of solid brick work, forming subways through which air passes freely, and down the inclines of which water flows. There are no cellars or rooms under ground. The streets are wide and well paved, and the heavy traffic is carried on by means of underground railways. It is to be supposed that the cars on these railways are moved by means of machinery at the ends of the roads, and that it will not be necessary, for obvious reasons, for men to be on the trains under ground. Any accumulations of dirt or mud in the streets are washed away every day through side openings into the sub-ways, and are conveyed with the sewage away from the city. The walls of the houses are in a manner honeycombed, so that there is in them a constant body of air, which may be changed or warmed at will. The walls of the rooms are so formed of glazed bricks that all paperings with their dangerous colors and mouldy paste, and all painting, are entirely dispensed with. The lecturer says:

"The most radical changes in the houses of our city are in the chimneys, the roofs, the kitchens, and their adjoining offices. The chimneys, arranged after the manner proposed by Mr. Spencer Wells, are all connected with central shafts, into

which the smoke is drawn, and after being passed through a gas furnace to destroy the free carbon, is discharged colourless into the open air. The city, therefore, at the expense of a small smoke rate, is free of raised chimneys and of the intolerable nuisance of smoke. The roofs of the houses are but slightly arched, and are indeed all but flat. They are covered either with asphalt, which experience, out of our supposed city, has proved to last long and to be easily repaired, or with flat tile. The roofs, barricaded round with iron palisade, tastefully painted, make excellent outdoor grounds for every house. In some instances flowers are cultivated on them. The house-wife must not be shocked when she hears that the kitchens of our model city, and all the kitchen offices, are immediately beneath these garden roofs; are, in fact, in the upper floor of the house instead of the lower. In every point of view, sanitary and economical, this arrangement succeeds admirably. The kitchen is lighted to perfection, so that uncleanliness is at once detected. The smell which arises from cooking is never disseminated through the rooms of the houses. In conveying the cooked food from the kitchen, in house where these is no lift, the heavy-weighed dishes have to be conveyed down, the emptied and lighter dishes upstairs. The hot water from the kitchen boiler is distributed easily by conducting pipes into the lower rooms, so that in every room and bedroom hot and cold water can at all times be obtained for washing and cleaning purposes; and, as on every floor there is a sink for receiving waste water, the carrying of heavy pails from floor to floor is not required. The scullery, which is by the side of the kitchen, is provided with a copper and all the appliances for laundry work; and when that is done at home the open places on the roof above make an excellent drying ground. In the wall of the scullery is the upper opening to the shaft of the dust-bin shaft. This shaft, open to the air from the roof, extends to the bin under the basement of the house. A sliding door in the wall opens into the shaft to receive the dust, and this plan is carried out on every floor. The coal-bin is off the scullery, and is ventilated into the air through a shaft also passing through the roof. On the landing in the second or middle stories of the three-storied houses there is a bath-room, supplied with hot and cold water from the kitchen above. In the living rooms, where the floors are of wood, a true oak margin of floor extends two feet around each room. Over this no carpet is ever laid. It is kept bright and clean by the old-fashioned beeswax and turpentine, and the air is made fresh and ozonic by the process."

This regarding an uncarpeted margin, though not altogether new, is an excellent idea, and permits of the carpets being readily and frequently removed and cleansed. A third part of one's life is, "or should be, spent in sleep, and great care is taken with the bedrooms, so that they shall be thoroughly lighted, roomy, and ventilated." Twelve hundred cubic feet of space is allowed for each sleeper, and from the sleeping apartments all unnecessary articles of furniture and of dress are rigorously excluded.

The fire-grates, the cheerfulness of which is not dispensed with, the ventilation and warming, the arrangement of water, gas, and sewage pipes, are all constructed on the most approved hygienic principles. Each house being complete within itself, those "disfigurements called back premises" are not required, and the interspaces between the backs of houses are gardens, in which the children play, for there are no gutters for them to play in; consequently there are no gutter children. "No bar, no dram shop, no saloon defiles the place. Nor is there a single gaming hell or house of ill repute." And the tobacconist's counter, like the dram counter, has disappeared.

The danger arising from malignant disease being spread by new clothing, made by tailors, dress-makers, etc., at their own homes, among their children, some of which may be suffering from a contagious disease, is now well-known. It is said that to put on a suit of clothes in Dublin now is to incur danger of no slight description. Dr. Richardson says: "I have myself seen the half-made riding-habit that was ultimately to clothe some wealthy damsel, rejoicing in her morning ride, act as the coverlet of a poor tailor's child stricken with malignant scarlet fever." This reminds one of the scene in Kingsley's "Alton Lock," in which the bridegroom died of typhus fever, the contagium of which was brought to him in his wedding coat. These dangers, in the model city, are met by the provision of blocks of workmen's offices, in convenient parts of the town, under the charge and supervision of a superintendent, and under the observation of the sanitary authorities. The present laundry system being like dangerous, the danger is avoided by the establishment of public laundries, with disinfecting rooms, and under municipal direction. The laundries, and also the

slaughter houses, which are likewise, with every carcass, under municipal and sanitary supervision, are a short distance out side the city. Model hospitals for the few sick, homes for the aged and helpless, and for little children, are provided in abundance; as are also houses, not asylums, for "the few who are insane."

"Our model city is, of course, well furnished with baths, swimming baths, Turkish baths, playgrounds, gymnasia, libraries, board schools, fine art schools, lecture halls, and places of instructive amusement. In every board school, drill forms part of the programme.

"There is in the city one principal sanitary officer, a duly qualified medical man, elected by the municipal council, whose sole duty it is to watch over the sanitary welfare of the place. Under him, as sanitary officers, are all the medical men, who form the poor law medical staff. To him these men make their report on vaccination and every matter of health pertaining to their respective districts, to him every registrar of births and deaths forwards copies of his registration returns, and to his office are sent by the medical men generally registered returns of the cases of sickness prevailing in the district. His inspectors likewise make careful returns of all the known prevailing diseases of the lower animals and of plants. To his office are forwarded for examination and analysis specimens of foods and drinks suspected to be adulterated, impure, or otherwise unfitted for use. For the conduct of these researches the sanitary superintendent is allowed a competent chemical staff. Thus, under this central supervision, every death and every disease of the living world in that district, and every assumable cause of disease, comes to light and is subjected, if need be, to inquiry.

"At a distance from the town are the sanitary works, the water and gas works, the slaughter-houses, and the public laboratories. The sewage, which is brought from the town partly by its own flow and partly by pumping apparatus, is conveyed away to well-drained sewage farms belonging to the city, but at a distance from it, where it is utilized on Mr. Hope's plan. The water supply, which is derived from a river which flows to the south-west of the city, is unpolluted by sewage or other refuse, is carefully filtered, is tested twice daily, and if found unsatisfactory is supplied through a reserve tank, in which it can be made to undergo further purification. It is carried through the city everywhere by iron pipes. Leaden pipes are forbidden. In the sanitary establishment are disinfecting rooms, a mortuary, and ambu-

lances for the conveyance of persons suffering from contagious disease. * * *

"The inspectors of the sanitary officer have under them a body of scavengers. These, each day, in the early morning pass through the various districts allotted to them, and remove all refuse in closed vans. Every portion of manure from stables, streets and yards is in this way removed daily, and transported to the city farms for utilization. Two additional conveniences are supplied by the sanitary scientific work of this establishment. From steam works steam is condensed, and a large supply of distilled water is obtained and preserved in a separate tank. This is conveyed by a small main into the city, and at a moderate cost distilled water can be supplied for those domestic purposes for which hard water is objectionable. The second sanitary convenience is a large ozone generator. By this apparatus ozone can be produced in any required quantity, and is made to serve many useful purposes. It is passed through the drinking water in the reserve reservoir whenever the water shows excess of organic impurity, and it is conveyed into the city for diffusion into private houses for purposes of disinfection."

We certainly should not relish the narcotized flesh of the animals slaughtered in the model slaughter-houses. "They pass through a narcotic chamber, and are brought to the slaughterer oblivious of their fate."

The disposal of the dead is provided for, of course, and cremation does not find favour in the model city.

"For various reasons the process of burial is still retained—first, because the cremation process is open to serious medico-legal objections; secondly, because, by the complete resolution of the body into its elementary and inodorous gases in the cremation furnace, that intervening chemical link between the organic and inorganic worlds, the ammonia, is destroyed, and the economy of nature is thereby dangerously disturbed; thirdly, because the natural tendencies of the people lead them still to the earth as the most fitting resting-place, into which, when lifeless, they should be drawn. Thus the cemetery holds its place in our city, but in a form much modified from the ordinary cemetery. The burial-ground is artificially made of a fine carboniferous earth. Vegetation of rapid growth is cultivated over it. The dead are placed in the earth from the bier, either in basket work or simply in the shroud; and the monumental slab, instead of being set over or at the head or

foot of a raised grave, is placed in a spacious covered hall or temple, and records simply the fact that the person commemorated was re-committed to earth in those grounds. In a few months, indeed, no monument would indicate the remains of any dead. In that rapidly resolving soil the transformation of dust into dust is too perfect to leave a trace of residuum. The natural circle of transmutation is harmlessly completed and the economy of nature conserved."

Dr. Richardson concludes his very clever and highly interesting address as follows:

I know we are of one mind, that though the ideal we all of us hold be never reached during our lives, we shall continue to work successfully for its realization. Utopia itself is but another word for time, and some day the masses, who now heed us not, or smile incredulously at our proceedings, will awake to our conceptions. Then our knowledge, like light rapidly conveyed from one torch to another, will bury us in its brightness.

> "By swift degrees the love of nature works
> And warms the bosom, till at last, sublimed
> To rapture and enthusiastic heat,
> We feel the present Deity, and taste
> The joy of God to see a happy world!"

While this admirable address tends to show to what a state of perfection a city might be brought, and, we may say, without very great difficulty, it yet appears to be incomplete, to be deficient in comprehensiveness, though probably as much so as the time and occasion permitted. While most prominence is properly given to the most potent causes of disease, as filth, defective drainage, etc., there are many other causes not provided against or touched upon. We can only mention two or three of these before concluding. Bad cookery is one, which might be easily enough overcome; intemperance in eating, more common probably on account of the "prohibition" as regards alcoholic beverages; the exercise of the unrestrained passions; over work and idleness; and the excitement arising from striving after wealth and position, are causes much more difficulty to meet, but which would probably gradually become less potent in the model city so graphically depicted by Dr. Richardson.

DR. GIBBONS in a paper on "Forest Culture as a Prophylatic to miasmatic Diseases," according to the *Pacific Medical and Surgical Journal*, comes to the conclusion that forest trees in sufficient numbers will absorb or neutralize the miasm.

A CASE OF POISONING of a suckling infant by opium administered to the mother, is noticed by an exchange. It was with great difficulty that the child was aroused; respiration ceased for a time and it appeared dead. The mother was about to undergo an operation and had taken three doses of the drug.

ARTIFICIAL RESPIRATION.—Dr. Corso, assistant of Professor Schiff, has prolonged the life of an apoplectic patient by artificial respiration, and he thinks a great future is in store for this process. Long ago Schiff suggested it as the proper treatin this infection, inasmuch as the immediate danger lies in impairment of the respiration through panalysis of the medulla oblongata, and artificial respiration gives time for the medulla to recover the shock and resume function.

LEAD POISONING.—M. Malherbe—Assoc. Franc. pour l'Advancement des Sciences *(The Doctor)*, believies the lesion to be sometimes peripheric in local paraysis from poisoning. He relates the history of a workman engaged in hammering sheets of lead, which he held in his left hand, which hand after a few days became paralysed with loss of feeling and diminution of bulk of the extensors of the forearm, with no symptons of general poisoning. He suggests the use of a special kind of glove for lead workers.

CONTAGIOUSNESS OF CONSUMPTION.—Recent experiments have demonstrated *(Pop. Sci. Mo.)* that when an animal with tuberculated lungs (consumption) is yoked to a healthy animal and the two are housed and fed together, the latter before long exhibits the symptons of tuberculosis. Krebs asserts that tubercle virus is present in the milk of cows, even when slightly affected, and he has produced tubercle in animals by giving them milk from those which were diseased; he accidentally induced the disease in a dog by feeding it with the milk of a tuberculous cow. These facts point to a fruitful source of this disease; as it is not at all improbable that many dairy cows, especially in cities, are tuberculous.

THE FOLLOWING VERDICT of the jury at an inquest upon an infant, in Exeter, England, recently, should induce physicians to always ask to see the spoon which is to be employed in giving powerful medicine: "Congestion of the lungs, accelerated by an overdose of opium innocently administerad by her mother from a *modern* teaspoon, containing two drachms, instead of from a teaspoon of older date, containing one drachm."

WE THANK THOSE who have already sent in the amount of their subscription, and would be very glad if those who have sent $1 in payment for the first six numbers, would now remit $1 more to pay for the first volume. Please attend to this.

ERRATA.—In No. 11 of this Journal, p. 352, 5th line from the bottom, for literation, read literature; at page 332, 3rd line of 2nd paragraph, for cures, read causes. Two or three typographical errors were obvious enough.

METEOROLOGICAL,—DIRECTION OF WIND.—Whenever barometrical readings are lower over any area than over those adjacent to it, the air will sweep round that area as a centre, and the direction of its motion will be opposite to that of the hands of a watch. Conversely, the air will sweep round an area of relatively high barometrical readings in the direction in which the hands of a watch move. The former of these motions is said to be *cyclonic*, the latter *anticyclonic*. These names are derived from the word "cyclone," the general name for hurricanes and typhoons, in all of which storms the motion of the air takes place around an area of diminished barometrical pressure. . . . The actual movement of the air has no reference, either in direction or velocity, to the absolute readings of the barometer at the point where it is lowest, or to the distance of the particles of air which are in motion from that point, but is related almost entirely to the distribution of pressure in accordance with Buys Ballot's Law. The law gives the direction of motion, and its truths for these islands and the adjacent parts of the earth's surface is incontestable.—*Mr. Scott on "Weather Telegraphy."*

The *Boston Journal of Chemistry* says that the good results of systematic training in hygiene under a regular professor are shown at Amherst College by the fact that there is a large and constant decrease in sickness from the beginning to the end of the College course, the fresh men being always the most sickly, and the seniors the most healthy class.