

## ADDRESSES TO THE WAGE CLASSES.

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On the evening of Saturday, November 8th, on the occasion of the close of the Exhibition, a meeting free to all wage-earning classes was held in the Public Hall. The chair was taken at 8 P.M. by DR. RICHARDSON, F.R.S., the President of the Congress, and the business commenced by the Secretary, Major McCoy, reading the awards made by the Judges and other Exhibitors at the Exhibition. The awards and the report of the Judges will be found at page 346.

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THE President, DR. RICHARDSON, F.R.S., delivered the following Address:—

### On Health at Home.

The old saying, there is no place like home, has a singularly happy meaning when it is applied to health and the benefits which spring from health that is good and beautiful. We who are engaged in forwarding Sanitary work may labour our lives out and still do little service until we can get each home, however small it may be, included in the plan of our work. The river of national health must rise from the homes of the nation. Then it will be a great river on which every blessing will be borne.

The placard calling together this meeting specially invites ladies—I had rather it had said women—to be present. It is worded in this fashion because we who have invited know that women are always at home as men are always abroad, and that the woman who is at home must be the continuous and natural guardian or ward of the health that should centre in the home. When I, as a physician, enter a house where there is contagious disease, my first duty is to look at the surroundings. What are the customs of the people there, are they wholesome, are they unwholesome? If the answer be "wholesome and common sense," then I know that the better half of success in the way of treatment and prevention is secured. If the answer be "unwholesome, slovenly, disorderly, careless," then I know that all that may be advised for the best will be more than half useless, because there is no habit on which any dependence can be truthfully placed, and because habit in the wrong direction is so difficult to move that not even the strongest ties of affection are a match for it in times of emergency.

If we could then get wives and mothers to learn the habitual practice of all that tends to health, we should soon have an easy victory, and should ourselves cease to be known as the pioneers of Sanitary work, the work itself being a recognized system and a recognized necessity practised by everybody.

In the few minutes at my disposal let me try and tell you what, after many years of experience and observation, seems to me to be a few golden rules for securing health at home.

#### 1. SUNLIGHT AT HOME.

1. Whether your home be large or small give it light. There is no house so likely to be unhealthy as a dark and gloomy house. In

a dark and gloomy house you can never see the dirt that pollutes it. Dirt accumulates on dirt, and the mind soon learns to apologize for this condition because the gloom conceals it. "It is no credit to be clean in this hole of a place" is soon the sort of idea that the housewife gets into her mind; the "place is always dingy, do what you may," is another similar and common idea; and so in a dark house unwholesome things get stowed away and forgotten, and the air becomes impure, and when the air becomes impure the digestive organs become imperfect in action, and soon there is some shade of bad health engendered in those persons who live in that dark house. Flowers would not healthily bloom in such a house, and flowers are, as a rule, good indexes. You put the flowers in your windows that they may see the light. Are not your children worth many flowers? They are the choicest of flowers. Then again light is necessary in order that the animal spirits may be kept refreshed and invigorated. No one is truly happy who in waking hours is in a gloomy house or room. The gloom of the prison has been ever considered as a part of the punishment of the prison, and it is so. The mind is saddened in a home that is not flushed with light, and when the mind is saddened the whole physical powers soon suffer: the heart beats languidly, the blood flows slowly, the breathing is imperfect, the oxidation of the blood is reduced, and the conditions are laid for the development of many wearisome and unnecessary constitutional failures and sufferings.

Once again, light itself, sunlight I mean, is of itself useful to health in a direct manner. Sunlight favours nutrition; sunlight favours nervous function; sunlight sustains, chemically or physically, the healthy state of the blood. Children and older persons living in darkened places become blanched or pale; they have none of the ruddy healthy bloom of those who live in light. You send a child that has lived in a dark court in London for a few days only into the sunlight, and how marked is the change. You hardly know the face again.

Keep, then, this word in your minds, light, light, light; *sunlight* which feeds you with its influence and leaves no poisonous vapours in its train.

Before I leave this subject, I want to say a word about light in relation to the sick. A few hundred years ago it became a fashion, for reasons it is very hard to divine, to place sick people in dark and closely curtained bedrooms. The practice to some extent is continued to this day. When a person goes to bed with sickness, it is often the first thing to pull down the blinds of the windows, to set up dark blinds, or if there be venetian blinds to close them. On body and spirit alike this practice is simply pernicious. It may be well, if light is painful to the eyes of the sufferer, to shield the eyes from the light, or even shut the light off them altogether; but for the sake of this to shut it out of all the room; to cut off wholesale its precious influence; to make the sick room a dark cell in which all kinds of impurities may be concealed day after day, is an offence to nature which she ever rebukes in the sternest manner.

This remark presses with special force in cases where epidemic

and contagious diseases are the affections from which the sufferers are suffering, for these affections as they live on uncleanness require for their suppression the broadest light of day. Moreover, I once found by experience, that certain organic poisons, analogous to the poisons which propagate these diseases are rendered innocuous by exposure to light. Thus in every point of view, light stands forward as the agent of health. In sickness and in health, in infancy, youth, middle age, old age, in all seasons, for the benefit of the mind and the welfare of the body, sunlight is a bearer and sustainer of health.

## 2. SLEEP AT HOME.

I have been speaking about sunlight, and am led by this to refer to another and allied topic—I mean night and hours of sleep. If it be good to make all possible use of sunlight, it is good equally to make as little use as possible of artificial light. Artificial lights, so far, have been sources of waste, not only of the material out of which they are made, but of the air on which they burn. In the air of the closed room the present commonly used lamps, candles and gaslights, rob the air of a part of its vital constituent, and supply in return products which are really injurious to life. Gaslight is in this respect most hurtful, but the others are bad when they are long kept burning in one confined space. The fewer hours after dark that are spent in artificial light the better, and this suggests, of itself, that within reasonable limits the sooner we go to rest after dark the better. We require in the cold season of winter, when the nights are long, much more of sleep than we do in the summer. On the longest day in the year, seven hours of sleep is sufficient for most men and women who are in the prime of life; on the shortest day, nine hours is not over much, and for those who are weakly, ten or even twelve hours may be taken with real advantage. In winter, children should always have ten to twelve hours of sleep. It is not idleness to indulge to that extent, but an actual saving, a storing up of invigorated existence for the future. Such rest can only be obtained by going to bed very early, say at half-past eight o'clock or nine.

It is really all wrong, at the present season, that we should be here robbing ourselves of sleep. It is wrong as ever it can be that our Legislators should often be sitting up, as we know they do, times after times, in the dead of night, trying against life to legislate for life. It is most foolish that public writers who hold so many responsibilities in their hands, should be called upon to exercise their craft at a time when all their nature is calling out to them, rest, rest, rest. It is said I am foolish for declaring these things. Is it so? I am standing by Nature, speaking under her direction, and, without a thought of dogmatism, I am driven to ask:—May it not be the world that is foolish?—the world, I mean, of fashion and habit, which could if it would change the present systems as easily as it criticises the view that it ought to make the change. Any way this I know, and it is the truth I would here express, that in every man, woman, and child there is, at or about the early time I have named, a

persistent periodical desire for sleep which steals on determinately, which, taken at the flood, leads to a good sound night's rest, and which resisted never duly returns, but is replaced by a surreptitious sleep, broken by wearing dreams, restless limbs, and but partial restoration of vital power. I said the other night in this room, make the sun your fellow workman. I repeat the saying now. I do not say, go to bed at all seasons with the sun, and rise with it, because in this climate that would not be at all seasons possible; but I say, as a general principle, as closely as you can, make the sun your fellow workman; follow him as soon as you are able to rest, and do not let him stare at you in bed many hours after he has commenced his daily course. Teach your children, moreover, this same lesson, and the practice of it, whereupon there will be, in a generation or two, even in this land of fogs and dulness, a race of children of the sun who will stand, in matter of health, a head and shoulders above the children of this present generation.

### 3. BEDS AND BEDROOMS AT HOME.

The mention of sleep causes me to say a word about beds and bedding and bedrooms. It is a point of the greatest importance in a healthy home to let every person in the house have a separate bed. It is a most unhealthy practice for two persons of any age to sleep in the same bed. Every person requires some different condition from everyone else in order to secure perfectly good repose. Take children as an example. One child requires more bedclothes than another, or a different kind of bed, or a different position before sound sleep can be secured; and this can only be obtained by giving a separate bed to each child. Then again, when two children sleep together, they are subject to the breath of the one or the other, and if both be quite natural it is bad; but if one be unnatural it is very bad; and if both be unnatural it is seriously bad. Near here, at this moment, a great experiment has been tried on this question with the most striking results. At the schools at Anerley every scholar has his or her own bed; and the wise authorities there,—who have improved the health of the children under their charge until the mortality is reduced to three in the thousand annually,—tell me that few things have contributed so much to the grand results they have achieved as this one practice of having a separate bed for every child. It is important to have always a well made bed, and everybody should learn to make a bed. A very soft or a very hard bed is a bad bed. The bed should be sufficiently soft to allow all parts of the body to feel equal pressure and yet not so soft as to envelope the body. The clothes should be laid on lightly, not be closely tucked in. The clothes should be light as well as warm. Dense blankets and coverlets are always unwholesome. Every portion of the bedclothes should be every day spread out for a short time to the air. I do not object to light bed-curtains at the head of the bed: they keep off draught, they keep the light from the face of the sleeper, and they neither prevent the entrance of air nor light.

I must add one word about bedrooms. It should always be remembered that the bedroom is the apartment in which one-third, at least, of the whole life is passed, and this remembrance should suggest that the bedroom ought to be the room on which most trouble after health should be bestowed. The rule that is followed is, with few exceptions, the reverse of this. The sitting room and the drawing room are made subjects of the greatest attention; but the bedroom may be small, close, at back of the house, at front of the house, anywhere, if it be but convenient to get at. It may not even have a fireplace; it may have the smallest window. It is often half a lumber room, a place in which things which have to be concealed—old boots and shoes, old clothes, old boxes—are put away. Its walls, covered with several layers of paper, may be furnished with pegs, on which to suspend a wardrobe of garments, and it is constantly decorated, for snugness' sake, with heavy curtains and blinds at the windows, and carpets all over the floor. These errors are unpardonable, and health at home is impossible where they are committed. The bedroom should be so planned that never less than four hundred cubic feet of space should be given to each occupant, however good the ventilation may be. The walls should be coloured with distemper or with paint, that, like the silicate paint, can be washed three or four times a year. The windows should have nothing more than a blind and a half muslin curtain. The floors should have carpets only round the beds, without valances from the beds. The furniture should be as simple and scanty as is possible; the chairs free of all stuffings or covers that can hold dust. Of all things, again, the room should be kept clear of vestments that are not in use. From time to time a fire should be made in every bedroom, that a free current of atmospheric air may sweep through it from open doors and windows. I need not say that the floors should be kept scrupulously clean, but I would recommend dry scrubbing as by far the best for this purpose.

### 4. THE BATH AT HOME.

To secure health at home some simple provision should be made by which the body of every person who lives at home may be subjected to the bath. This wholesome process is frequently neglected from the excuse that there is no convenience for a bath. The excuse is more plausible than real. A formal bath is not at all necessary. A shallow tub, or shallow metal bath, in which the bather can stand in front of the washhand basin; a good sponge; a piece of soap; two gallons of water, and a good large towel, are quite sufficient for every purpose of health. To stand in the shallow bath, and from the washhand basin to sponge the body rapidly over from head to foot, and afterwards to dry quickly is everything that is wanted if it be carried out daily, and this may be so easily done, after a little practice, that it becomes no more trouble than the washing of the face, neck, and hands, which so many people are content to consider a perfected ablution. In winter time the water should be tepid, in summer cold; and once a week there should be dissolved in the two gallons of water a quarter of a

pound of fresh washing soda. This addition cleanses the skin effectually and removes acidity.

#### 5. THE AIR AT HOME.

In order to secure health at home it is necessary to maintain, as far as can be, an equal temperature in the different rooms—a temperature of 60° Fahr. is nearest to the best—a free access of air without draughts, and, above all things, an air that is dry. Washing days at home amongst the poor are the days of most danger to the young. In the damp atmosphere, colds, sore throat, and croup find easy development; and in a house persistently damp from any cause, consumption of the lungs is induced as if under an experiment devised for the express purpose of production.

#### 6. ANNUAL CLEANSING AT HOME.

From the more strict of our Jewish fellow-subjects I take my last lesson for "Health at Home." Their system of complete household cleansing once a year, the cleansing of every article, great and small, of every wall and floor and door and lintel, and the removal and destruction of all organic refuse, however minute, is a practice which above all others has so saved this wise and discerning people from the scourges of the great plagues, while all around have been stricken and destroyed, that a marvellous preservation has more than once accounted for what was a mere natural sequence and natural necessity. Health at home calls for this salubrious physical sanctification in every domestic centre and circle once a year at least.

And now I leave my learned colleagues to descant on ventilation, good food, good air, and other accessories to health everywhere, at home and abroad. And though by our united efforts we may not essay to lead you direct to Salutland and its hundred years of happy life, we shall take you, if you will go with us, a long way towards even that promised commonwealth of health and long life.

B. W. RICHARDSON, M.D. F.R.S.

### Health and Good Food.

In order to get a clear idea of the bearing of the question of food and its use in the body, we must be prepared to look upon man as a mechanical engine. As science advances we see this more clearly, and can observe how strictly all our actions and functions are regulated by physical laws. It is therefore by obedience to those laws that we shall obtain the best results, whilst if we oppose them we shall assuredly pay the penalty. The necessity for this obedience is plain to all in the rougher matters of physics, although it is not so generally admitted in the finer kinds that have to do with our bodily functions. Thus everybody knows that if he goes up to a second or third story and comes down again by jumping

out of the window instead of using the stair, he will assuredly come to most serious grief. But many persons do unwittingly as great injury to themselves in the long run by sins against physical laws in the management of their own bodies. An engineer knows that unless he stokes his engine-fire he will get no work out of his engine, but men often try to get work out of their bodies without stoking the fire properly—that is, without supplying the necessary amount of food of proper quality. There is, however, this difference between our bodies and a mechanical engine, that, whereas the latter will yield no work without stoking, the former may do so for a certain time. How is this? The obvious answer is, by consumption of the engine itself, and in this lies the peculiarity of the animal or human engine; the supply of food does the double work of furnishing energy and repairing worn structure. The wonderful mechanism by which the body is put together permits of oiling, repairs and coaling going on without interrupting the actual work. We require, then, food proper to fulfil all those functions—mineral matter to build up our skeleton, nitrogenous matter to repair the softer tissues, and carboniferous matter, which may be burned off by the oxygen we take in through the lungs, in order to supply energy for active work. Again, we find that we must regulate the food according to the work done, a larger quantity being necessary when the amount of work is increased. If, on the other hand, we take more food than is actually required for our work, it can within certain limits be stored in the body and afterwards utilized, but if this is done habitually it either leads to corpulence or to disease. On the other hand, if the amount is too little for our work, we can still go on for a certain time doing our work at the expense of our body. First, the fat is used up, and this in some cases is not a bad result, but then after that the muscles and other tissues begin to suffer, and sooner or later the wasteful process must end in disease and death. Among the well-to-do classes the chief danger is from over-feeding, with the result of throwing upon the liver, heart and other organs an amount of work they cannot accomplish; hence arise various diseases, indigestion, palpitation, liver-complaints, gout, &c. Among the poorer classes the danger is too often from under-feeding, and this is especially the case with the women and children. This is one of the causes of the excessive death-rate among children in those classes; they are underfed as infants, in consequence of which they either perish or live to grow up ill-formed and unhealthy, and afterwards to give birth to offspring who add inherited bad health to the other evils that await them. Sometimes people think little of a period of starvation (when it does not immediately affect themselves) and are under the impression that its results are soon recovered from; some people again voluntarily fast, either for the good of their health or as a religious rite, or perhaps through sheer negligence; some again do it by way of scientific experiment; whilst not a few do it involuntarily by way of punishment. Now it is important to know that even a temporary starvation is a much more serious thing than most people imagine, and there seems good reason to believe that serious con-



sequences may be traced to this cause, which has up to lately been only slightly suspected. A most important paper has been written within the last year by Dr. D. D. Cunningham, of the Indian Medical Service, in which he gives an account of his researches into the effects of starvation on both plants and animals. He there shows that when they are deprived of nourishment for a certain time a series of changes go on in their structures which are not easily recovered from, and, if they are prolonged too far, are quite beyond all repair. The living membrane of the stomach and bowels, on the good condition of which all the nourishment of our body depends, undergoes a peculiar and fatal form of decay, so that even if food be supplied it cannot be digested or taken up into the body for use; it consequently becomes irritating instead of nourishing and the cause of death in place of life.

In this way we can explain the terrible mortality in Indian famines, especially in the camps of relief, and the hopelessness of trying to remedy the mischief after it has reached such a pitch. The proper way is to prevent, if possible, the occurrence of such calamities, by every measure that lies in our power. But this has a serious application nearer home; if even the temporary loss of proper food is so dangerous an evil, how doubly responsible is the man who spends on his vicious indulgence the money that ought to feed his wife and children! It also affects in a very serious way the question of strikes, which have assumed so much importance of late years. I am not going to discuss the point here, as to whether or not strikes are an advisable way of trying to raise the market value of labour, but I think it is a question that well deserves careful consideration, whether or not strikes, with their attendant misery and starvation, are not a most fatal weapon to use, even when they are apparently successful. That wages are lost in the struggle we know, but it ought also to be known that health may be, and doubtless often is, lost at the same time; with this sad difference, that the loss of wages may be made up in aftertimes, but the loss of health in too many cases never can be so repaired.

But there is more than one kind of starvation. I have up to this time spoken of more or less complete deprivation of all food; but there is partial starvation by deprivation of one particular kind of food—and this is not only common, but among the poorer classes of the people almost universal. One particular kind of this form of starvation has been more the subject of inquiry perhaps than any other—namely, that which depends upon the loss of vegetable food, more especially what are called green vegetables, and fruit. The consequence of such starvation is known as scurvy, a disease formerly very common in the northern or colder parts of Europe,—a disease which used to be the terror of our navies and our merchantmen, and which ever lies in wait for armies, sometimes even in their hour of victory. Happily, the cause of the disease is known and its remedy, so that now, by the aid of lime-juice, we can send our ships to sea without fear, and scurvy is but little known now, except where ignorance, greed or obstinacy on the part of commanders leads them to expose those under them to its terrible

ravages. I have been myself a witness to the havoc it created in the Crimean War, and we should have had a somewhat sad story to tell of our late occupation of Cyprus, had it not been for the abundance of grapes and other fruit in the island. But apart from those terrible and startling outbreaks of the disease, I am sure a good deal of it exists in a milder form among a large number of people in this country, on account of the neglect of vegetable food. It is a good thing that potatoes have become so general an article of diet, as they are excellent remedies for scurvy; but half the good they do is lost in our way of cooking them. By peeling them before cooking, the most valuable part of the juice is lost; they ought to be boiled in their skins, or steamed, or, if it is necessary to cut away portions when they are not very good, they should be stewed or made into a soup, so that the liquor they are cooked in is consumed as well. But should potatoes fail, every effort should be made to procure green vegetables, such as cabbage and the like, and onions, as the best substitutes.

Another form of starvation is the want of nitrogenous or flesh-forming food. This food is best known in the form of meat, eggs, cheese, or milk; but it exists in large quantities also in flour, oatmeal, Indian meal, and especially in beans, peas, and lentils. These last—beans, peas, and lentils—are most nourishing, and ought to be much more used than they are: they contain much more of the flesh-forming food than the best meat, and would form a cheap and excellent substitute when meat is dear. Meat itself, too, would be much more usefully and economically prepared by being made into a soup or stew with vegetables, instead of the wasteful process of grilling or roasting.

Another form of starvation is the want of fat, and this is very frequent, on account of the dearth of most kinds of fat. Fat is a most essential thing, and no hard work can be well done without it. Children suffer especially from the want of it, and there is little doubt that deprivation of fat is one serious influence in the production of that terrible disease, consumption. Indeed, one eminent physician used to express the opinion that consumption in England was due to the high price of butter. Although not all the truth, it is still in a large measure true; and certainly if children could be more generally fed on milk in their earliest years, and get a fair share of butter when able to eat it, they would be not only more healthy themselves, but would also be the parents of a healthy offspring. As it is, infants are too generally fed with bread or biscuit sop, corn-flour, or such like starchy foods, which the poor little stomach does not know what to do with, for digesting it is impossible; pain is the result, the poor little thing cries and gets slapped by its mother for being fractious; whereas it is rather the mother that ought to suffer for feeding it wrongly. I do not wish, however, to throw too much blame upon her, seeing that she is too often so heavily weighted with want of knowledge and poverty.

F. DE CHAUMONT, M.D., F.R.S.

### Health and Good Air.

THERE can be no health without pure air. Impure air either inside or outside your houses entails sickness and increased mortality. There is no better barometer to show the constitution of the air than children.

In towns where the buildings are crowded together, and there is no circulation of air, the pale faces of the children show that they suffer from want of air.

The air of a town is less pure than the country air, because of the quantity of particles of impure matter with which it is filled. Town air contains particles of soot and sulphurous acid derived from the burning of coal, is full of dust from the streets, which is mainly formed of horse dung; the act of breathing throws out particles of matter from the body; similarly the sewers pour out their gases, and all these particles float in the air, until the oxygen of the air can act upon them, and alter their character.

There is formed in abundance in pure country air a substance called ozone, which consists of oxygen in a peculiar condition, and which acts with great rapidity in altering the organic matter which floats in the air. In town air this substance rarely exists, as it seems to be rapidly used up in endeavouring to destroy the impure emanations with which town air is filled. A friend of mine told me that he had recently made experiments on the ozone in the air on the pier at Brighton, and that when the wind blows from the sea he found plenty of ozone; when it blew directly over the town he found scarcely any.

Then impure matters, suspended in the air, hang about in the lower strata; as you ascend the air is purer, at 100 feet high they are greatly diminished; at 300 or 400 feet high the air is nearly pure.

However impure the air of a town may be, the condition of air in a house must be still more impure.

The movement of air out of doors averages 12 miles an hour or 17 feet in a second. This movement is rarely less than from 4 to 5 miles an hour or 6 feet in a second.

Imagine a frame about the height and width of a human body, measuring about 6 feet by  $1\frac{1}{2}$ , or 9 square feet: multiplying this by the velocity of movement of the air at 6 feet a second, it will appear that in one second 54 cubic feet, in one minute 3,240 cubic feet, in one hour 196,400 cubic feet of air would flow over one person in the open.

In a room the conditions are very different. The main source of impurity in a room in which people are congregated arises from the effect produced on the air in the process of breathing. In this process—1. The oxygen is diminished. 2. The carbonic acid is increased. 3. A large amount of watery vapour is produced. 4. There is an evolution of ammonia and organic matter. 5. A con-

siderable amount of suspended matter is set free, consisting of epithelium and molecular and cellular matter, in a more or less active condition of putrefaction. At the same time, portions of epithelium are constantly being given off from the skin, and even pus cells from suppurating surfaces; as, for instance, with surgical cases in hospitals.

I will mention two well-known standard cases of the effect of want of fresh air in a confined space, viz:—the well-known cases of the Black Hole at Calcutta, and the steamship "Londonderry."

In the year 1756, 146 individuals were confined in a small cell, known as the Black Hole of Calcutta. This cell was 18 feet long by 14 feet wide by 10 feet high, being so small that the last person of the 146 had to be crushed in upon the rest with violence as the door was closed and locked. The only means of ventilation were two small holes. In the morning 123 corpses were taken out, and 23 beings, who could scarcely be said to be alive.

The steamship "Londonderry," left Sligo for Liverpool, on 2nd December, 1818, and stormy weather coming on, the captain forced 200 steerage passengers into their cabin, which was 18 feet by 11 feet and 7 feet high. The hatches were battened down, and covered with tarpaulin. When the cabin was opened, 72 persons were found dead, and several expiring.

These were deaths caused by breathing over again air which had been previously breathed without any addition of fresh air to dilute it.

If it were desired to supply in a room a volume of fresh air comparable with that supplied out of doors, it would be necessary to change the air of the room from once to five times in every minute, but this would be a practical impossibility; and, even if it were possible, would entail conditions very disagreeable to the occupants.

Hence, to maintain the comfort and temperature we desire indoors, we sacrifice purity of air. Therefore, however impure the outer air is, that of our houses is less pure; and it may be accepted as an axiom that by the best ventilating arrangements we can only get air of a certain standard of impurity, and that any ventilating arrangements are only makeshifts to assist in remedying the evils to which we are exposed from the necessity of obtaining an atmosphere in our houses different in temperature from that of the outer air.

In fixing the standard of purity or impurity in air regard must be had to the moisture of the air, it must not be too dry or too moist. The moisture is measured by the difference between wet and dry bulb thermometer. This difference should not be less than 4° Fahr., or more than 8° Fahr. The maintenance of a certain amount of purity or impurity in a building depends on the ventilating arrangements.

We are told by theory that a room containing an air space of 1000 cubic feet, occupied by one individual, would require to be supplied by 3,000 cubic feet per hour, in order to maintain it in a proper condition of purity and humidity. But in our temperate climate, a careful practical examination of the condition of barrack-rooms and hospitals, judged of by the test of smell, showed

that arrangements which appear to provide for a volume of air much less in amount than that obtained by calculation will keep the room in a fair condition.

From similar experiments made in soldiers' barracks, these results have pointed to about 1200 cubic feet of air admitted per man per hour in barrack-rooms occupied by persons in health.

This need not be set down to errors in calculation or in theory.

There are many data which cannot be brought into the theoretical calculation. For instance, the carbonic acid disappears in a newly plastered or lime-washed room, and could be recovered from the lime; therefore a newly cleaned, lime-washed room will present different conditions from a long-occupied, dirty room. Washing with quick-lime destroys fungi in dirty walls; the same effect is produced by sulphurous acid fumigation. Air has the same property, especially dry air; and hence, opening windows, turning down beds, and all such measures, act directly on the subsequent state of the air. Therefore an enormous effect is produced on all the elements of the above calculation if the windows of a room are kept open for several hours a day, instead of being closed.

Besides this, the conditions under which the air flows in and out of a room are so varied. The walls and ceiling themselves allow of a considerable passage of air.

The ceiling affords a ready instance of porosity. An old ceiling, it will be observed, is blackened where the plaster has nothing over it to check the passage of air, whilst under the joists, where the air has not passed so freely, it is less black. On breaking the plaster, it will be found that its blackness has arisen from its having acted like a filter, and retained the smoky particles, while the air passed through.

Ill-fitting doors and windows allow of the passage of a considerable quantity of air.

In a temperate climate, where the changes of temperature of the outer air are rapid and considerable, these means of producing the outflow from and the inflow of air into a confined space are in constant operation.

Let me give you an instance—

Thus a bed-room twelve feet by fifteen feet and nine feet high, which is generally considered a sufficiently large room for one person, requires, if a proper degree of purity of air is to be maintained in it, that the air should be renewed at the rate of about 1880 cubic feet per hour for each individual occupying it. In a common lodging-house, six persons could, under the Act, sleep in such a room; the air to be removed and the fresh air to be admitted for this number will be 11,200 cubic feet per hour. If the room had a fire at bed-time the velocity of air in the flue at about three or four o'clock in the morning would probably, with an ordinary average outside temperature, be about two feet per second. An ordinary flue of fourteen inches by nine inches would under such conditions remove about 6500 cubic feet per hour; but the law makes no provision for flues in sleeping rooms, except in the case of cellars; and, moreover, the absence of inlets for fresh air to replace that

drawn off by the chimney-flue materially checks the draught in the flue. If in such a room no arrangement is made for the renewal of the air, in a ten hours' period of night occupation of the room, the amount of carbonic acid and other emanations from each occupant diffused through the air would be ten times as great as the usual amount in fresh air; and with the six occupants might be fatal. The safeguard in practice against such extreme vitiation is the badly-fitted doors and windows, through which some exchange of air takes place, and the exchange is much accelerated by the lowering of the temperature of the outside air during the night.

In rooms occupied as living rooms the air deteriorated by the burning of lights must be provided for in addition to that due to the occupants, and (as shown above) an ordinary gas burner deteriorates the air as much as six individuals at least. These facts bring home to the mind the importance of providing in a systematic manner for the renewal of the air of all inhabited space: that is to say, the removal of the vitiated air, and the introduction of fresh air.

It may be summed up that, whatever the cubic space is, the air in a confined space occupied by living beings may be assumed to attain a permanent degree of purity, or rather impurity, theoretically dependent upon the rate at which emanations are given out by the breathing and other exhalations of the occupants, and upon the rate at which fresh air is admitted, and that, therefore, the same supply of air will equally ventilate any space, but the larger the cubic space the longer it will be before the air in it attains its permanent condition of impurity. Moreover, the larger the cubic space, the more easily will the supply of fresh air be brought in without altering the temperature, and without causing injurious draughts. One of the chief difficulties of ventilation arises from the draughts occasioned thereby. Everyone approves of ventilation in theory, but practically no one likes to perceive any movement of air.

These conditions point to the care which should be exercised in the form of rooms, the position of windows, doors, fireplaces, and other matters. We should study how the currents of air move in a room: what is the effect of the form of a room on the circulation of these currents of air: for instance, a lofty room with the tops of windows some distance below the ceiling, and without outlets for air at the ceiling-level, becomes dangerous, unless a constant circulation of air goes on, because the heated air, loaded with impurities, ascends, stagnates in the space near the ceiling, cools, and falls down, and re-mixes with the air in the lower part of the room, and thus increases its impurity.

These effects are modified by anything which causes circulation of the air. The open fireplace creates circulation of air in a room, with closed door and windows. The air is drawn along the floors towards the grate; it is then warmed by the heat which pervades all objects near the fire, and part is carried up the chimney with the smoke, whilst the remainder, partly in consequence of the warmth it has acquired from the fire, and partly owing to the impetus created in its movement towards the fire, flows upwards



towards the ceiling near the chimney breast. It passes along the ceiling, and, as it cools in its progress towards the opposite wall, descends to the floor, to be again drawn towards the fireplace.

Thus the open fire, whilst continually removing a certain quantity of air from the room, which must be replaced by fresh air, causes an efficient circulation of the air remaining in the room.

It is impossible in the short space allotted to me to give you a lecture on ventilation, and its accompanying science, warming. Warming and ventilating must go hand-in-hand in this climate. The reason why ventilation is so much objected to, and so little practised is because people endeavour to bring in fresh air in cold weather without tempering it. In a large room, well warmed, you may by judicious arrangements bring in cold air to the large mass of warm air in the room without discomfort, but in a small room where the volume of air flowing in more nearly approaches that of the air in the room, you must temper the air in cold weather before admitting it, if you are not to feel a draught.

In conclusion let me urge upon you to think upon this matter. Sanitary Science is made up of simple principles which are within the reach of everyone to understand, and if you will only attend to these principles you will find your health and that of your children improved, and your power of work and usefulness vastly increased.

DOUGLAS GALTON, C.B., D.C.L., F.R.S.

### Health and Pure Water.

THE first duty of an Englishman is one which I fear is less observed than it should be. In times past when Nelson signalled that "England expects every man to do his duty" it was understood that it was both a duty and a privilege to obey orders. Now-a-days, when we seem drifting into a condition when everybody is to be equal, and therefore nobody is to be master and nobody to issue orders, I do not quite see how things are to work equally well.

You probably wonder what this remark has to do with my subject. I am one of the old-fashioned type, who like to work under orders. Our President said, "Mr. Symons, you will take ten minutes for Pure Water." There were my orders, with the limits of time and subject—short, sharp, and decisive. It is a pleasure to obey such instructions, even if it is not very easy to carry them out.

Pure water. Well, to begin with. Considering the myriad sources of pollution and contamination which have prevailed not only since man came upon the earth, but even long before, is it not rather remarkable that there is a drop of pure water left? Look at the mass of foulness hourly poured into such rivers as the Clyde and the Irwell, by the side of which the Thames is purity itself. Look at the contamination from mining works, from manufactures (paper

for instance), from dye works, &c. Or, abandoning all thoughts of industrial appliances, pass in review the countless millions of human beings who have lived and died on this globe, of the still more countless millions of animals, cattle, reptiles, and birds, all which have had their share in contaminating the water supply of the earth. And even to this list we must add the fermenting juices of decaying vegetation, which in tropical regions are not to be ignored. Think of the thousands of tons—nay, mountains—of filth which have streamed down every river on the globe, and I am sure that you will agree with me that it is a marvel and a mercy that with trifling exceptions the water supply of the world is as copious and as pure as it was thousands of years ago.

I have not time to trace the various means whereby all this foulness is removed. I can only stop to remind you of two facts. Everybody who has started an aquarium knows that the secret of keeping the water bright and beautiful is to exactly balance the animal and vegetable life existing in it. And so on a larger scale, the weeds of our rivers extract much of the animal matter contained in the water, and what with weeds and what with the action of atmospheric oxygen upon the water, a dirty river may become almost clean ere it enters the sea. But a far stronger reason is in the fact that all our water supply, no matter whether we gather it on our roofs, dip it out of a brook, or pump it from the bowels of the earth, is rain. Rain is condensed vapour, but vapour raised from dirty water is clean. The sun may raise vapour from a filthy lagoon, but that vapour passes into a cloud purer than from the finest laboratory in Europe, the cloud floats off and bears its burden of pure water to the region where it is needed. If man does not get pure water, he has himself to blame for its contamination.

Considering the sharp lesson which water-works superintendents have received from a fatality in this neighbourhood, I need say nothing to a Croydon audience upon the desirability of their scrupulously guarding against the pollution of water required for food and for food utensils. But however pure the water may be when it flows through the street mains, that purity will be of little moment if the domestic fittings, and I must go further and say the domestic arrangements of the people, are not what they should be. Every traveller by rail knows that the waterbutt—that foul, slimy, open receptacle for blacks, leaves, and an etcetera which I will not specify—is far from extinct. People of a somewhat higher class get a little fright about bad water; they rush off and buy a filter, and having done so, soon forget all about it and leave the poor filter to purify all the drinking-water of the household for all time to come. If the water wants filtering, it is obvious that the filter is intended to keep back some obnoxious substance, but if so, surely the filter itself must soon become clogged and noisome. My impression is, that when water requires filtering, the subject is altogether a more serious one than is generally supposed. In ordinary towns I do not think that filters do any harm, because the water is usually so good that there is little to pollute the filter, and even if

the filter is neglected for years the water probably passes out in much the same condition as if no filter were there.

One word before I leave this subject. I am no authority respecting filters. Do not attach any weight to my remarks except as far as the thoughts commend themselves to your judgment; and on no account regard them as an attack upon filters in general; what I complain of is the unintelligent misuse of filters. I do not attack their use, but their neglect.

The ordinary public are apt to look upon rain as a nuisance—and this year at any rate an excessive supply has cost the nation many millions sterling,—but as all our water comes from the rain the amount that falls in different districts is a matter of great public importance, although Government do not seem to think so; for they leave it to private enterprise to determine all the phenomena connected with its distribution. That, however, by the way. I have mentioned the subject because I thought it might be of interest to you to see a map which, by gradations of tints, shows the districts where the rainfall is greater and greater, the darker the colour the greater the fall of rain. Here, at Croydon, as Mr. Corden told us in his paper, the fall of rain is about 25 in., but the districts marked with the deepest tint have at least three times that amount, and in those districts are spots where the fall is four, five, six, and almost seven times as great as it is here. Need I say that these localities are veritable mines of the priceless treasure—pure water.

Several causes are tending to render pure water increasingly scarce in this country. Our population is increasing at a rapid rate, and therefore more clean water is required and more water is dirtied every year. The moorlands, whence much of our best drinking water comes, are yearly being brought into cultivation (which means treated with manures, &c., which will dissolve and run into the streams). Our rivers have many of them become rather sewers than rivers; and no matter how bright the effluent water of a sewage farm may be, it is hardly pleasant to be obliged to drink it. The tendency of our population to congregate in towns of great size, renders the providing of an adequate supply of pure water for their use a matter of great difficulty and magnitude, and, as there seem very strong reasons against the supply of two qualities of water to each house, the total volume of pure water required for our large towns is enormous. There has moreover sprung up a sort of rivalry in the promotion of big schemes; and as there is no public department to look after the subject, and the decisions are given by Private Bill Committees who never have the national bearing of the schemes brought before them, the result is, as I have said before, that the rich and the venturesome have it all their own way, and the committees hand over to them in perpetuity stores of water which, under a wiser régime would be duly administered for the benefit of the nation at large.

G. J. SYMONS, F.R.S.

### Health out of Doors.

At the wish of Mr. Edwin Chadwick and by the kind invitation of the Chairman of the Schools' Management Committee (Mr. Wainwright), several members of the Sanitary Congress, with myself, paid a visit to the North Surrey District Schools at Anerley, when certain facts with regard to the method of education pursued there were made known to us, and were so remarkable that I hope you will excuse my bringing them again to your notice to-night.

As a ratepayer in Croydon I had known of the existence of these schools, but had never had the privilege of visiting them, or knowing so much of the internal management before the present occasion. The schools were first instituted in the year 1849, and were an outcome of a similar establishment on Westow Hill, kept by Mr. Aubin, where for many years children had been farmed from several London parishes; but after a Government inquiry, held in consequence of a serious outbreak of cholera and a large mortality, it was decided to build the present establishment, where children belonging to the four districts in North Surrey—Wandsworth, Lewisham, Richmond, and Croydon—should be sent, boarded, clothed, and educated, the expense of each child being defrayed by the particular union in which the parents of the child resided.

It is more especially with the method pursued and the extraordinary results achieved that I wish to claim your attention to-night.

All work is done by the children as far as practicable.

The domestic duties of the house, as well as making their clothes, are done by the girls. Agricultural, mechanical, and other labour is contributed by the boys as far as their age and the insufficient time at command for learning a trade will permit. Their number averages over 800, and they are only drafted here from the work-houses in the district, either from the poverty of or desertion by their parents. It is proper to add that when children are received here from the ages of three or four years, they are first placed in a probation ward for three weeks to ascertain if they are incubating any infectious disease, whilst both then and hereafter each child sleeps in a separate cot or bed. This has been found to exercise a great influence in promoting health and preventing disease.

I will not weary you with too many details, my object being to direct your attention to the half-time system, *i.e.*, half the time being devoted to mental and the other half to physical labour. At present, more for the convenience of the labour-master than anything else, the half-time system is only partly carried out; the proper method would be, half the day—say, the morning being occupied by teaching, the afternoon in handiwork of some kind. Three alternate days are given to the schools and the other three to agricultural labour, or trade, the position in each week being reversed.

After a trial, during the last seven years, it has been found that since physical and gymnastic exercises have been introduced, not only has the health of the children been improved, but better order and discipline have been maintained in the school and dormitories, and their physique has been materially improved by it. As an instance of this, some boys were required for the training ship, "Excellent," and the lads being asked to volunteer, sixteen or seventeen stepped out from the ranks. Of these none were rejected by the medical authorities, their chests being all of the proper standard size, whilst of a similar batch of boys drawn from another school of the same class more than half were rejected. In the last twelve months there have only been two deaths out of 800 children: one of these was a boy who died five or six weeks after admission, from old lung disease; the other was a child who, having been deserted and left exposed all night on Wandsworth Common, had never recovered the shock to the system induced thereby. The ordinary mortality does not exceed three per 1000.

You may fairly ask—what is the object of telling us all about these schools and their inmates? Well, it is this:—A large proportion of you are parents, and I wish to draw your attention to the necessity for not cramming your children with too much book-learning, but by adopting the old maxim, "A sound mind in a sound body," to let them have more play and more bodily exercise. We find in a school such as this, where children are drawn from the lowest order of society, exposed to the risk of frequent interruption to their education (for unless they are orphans, if the parents leave the workhouse in which they are temporarily residing, they are compelled to take their children with them), that the children here are equal to others attending a School Board school, whilst of the one-third of the number in this establishment, which is the proportion of children who are stationary, they excel the School Board children by the age of eleven or twelve. All these data are worthy of note, and I should like teachers in private schools and parents generally to notice them, because I am satisfied that as a rule sufficient attention is not paid to bodily training and exercise, more especially with girls. Why should not girls play (as at Anerley) not only with their hoops and skipping-ropes, but football (of course this only means kicking the ball about), trap-bat and ball, cricket, &c., in addition to the dumb-bell and manual exercises, which are rendered pleasant by the accompaniment of music and singing.

We may now leave Anerley, and study girls of our own social standing. Take, for instance, those who are just leaving school, or, as it is erroneously termed, "*finished their education*." What exercise or physical exertion do they take in the course of the day? A short walk or lounge of an hour's duration in a town, looking at the shops. Why should not these young ladies take more physical exercise? It is too much the fashion for such as these to lead a purely artificial life; "they toil not neither do they spin." Their minds either become a blank, or lose much of that intellectuality which is so pleasant and yet so rare a feature in the young.

Why is this? Because their very existence is at war with time

and nature. One day is pretty much the same as the other: the same listless promenade, the same feeling of *ennui*, the same longing for bedtime, that another day has passed.

Given the disease—point out the remedy. I would urge upon all girls that as soon as they leave school they should take more physical exertion. This may be done in two ways:—

First. By cultivating some of those sciences which would teach them to look "through Nature up to Nature's God."

What can be a more feminine occupation than the study of Botany.

Cowper says: "The love of nature, 'tis an ingredient in the compound man, infused at the creation of his kind." What more exquisite in their simplicity than the wild flowers which are to be found in every hedge-row or country lane. The choicest exotics, cultivated at a larger cost and with great skill and care (themselves growing wild in tropical regions), can do no more than compare favourably with the simple posy gathered in an afternoon's ramble.

*Geology* in its elementary form is well worth more study than is given to it. How many young people, and older ones too, who have strolled to our beautiful hills at Addington, and seeing the bed of smooth water-worn pebbles scattered over the surface, have ever given themselves the trouble to think, "Why are these here? How came they here?" and have drawn an analogy between them and the shingles on the sea-shore! Yet these pebbles at one time formed the shore of an ancient sea, precisely as at the present day at Brighton and elsewhere. They then became the estuary of some tidal river. This you can see by the fossil oysters found amongst them, which were just as now, living and dying on the spot.

All this is good mental food, and conjoined, as it must be, with bodily exercise, is one source, among others, which leads to "Health out of Doors."

Another, or second method, would be gymnastic or bodily exertion, combined with amusement.

What are those which are available for girls?

In later years it has been much more the fashion than formerly for girls to skate, but our winters are so variable and safe ponds so few, that the opportunity seldom arises for it to be frequently enjoyed. In summer there is lawn-tennis, but every one has not the privilege of a garden sufficiently large attached to their house. In every town in the kingdom of the size of this, or even smaller, I would establish a gymnasium, with a court attached suitable for rackets, fives, or lawn-tennis, which, I am told, is a beautiful game on a skating-rink surface. It should be opened during the day for ladies *only*, the evening being given to the sterner sex. I know medically that such a thing is urgently needed. All fancy work undertaken by ladies is an in-door occupation, and often necessitates a cramped position in the worker. When girls found that they could enjoy themselves in some out-door game freely, without any overlookers or fault-finders to say this or that was unladylike, or some nonsense of that kind, they would speedily become absorbed in the game—and what would be the after result? Muscles would be

brought into play which no amount of crewel, embroidery, or other work could develop; their chests would be expanded; the mind being engrossed with the interest taken in the game, the body would as a necessity get fatigued, any vain or unbecoming thoughts driven away, and thus a healthy moral tone imparted.

There need be no apprehension of any young girl becoming too forward or hoydenish, for the reason she would be in the society of her own sex, and a time would come sufficiently soon when she would not care to join in amusements which a year or two previously she was only too happy to participate in.

*The Skating Rink* where a portion of our Sanitary Exhibition is being held is for sale. Can we not purchase it, form a Limited Company, and adapt it to such a purpose as I have named? The object should not be excessive pecuniary gain, but it might be made not only self-supporting, but pay a small dividend, so that capital should not be felt to be either thrown away or unemployed. By being thrown open (more especially as a Gymnasium) to young men in the evening, they in their turn would be provided with healthy recreation when they return from business—a far more profitable occupation than lounging in our thoroughfares, smoking to excess, or making bad acquaintances.

I have shown, I hope, clearly what is accomplished by physical education at the North Surrey District Schools, and I have ventured to hint how much might be effected in the same direction with another class of pupils. Remember the paramount importance it is that the young, who will one day be the parents of a future generation, should be healthy now. It behoves us all, therefore, not only to advocate but practically to assist in carrying out the work; and if we are to become the long-lived people which our President predicted in his inaugural address we might be, we must not wait for the 200 years, but make a beginning at once, and then carrying on our imagination some twenty years, picture ourselves pointing with pride and congratulation, not only to 1879 as the year of the Sanitary Congress, when important and vital facts were first revealed to us, but turning to our grandchildren, congratulate ourselves on the improvement which has been secured in their mental and bodily culture, by which they have been fitted morally and socially for every station in life in which it shall please God to call them.

J. H. STRONG, M.D.

### On the Technical work of the Sanitary Institute of Great Britain.

Two important questions naturally suggest themselves; one at the opening, and the other at the close, of a Congress, like that in which we have been engaged. Previous to the opening of the Congress, everyone was inquiring as to the character of the work to be done. At the close of it, the critics are busily discussing

what has been, or is likely to be, the outcome of it. The character of the work done is now a matter of history, and I shall leave to others the task of analyzing and passing judgment upon the various matters brought forward and discussed at the Congress. In the few remarks which I have been invited to make upon the Congress, I shall confine myself to a brief consideration of its relation to the more technical work of the Institute, and give a short sketch of the principles upon which the Institute was founded.

The holding of a Congress, although a very useful method of bringing the work of the Institute into contact with public opinion, is not by any means essential to its existence. Should the Council at any time decide to suspend the Congresses altogether, or to hold them at longer intervals, it would not be the slightest indication that the work and usefulness of the Institute was on the wane. On the contrary, it would rather go to show that the technical work of examining and teaching which it has initiated was absorbing all its energy and force.

If the holding of Congresses formed no part of the *raison d'être* of the Institute, at its foundation, some who have recently become acquainted with it may be interested to know what is the technical work to which reference has been made, and the means by which it is carried out.

The pursuit of Sanitary Science required for its development that some organization should be supplied as a focus to which the members of the various professions engaged therein might be attracted. It was necessary that such an organization should embrace the makers and administrators of the laws relating to Public Health, and also the members of the various trades engaged in the manufacture of Sanitary appliances, and in carrying out the plans and designs of the scientific experts. These several sections are all represented in the three orders of Fellows, Members, and Associates, of which the Institute is composed, and which constitute, if I may so designate it, the corporation *in posse*. Life and Annual Subscribers are entitled to be enrolled and enjoy certain privileges, but take no part in the government or management of the Institute. Such in a few words is the "Basis of the Constitution."

The technical work which the Institute has set itself to perform, may be classed under the two following heads—

First.—The Council have appointed a Board of Examiners to conduct examinations, and to grant Certificates in Sanitary Science to Local Surveyors and Inspectors of Nuisances, and to persons desirous of qualifying themselves for such appointments, or of obtaining the Certificate of the Institute.

Second.—The Council appoint Judges to investigate Sanitary appliances, to award medals and certificates, and to carry out detailed experiments, by means of deferred practical trials, as to the value of the various forms of apparatus and appliances, which the public are invited to purchase, but the value of which they have few means of ascertaining beforehand.



The means by which the Council propose to carry out these important functions are also of a twofold character.

(a.) By the formation of a School of Hygiene for the technical teaching of Sanitary Science. The subjects to be taught in the School will embrace Preventive Medicine, Practical Sanitary Science (Medical, Chemical, Engineering, and Constructive), together with Jurisprudence and Sanitary Law. A systematic course of lectures will be delivered on each subject, and it affords a happy omen of success that Dr. Richardson, Professor Corfield, Captain Douglas Galton, and Mr. W. H. Michael have undertaken to deliver the first series of such lectures.

(b.) By holding an Annual Exhibition of Sanitary Apparatus and Appliances, by which means the immense importance of exemplifying the application of Art to Sanitation is fully realized, invention and excellence of workmanship are stimulated, and all classes of the public are instructed by seeing and examining the specimens for themselves.

The Institute aims, through its examinations, at pronouncing an authoritative opinion upon the fitness of those who may be called upon to carry out the provisions of the Public Health Acts. By carefully conducted tests it endeavours to determine the value of different kinds of appliances, and thereby to assist the public in forming a correct opinion upon the value of special means for alleviating the defects resulting from impure air, impure water, imperfect ventilation, and some of the grosser causes of the violation of the laws of health. Success in such a work as I have described, is only to be compassed by years of patient labour. It is, therefore, very encouraging to note that the results obtained by the Examinations and Exhibitions already held under the direction of the Council, give abundant evidence, not only of the usefulness, but also of the overwhelming importance of this portion of the work of the Institute.

The Institute would be strengthened, not so much by a Charter of Incorporation, as by the Government requiring that all those who are entrusted with carrying out the Public Health Acts should in future obtain a Certificate of Competence from some examining body previous to the confirmation of their appointments. Until this is done, Sanitary Authorities and Local Boards would greatly assist in the work of technical education if they were to require all their Local Surveyors and Inspectors of Nuisances to possess such a certificate, either at the time of their appointment or within a reasonable period afterwards.

Most of our Universities have instituted examinations and now grant certificates in Sanitary Science to medical men. It would be a great advantage and tend to secure uniformity of work and action on the part of Medical Officers of Health if they, in like manner, were required to possess a Certificate in Sanitary Science as a condition of their appointment.

It is admitted that Croydon has derived great advantages from Sanitary Science, in consequence of which, it is now the healthiest and wealthiest suburb of the metropolis. I sincerely hope and

believe that the Congress held here during the year 1879 will mark a period in the history and progress of Sanitary work, that it will serve as a finger-post to those who come after us, directing them to the attainment of a brighter, happier and healthier state of existence than even the favoured people of Croydon now enjoy. We may thus hope that the good effect of our work will leave its imprint "upon the sands of time."

LORY MARSH, M.D.

### The Lessons Taught at the Exhibition.

I AM requested to speak for a quarter of an hour upon the lessons which may be learnt from the Exhibition of Sanitary Appliances which has been opened in Park Lane in connection with this Congress.

The subject is a large one, the time for its consideration is limited, and the references must therefore be wide and general rather than detailed and specific.

I must divide my subject into several heads for convenience of reference.

First. The extent of the Exhibition. There is the broad fact that upwards of two hundred exhibits have been marshalled in the Central Croydon Station and its annexe—the Skating Rink; and that 189 distinct stands have been marked out for the exhibition of 710 different classes of articles. This work has been done at a considerable expense to those who have placed the articles there.

The list includes an immense number of things which at the first sight might, by a thoughtless objector, be considered outside the area of Sanitary work, and therefore foreign to the object which Sanitary Science has in view. This idea would arise from the narrow field to which the subject of Sanitary work is restricted in the minds of many people. It is, however, a fact that everything connected with the question as to how air is to be kept pure, good water provided, wholesome food procured, and healthy exercise obtained; how mental rest is to be ensured and artificial warmth acquired, comes properly within the consideration of those who are instructing the people in the mysteries of Sanitary law. The appliances connected with them and kindred arts are therefore fairly admissible into an Exhibition which is intended for the education of the people in the right principles of Sanitary work.

The expense which has been incurred by those who have made the Exhibition a success by becoming exhibitors, tells us most forcibly that a demand is springing up among the masses for a class of workmanship and a kind of material which shall be sanitarily perfect: and that persistent inquiries are being made by numerous individuals for such. It is a satisfactory sign of the times, and contains more in it than at first sight meets the eye of

the shallow observer. One great value of exhibitions such as ours in these matters exists in the fact that they bring all kinds of suggestions, all kinds of so-called Sanitary patents, to the test of trial by unprejudiced people, and the verdict of public opinion is fairly obtained. They give inventors an opportunity of seeing other inventions besides their own side by side with their own work. This enables all to judge of an individual work or of a competing invention better than could possibly be effected in any other way: and although every inventor will naturally be biassed in favour of his own invention, just as every mother thinks her own child the finest, the handsomest, or the best in the world; yet it naturally follows that the people, who are, after all, the judges, will pronounce an opinion upon the merits of an invention and give effect to their judgment by preferring the most useful article. By this means inventors have the weak points in their inventions quickly shown to them, and they learn lessons which may save them much loss of time, and prevent a needless expense. Although they may outwardly retain their opinions as to the superiority of their own work, they do not waste the further time and money that they might otherwise have done if they had not had an opportunity of testing rival plans. Thus both inventors and the public are mutually benefited by that close scrutiny which all such works receive at the hands of rival manufactures. Inventors of useless designs are shown their uselessness by the neglect which is accorded to them, and they are saved much expense which they would probably have been put to if they had not exhibited and if the comparison had not been made.

Second. The measures which had to be taken for the establishment of the Exhibition, and still more, the character of the Exhibition itself, bring out into strong prominence the fact that it is to men of science that humanity owes all beneficial progress, and that, although the masses of the people may deify the politician of the day, or the successful soldier, and may follow about the stump orator, or the cunning political place-seeker, as if they were made of a material something more than human, it is not to the ordinary politician that we must look for any improvement in the welfare of the people or for progress in arts and sciences. The politician is never so true a friend of the poor man as the man of science.

It was the man of science who developed mathematical precision, who elaborated architectural design, and gave employment for the building trades. It was the man of science who perfected our chemical works, and gave us manufacturing pre-eminence; who discovered the power of gas and steam; who traced out our railroads, made our steamboats, and projected our telegraph lines. It is science and not politics which developed every step of progress which has been made in lengthening man's life and diminishing the chances of, as well as the evils attendant upon, sickness and mortality. Politicians have added to these evils to a fearful extent by impeding the adoption of right measures and trafficking in gigantic jobs. It is science and not politics which has done all

that has been done to elevate the human race beyond that mediæval position which it occupied in the Middle Ages. At that time agriculture was the principal occupation of the masses, and the people were to some extent the serfs of the great landowners.

It is science, not politics, which will do away with war, abolish standing armies, and make men beat their swords into ploughshares and their spears into pruning-hooks. It will not be very long before war will be of that deadly character that it will become an impossible act between civilized nations: because the arms of precision will be so fatally constructed that both the contending armies will be all but annihilated in the struggle; whilst on the sea the weapons of warfare will be almost as dangerous to friends as to enemies.

In the meantime, science is showing us that our life is far shorter than it ought to be, that disease is an unnecessary adjunct to our state of existence, and that a doctor's duty would be more effectually exercised in keeping people well than in curing them after illnesses have commenced.

The man of science is often abused by the stump orator, or sneered at by the narrow-minded politician. He is deserted for the platform of the latter, and left to fight his own battles all but single-handed: but after all, science and not politics is the true friend of the people. If our Exhibition had had a political tendency, it would have met with an enthusiastic reception by one or other side of the great camps into which the country is divided. Its establishment was outside the pale of political life, and politicians gave us very scanty help. I hope our thinking population will take this to heart, and not be led away by clap-trap and clamour to neglect the teachings of art and science, and the study of those natural laws upon which the happiness and prosperity of the people depends.

No unprejudiced person can walk through the Exhibition which is just now closing without seeing on all sides of him that comfort and happiness, personal enjoyment, and personal safety are to be found in industrial works rather than in the useless platitudes of political warfare. I am urged to make these remarks because acknowledged politicians are seldom willing to help forward Sanitary measures until the people themselves have determined that such works shall be done. I am satisfied, therefore, that it is our duty, as having a perfect trust in the rectitude of our principles, that we must educate the public in those principles before politicians will deign to help us in the least. Expediency will then bring them into our camp.

The next point which has been brought out by the Exhibition in Park Lane is the fact that there are wonderful provisions for the protection of the people against the incidences of those diseases which vice, folly, and avarice have brought among us, and concerning which both as to cause and cure the great majority of the people are at present profoundly ignorant. It has been said that the people of Croydon as a whole were well up in the study of Sanitary work, and had such perfect knowledge as to the right use

of Sanitary appliances that as far as they were locally concerned, the Exhibition would be a work of supererogation. I hope those self-satisfied individuals will now acknowledge their error: no one can remain for long within the precincts of the tent without observing something to interest him as making life more enjoyable, something to be made a note of.

It has been a great pleasure to me to watch the intelligent mechanic looking closely into things which had not caught my eye, to observe that he took in at a glance that which would have taken me a long time to comprehend, and to make an observation which told me that the plumber—for such was his trade—had learned something which he did not know before. Had it been possible to have held the Exhibition in Croydon ten years ago, we should most probably have escaped the evils which arose in 1875 from a general want of knowledge upon the proper principles which should guide the householder in his plumbing and house-draining work.

The absence of correct knowledge on these points led to the greatest misfortune which has ever befallen our town. It brought its lesson, which it is to be hoped will never be forgotten. Be that as it may, the exhibition of appliances connected with the supply of water to houses and its use for cleansing purposes is such as must make our local workmen as efficient as it is possible for any body of men to be, if they have taken advantage of the opportunities afforded to them. I wish it could have been arranged that all men so employed could have had an opportunity afforded them of visiting the Exhibition at a set time, and having the principal exhibits explained to them by Captain Galton and Professor Corfield; such demonstrations on the spot by such men would be a right work for the Sanitary Institute to entertain. The gimcrack appliances which are now in use in this town for the purpose of checking the waste of water ought to be abolished by universal consent, and the efficient apparatus which were exhibited by more than one firm substituted in their stead. It will be a lasting shame to our intelligence if any difficulty is again experienced in Croydon either in preventing useless waste of water, in making its contamination impossible, or in staying the intrusion of foul air from the sewers into the interior of our houses. All these results are shown to be easy of attainment. It would be invidious on my part to mention the names of makers; I must refrain therefore for fear of doing an injury to an equally efficient plan. No one, however, can examine the works of art submitted by Doulton, and Stiff, by Jennings, and by Wilcox of Leeds, without being struck by the advance which has been made in Sanitary work since the days when common earthenware pipes were first laid in Croydon. The beautiful and efficient appliances which are now produced enable us to command a non-porous material for our butchers' and fishmongers' shops; to protect our hospitals and our bath-rooms from the evils of contamination; our kitchens and our larders from absorptions of foul matter, and save us from many hitherto unsuspected dangers. The exhibition of such works must indicate the

fact of a real evil which it behoves all those that are engaged in such occupations and businesses to have reduced to a minimum. I must refer to the impervious pipes which are made of material capable of repair, and which are shown of enormous size. They are far superior to bricks for sewers, and if, as reported, they resist the chemical influences of sewage, they are invaluable for sewer purposes, and such concrete tubes should be used wherever possible.

I must mention the exhibit of Mr. Lascelles, because he is a Croydon man, and because he has manufactured, out of that which was supposed to be a useless material, a most valuable article, whilst the substance of it is such as will enable those who occupy the buildings which he erects to defy fire, and, what is of much greater importance, to defy the chance of infectious disease becoming a part and parcel of the building. The germs which can be produced may be manufactured, so to speak, in the rafters, the floors, and walls of the infected building. Such infection is not possible in Mr. Lascelles' work, and I trust that his public spirit in showing it at Croydon may meet with a proper reward.

The next point of general importance in this Exhibition are the various plans shown to obtain a good ventilation of buildings. They indicate a necessity, and show us that there are many men prepared to remove the evil which a want of ventilation entails. I fear that for ordinary dwellings there will be a difficulty in fixing upon the best plan, if it is necessary to be independent of open windows and well-constructed fireplaces; of which some most excellent and ingenious specimens were to be seen.

I must not omit to mention the advance which has been made in the use of gas for cooking and other household purposes. The use of gas for such purposes may reconcile us to the low illuminating power which gas companies find it most beneficial to themselves to supply. A low illuminating power is better fitted for heating purposes than a higher one, and those who use gas for fires and cooking may well be content with a low lighting power. The information conveyed by the Exhibition, as to the best plan for cooking and for warming purposes, must be generally useful, and ought to give a great impetus to its more general use in private houses. It is cleaner, it is safe, and, if carefully husbanded, it is shown to be nearly as cheap as house coal, whilst it saves much labour and great waste. But it requires a proper regulation as to ventilation, and a right application of vapour to render it satisfactory. All these were met by several appliances which were exhibited in the building. The economical housewife could not have spent a morning in the Exhibition, examining these appliances, without making up her mind to introduce them into her own kitchen; whilst to the poor, who have to husband their coal for cooking purposes, they would be a priceless benefit, if it was not for the first expense of laying on the gas.

The transition from gas to cooking is natural. The cooking stoves, which enabled cooks to do their work as efficiently with much less fuel than is ordinarily used—whilst the heat of the kitchen at times is all but unbearable,—is a manifest improvement.

As regards sewage utilization, there was not much scope for show; but in those districts into which sewers are not yet introduced, and where they are certainly objectionable, the earth-closets, such as Moser's and other makers', show an advance upon the objectionable cesspool, and should indicate to Sanitary authorities that to allow of the latter is a blunder and a crime.

The exhibition of school furniture is an indication of a growing knowledge as to the evils which are induced in school by bad position and muscular restraint. This subject requires more attention than it receives, and if time allowed I should dwell strongly upon the point. If time was not failing me, I must, however, refer to one more sign of the times: it is the care which is now bestowed upon the production of non-intoxicating drinks. Our townsman, Mr. Packham, is doing good service, and his pure waters and such drinks as zoeidone and all the class are likely to help the cause of temperance among us, and to assist in removing the greatest cause of disease and early death which exists among us. May Sanitarians never forget that this is one of their missions, as well as the production of appliances for providing pure air, pure water, and wholesome food. I will conclude with the words—May God prosper the work. *Finis coronat opus.*

ALFRED CARPENTER, M.D.

Professor CORFIELD then delivered an interesting address entitled "Mistakes about Health," which was frequently applauded. Through an oversight the Editors regret they are unable to publish it in the Transactions for the present Year.

*The following Letter, written to the President of the Congress of the Sanitary Institute of Great Britain, Croydon, was also read.*

DEAR AND HONOURED PRESIDENT—

Will you express my regret at the conditions which prevent my attendance to fulfil the task you have assigned to me of briefly addressing the meeting on the application of Sanitary Science to the reduction of Infantile Mortality prevalent amongst the wage classes in Croydon?

With all shortcomings, the result of ignorant opposition, a reduction of the death-rates of the general population by more than one-third in Croydon, as compared with the death-rates previous to the introduction of works on Sanitary principles, must be a consolation to those who have bestowed their labour on their prosecution. But a table which I have had made out, showing

the mortality and its chief preventable causes amongst the more numerous classes of society, shows, as respects the labouring classes there, that there is yet a greater amount of insanitary conditions to be removed, especially affecting their children, than I had anticipated. It appears from this return that whilst of the children of the gentry and professional persons, 6.41 per cent. die within their first year—and 9.26 within their fifth year of life;—of the wage classes, 22.63 die within their first year of life, and 39.03 within their fifth year. This excessive death-rate of the children of the wage classes, I submit demands a close examination of the causes. It appears from the returns that a greater proportion of the excess arises from zymotic and other diseases which we know to be removable. Such excess, I can state, does not affect wage classes in rural districts, where the proportion of deaths in the infantile stages is not greater than those of children of the best-conditioned classes of Croydon.

On the visit we made the other day to the Orphan Institution—the district school—near here at Anerley—we saw Sanitary conditions, by which the great mass of children's diseases that produce the high death-rates amongst the children of the wage classes in Croydon are now almost entirely prevented. If such an amount of infantile mortality prevailed amongst the pauper children in that Institution, as the returns show to be yet prevalent in Croydon amongst the children of the industrious and self-supporting wage classes, it would be deemed intolerable, and would properly be made the subject of a public inquiry.

Now, without imputing any blame to anyone, except an ignorance of Sanitary Science, and as a consequence, want of skill in its application; do you not consider that a special voluntary inquiry into the causes of these excessive infantile death-rates may be commended to the people of Croydon, in which I am sure we should be glad to render them any aid in our power?

I must, however, guard myself against any supposition that I consider that such means of prevention as we saw in operation at Anerley; such sleeping space, such bedding for the children, each in a separate bed,—with such air-cleanliness, such skin- and clothes-cleanliness, such wall-cleanliness, such ventilation, such physical exercises, such tepid baths,—could be immediately obtained and practically applied, without a great mind and a mighty effort, for the protection of the children of the wage classes at Croydon. Nevertheless, with the light of existing experiences, it may be shown that a great deal more may be accomplished on principle in the way of prevention than will readily be recognized. For the prevention of disease, as for the prevention of fire, immediate action must be taken upon the first spark. By organized inspections, and action upon the earliest premonitory symptoms, we, at the first General Board of Health, reduced death-rates from cholera by three-fourths.

I need not describe the conditions of large proportions of the mothers of the children of the working classes—of how much those mothers have to do without help, in order to cook their



husband's meals as well as those of their children; how often they have to leave their rooms for the whole day—how many of them have to go out to work during the day without having any one competent to "mind baby" and the children. Do people know the fact, as stated by Dr. Farr in his statistics, that in this country of ours some fifteen hundred children are annually burned alive, chiefly from accidents due to their clothes catching fire when left alone during the mothers' absences? You best know and can best describe the common ignorance of poor mothers of the means of preventing the generation and the spread of fatal disease amongst their children. Such conditions are now mitigated by the institution of well-appointed *crèches*, the use of which is extending at Paris and in other cities on the Continent, and also in America. The poor mother has no nurse, and no governess to help her in the care of her children, and no doctor to visit them, as the rich mother has. But the institution of the *crèche* gives to the poor mother, for a time, a sufficient share of the services of both. When she is obliged to go out for work, or to attend to other matters at home, she places her infant for the time under the care of a nurse, at a convenient and well-appointed place, the *crèche*, and returns at a proper time to give it suck. For those children who are weaned, food is provided, better than it is usually done at the cottage, and at no greater cost. The nurse of the *crèche* takes care that the infants are brought and kept in a constant state of cleanliness. A doctor visits the *crèche* every day and examines each of the children. If he detects any incipient symptoms of disease, he orders the immediate separation of the child, and goes to the home and gives instructions as to the treatment of the case; and if it be a case of infectious disease, gives instructions for the prevention of the spread of the infection. If he finds about the house any local cause, for the generation or the aggravation of disease, he takes order for the removal of that cause. This may be made a great factor of prevention.

The results of the well working of these institutions are such as you would confidently expect them to be. We were assured at the last International Congress on Hygiene, held at Brussels, that they had effected a reduction of one-half—one-half, be it remembered!—of the previous infantile death-rates. At first, the unguarded agglomeration of infants in their dirty conditions, as in all our common schools, caused the *crèches* to be unsuccessful; but now they, the children, are required to be carefully and agreeably cleansed with tepid water. These institutions are spreading in America; and a visitor of one in New York gives a description of the outdoor children, as presenting the same agreeable appearance as was presented to us by the indoor infants on our visit to the Institution at Anerley. "There," he says, "we found engaged with toys a number of tiny trotters, all clean as new pins, and all fresh from the bath. Those who send their children to the *crèche* are working women, who pay, and without the help of this nursery would have to pay, for having the child looked after at home, or else lose their daily employment. Besides this, there are few

homes, especially in a city, where little children could have the benefit of such good air, such cleanliness and good food as in this admirably managed establishment. What happiness and ease of mind for the working mother to feel that her infant is safe and not left to the tender mercies of the dram-drinking virago, whose control over the child left to her care lies in threats and starvation!"

The next means for the prevention of infantile sickness and mortality is a well-appointed infant-school, under similar conditions as to cleanliness, and with the service of a regular examination by a responsible medical officer of health on alternate days, and with the exercise of the power and duty of similar action on the detection of symptoms of incipient disease. Next after that comes the primary school on the half-time principle, with a visit and examination of every child by a competent medical officer at least once every week, and with immediate separation and prompt preventive action upon the earliest symptoms of disease. In the infant-school and the so-called primary school (the real primary school, the most "formative" upon a proper national system being, as I have elsewhere shown, the infant-school) there should be provided such physical training by exercises of all sorts, as is seen at Anerley, which would serve as a college for the guidance of the preventive training of a whole district. Such exercises, you well know, and as Dr. Roth has long shown, serve to correct and eradicate congenital defects and hereditary lameness, as well as to fortify the body against the common passing causes of disease.

Such physical exercises, it may be observed, serve as training in morality, in action, in patience, in self-restraint, and in prompt and immediate obedience to command. Let not the working-man imagine that the military drill, which is one of them, serves only to fit his son to be a soldier. It trains his son to be a better and more valuable workman, and to be worth more wages than the untrained stupid, slow, and clumsy common lout. It exercises his sons in collective action in lifting together, in pulling together for the increase of force, so important in these days, in prompt and exact results. Such training as that at Anerley,—such as might be and ought to be given in all public elementary education,—imparts to two the efficiency and value of three for productive industry. It teaches the child in walking to move more quickly from point to point. He will by treading more evenly, as experience shows, save a pair of boots a year as long as he lives. In enforcing personal cleanliness, be it noted, we are enforcing an important economy of food. It is found that pigs that are washed put on a fifth more flesh with the same amount of food consumed than do pigs that are unwashed; and so it is with human beings. Five children that are washed will do as well on the same amount of food as that which is required by four that are unwashed. The medical officer's visits to the homes may have the important effect of correcting defective house work; and, on the whole, though we may not obtain such great results as are attained at Anerley, a considerable advance will be made towards the reduction of infantile mortality by the arrangements I have specified.

But, say the local rate expenders, will not all this incur great expense? No, we reply, great economy! As I stated on Saturday, the cost of teaching and training at Anerley is little more than a pound per head per annum, for physical training as well as book teaching on the half-time principle; or less than one-half the cost of the inferior mental training given in the common small long-time schools. The children taught in the good infant schools at Anerley, complete their instruction in the three R's in five years, as against seven in the long-time schools; that is to say, the cost of well organized half-time is £1 per head for five years, as against more than £2 per head for seven years. In other words, the cost of teaching and training well, physically and mentally, three children on the one system, may be set against the cost of teaching one child comparatively ill on the other.

I must repeat that the common long-time schools, in occupying the children with the three R's up to the thirteenth year, practically exclude from secondary education even those of middle-class parents who cannot afford to keep their children at school beyond that period; while such an organization as that at Anerley, which, with the aid of good infant-school teaching, completes the instruction in the three R's two years earlier, gives the time needed for secondary education, and with that time gives more of physical and industrial training to fortify the constitution in health and strength for work through life. There is moreover the gain in the domestic budget by combining earning with learning on the half-time principle.

All this Sanitary improvement, conditioning mental and moral improvement, and augmentation of health and strength and productive power, is practicable on the principles of administration of the half-time school you visited. We challenge the existing systems as weakening the body to strengthen the mind, which they comparatively fail to do;—and we claim a foremost position for Sanitary science, in the national training and education of the population.

I have the honour to be,

Dear and honoured President,

Your faithful Servant,

EDWIN CHADWICK.

To DR. B. RICHARDSON, *President of Congress.*

At the conclusion, the PRESIDENT called for a vote of thanks to the gentlemen who had addressed the meeting, and this was awarded by acclamation. A vote of thanks was then, on the motion of SIR ANTONIO BRADY, unanimously accorded to the PRESIDENT for his kindness in presiding, after which the meeting separated.

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