CONGRESS AT CARDIFF.

POPULAR LECTURE

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(FELLOW.)

THE PREVENTION OF CONSUMPTION.

THE essential feature of a Popular Lecture as distinguished from a scientific or technical paper consists in the fact that it is addressed not to experts or specialists, but to the ordinary work-a-day citizen, with just so much knowledge as can be acquired from the daily papers or the lighter monthly magazines.

Inasmuch as knowledge acquired in this way is apt to be fragmentary or inaccurate, it would seem advisable for any one who undertakes a popular lecture on a scientific subject to begin at the very beginning and build up the edifice of knowledge from its very foundation.

My subject this evening is "The Prevention of Consumption," and I will start by telling you what consumption is. It is the commonest form of tuberculosis of the lungs and it is often called pulmonary phthisis. Tuberculosis is the name common to a great many diseases which affect every organ of the body, and differ widely from each other in the changes they bring about and the symptoms which they cause, but all of which agree in this one point: the presence of small masses or out-growths of newly formed tissue called tubercles. The word tubercle originally meant a little lump or mass of anything, but in medical language the term is now restricted to mean a local overgrowth of cells caused by the presence of a minute vegetable parasite called a bacillus. Our bodies are built up of cells just as a house is of bricks, and when the disease germs affect a lodgment within us, our cells rise up in revolt, and endeavour to surround the intruders and to enclose them as though with a cordon of sentinels. The result is the formation of a little mass called a tubercle, which is the visible outcome of the reaction of the tissues of the indivi-

dual attacked against the invading parasite. I can best compare a tubercle to the galls produced on plants as the result of the bite of a fly and the presence of its egg. You are all familiar with such galls in the shape of the so-called oak-apple and the red "spangles" that occur on rose trees.

In a tubercle the cells are not merely increased in number. Their appearance is changed, and some few of them grow so large as to look quite gigantic compared with the others. These big cells, when seen with the microscope, are a good indication of the disease which is present. Tubercles differ very much in size: some need a microscope to see them, others grow to the size of a walnut or even of an egg. To say that the average size of a tubercle is somewhere that of about the size of a pin's head is not far from the truth. Their colour is grey or yellowish.

It will occur to many of you to ask what harm are tubercles? Why does their presence constitute such a great disease? It is because they are so many poison centres, whence a destructive influence streams forth, causing the cells to die and change into a sort of yellowish cheesy matter, which is of no use for anything and may harden into a chalky mass, or, more commonly, soften down into pus or liquid matter. In this way our vital organs may become riddled with holes and fatal disease may ensue.

No organ of the body is completely immune against the outbreak of tubercles, but some parts are oftener attacked than others. According to its distribution in the body, tuberculosis assumes certain forms which I will now mention.

Firstly, there is the pulmonary form, when the lungs are attacked. This is the commonest place for the disease to occur, and pulmonary consumption therefore claims more victims than any other form of tuberculosis. The germ gets into the lung with the air that is breathed, though some now hold that it is swallowed and gets to the lungs in other ways.

Secondly, there is tuberculosis of the glands in the abdomen. This occurs mainly in babies that have been fed with cow's milk containing the bacillus. Doctors call this form *Tabes mesenterica*. It is not so common with us in Ireland as it is in Great Britain, for there is not so much factory work for our young married women and they have more time to suckle their babies.

In the third place there is tuberculosis of the glands, bones, and joints. The glands most often affected are those in the side of the neck. They swell up, forming unsightly lumps, which soften down into abscesses that discharge through the skin, and when they get well, leave disfiguring scars. The germ gains access to the glands by way of the nose, mouth

(including the sockets of decayed teeth), and very often by the tonsils. The evil is still worse when the bacillus gets into the bones, usually near the joints, as it does unfortunately very often. The way this comes about is interesting. Tiny children just learning to walk, and still in what I may call the crawling state of development, often knock their knees, their shins, or their elbows against the floor or some other hard object, and so injure the small, thin-walled blood vessels in the tender growing ends of their bones. Tubercle bacilli, which are often present in the blood in small numbers and can do no harm so long as they are shut up within the blood-vessels, are able to escape at these damaged spots and, settling down in the tissues, gradually increase and multiply; and so, after the lapse, mayhap, of years, produce a destructive focus of disease. The large joints of the limbs, the hip, knee, ankle, shoulder, and elbow, as well as the bones of the hands and feet, are commonly attacked. The back-bone is often affected, giving rise to that terrible deformity, spinal curvature. The surgical wards of our hospitals are crowded with such cases in young people of both sexes, and the amount of pain, disfigurement, and loss of working power so caused is something terrible to contemplate.

Fourthly, tuberculosis may occur in the membranes of the brain, causing the disease called by doctors *tubercular meningitis*. Children under twelve are most often attacked, and the disease is invariably fatal. The germs are carried in the blood and deposited all over the body, but the brain, being the most sensitive part, resents the attack more keenly than the other organs.

Fifthly and lastly there is *lupus*, the name given to a form of tuberculosis which occurs in the skin. The part oftenest affected is the face, and young women are the most usual victims. Lupus eats away the features, destroying the nose, lips, and eyelids, and thus produces the most hideous deformity. Hence its name, which is Latin for a wolf.

Having thus set forth the chief forms that tuberculosis may assume, I will now tell you something about the germ or bacillus which does all this harm. It is a tiny living creature shaped like a little stick, unable to move, colourless, and about one six-thousandth of an inch in length. You will get a better idea of how small it is when I tell you that about one hundred millions of these germs could lie in a single layer on the area of a penny stamp. Small as it is we can get it to grow outside the body on specially prepared jelly or on slices of potato soaked in dilute glycerine. It grows slowly, but ultimately forms crusts and scales of yellowish hue which are quite visible to the unaided eye, and are made up of incredible swarms of bacilli. The smallest trace of such a culture injected into a

susceptible animal gives it tuberculosis. The bacillus belongs to a group of lowly plants, the proper function of which in Nature is to break down dead organic matter, to cause putrefaction and decay. A few of them have acquired the bad habit of thriving in the living bodies of men and animals and so causing disease. The tubercle bacillus is one of the worst of this group of parasitic germs.

The question next arises, where does this germ come from; from what source do we obtain it? It will not grow unless at blood heat, and therefore in this country it only finds in the bodies of men and the higher animals the warmth it requires. Its only source, therefore, is the body of men and animals affected with the disease. It is found in all the discharges which reach the surface of the body from diseased internal parts. For practical purposes, however, we need only deal here with the two main sources of infection, and these are:

- (1) Sputum or phlegm expectorated by consumptives, and
- (2) The milk of tubercular cows.

Could we but cut off or stop up these two sources of disease germs, we should soon be able to strike tuberculosis off our bills of mortality, instead of allowing it, as we are doing at present, to kill its hundreds of thousands. In a small country like Ireland, with less than five millions of population, tuberculosis killed last year nearly twelve thousand people, most of whom died from pulmonary consumption. In Dublin last year just a thousand people died of consumption, and about three hundred more from other forms of tuberculosis. Surely this is too high a toll to pay, when, if we were earnest about the matter, we could greatly diminish our losses. And what is worse for us who live in Ireland, we keep on paying toll at this excessive rate, whilst you in Great Britain are gradually, but steadily, escaping from the grip of the destroyer. Forty years ago your death-rate from tuberculosis was somewhere about 3·2, and now it is down to 1·8. Ours is now 2·7, practically the same as it was then. The explanation may be put in a nut-shell. You have been thriving and we have not. Another unpleasant feature of the situation, as it presents itself to us in Ireland, is this: the people who are most severely stricken and contribute the largest proportionate number of deaths in Ireland, are those in the prime of life, between 25 and 35, whilst with you it is amongst children under 5, whose lives are of little economic value, that the heaviest mortality from tuberculosis occurs. That is why we, on our side of the channel, are giving so much attention to this matter. That is why, under the guidance of Lady Aberdeen, our women have organised themselves into a National Health Association, one of the principal objects

of which is to induce the people to adopt the necessary preventive measures and provide them so far as possible with the means of doing so. That is why we have been at the pains of organising two separate and distinct tuberculosis exhibitions; collections of objects illustrating the nature and prevalence of tuberculosis and how best it may be combated. One of these exhibitions has been touring the North of Ireland and the other the South. They have visited over 60 centres of population, and in connection with these visits, over 500 popular lectures, illustrated by lantern slides, have been given to audiences that have been computed to number over 400,000 people, whilst fully 800,000 have inspected the exhibitions, being about a sixth of our total population. In addition to these regular lectures, innumerable homely talks, demonstrations, and other less formal methods of instruction have been resorted to and largely availed of. For this reason also we have appealed to Parliament, and caused a Bill to be promoted which is specially directed to the prevention of consumption, and goes far beyond any measure of the sort that has hitherto been introduced. It is therefore in accordance with the fitness of things, that one of the workers in this great National campaign of ours against pain, sickness, and death, should come here and tell you what we are doing and how we are doing it.

The prevention of a disease like tuberculosis, which has no definite incubation period, no definite course, no definite period of infectivity, and the sufferers from which may keep on for years earning their livelihood whilst carrying about the deadly disease germs and spreading them around, constitutes a very difficult problem. It is a problem totally different from that which confronts us in the case of the acute infectious diseases. A case of smallpox or scarlatina can be readily traced to some previous source of infection. The patient is so ill that he cannot leave his bed; the whole thing is over one way or the other after a few weeks. The principles or springs of action (recognition, isolation, disinfection) are of course the same in the long run. But their application to tuberculosis is infinitely more difficult than is the case with any other infectious disease. It is not right, therefore, to talk lightly, as many people do, of doing away with consumption, or preventing consumption. The evil has sprung up gradually and has entwined itself in the very vitals of our population. To uproot so great a noxious growth, and one so closely interwoven in the fabric of our national life, is a work that must take many years of steady unwearying labour to accomplish. That we shall eventually accomplish it I have every confidence.

But how are we to go about it? In answering this all-important

question I would make, first of all, a little comparison which I recommend you to consider. Suppose we had to deal with the problem of a large mass of inflammable or combustible material, which was in danger of being set on fire or exploded by flying sparks, what should we do? Two things, I should say: first, prevent access of sparks, and secondly, diminish the amount of the combustible or render it non-explosive. Now, an outbreak of tuberculosis may be compared to the explosion of a powder magazine; the bacillus is the match which ignites it. The tender years, hereditary predisposition, or enfeebled constitution of the patient is the powder. The problem of preventing consumption resolves itself, therefore, into two parts: the first is to prevent the accumulation of combustible material, that is, of persons susceptible of taking the disease; the second is to cut off the supply of matches, in other words, of bacilli. The first part of the problem consists in the main of providing better conditions of life for the working class, especially for the poorer workers whose earnings are small and precarious. The chief practical step seems to me to be the provision of better housing accommodation, so as to avoid dirt, dampness, foul air, and overcrowding, especially at night. I am inclined to look upon better housing as the key of the whole situation in the case of adults; for, apart from the enfeeblement or diminution of resisting power begotten of bad housing, adults do not readily contract tuberculosis. Indeed, the resistance of many men and women is surprising, when we consider the numberless sources of infection to which they are liable. Dustmen, scavengers, and domestic servants, who have to dust out rooms where consumptives have been expectorating, are cases in point. With young persons the reverse is the case. No matter how good the condition under which they live, they can hardly escape infection if the bacillus obtains access to them. To return to our simile, children are a permanent mass of combustible matter which imperatively needs guarding against access of spark or firebrand.

In order to cut off the supply of bacilli we must stop the fountain heads from which they spring, and these, as already stated, are mainly two in number: the sputum of consumptives and the milk of tuberculous cows. The number of germs which an ordinary consumptive may cough up in the day may safely be put down at several millions.

In a coloured drawing of the sputum of such a case, when stained and prepared for the microscope, the germs, being devoid of colour, are made visible by a process of staining; the bacilli possess the property of holding on very tightly to certain stains, and the consequence is that they can be made to look red, whilst all other bacilli, and the cells of which the

sputum is mainly composed, can be made to appear of a contrast colour. Owing to this property we can readily pick out a single tubercle bacillus out of a swarm of other kinds. You may notice that many of the bacilli are lying within the cells. This is a good sign, because it shows that the cells are able to take them up and devour them. If all could thus be devoured, the patient would get well. When we send a consumptive patient to a sanatorium we hope to teach his cells how to devour the germs of tuberculosis; to give them back the power which they have temporarily lost, of acting as the policemen of the body.

The way in which the germs contained in sputum bring about infection is usually stated to be as follows:—The matter expectorated gradually dries up and mingles with the dust. When this is set afloat in the air by such operations as sweeping, beating carpets, tramping on floors, and the like, the bacilli (which are not injured by being dried up) are also suspended in the air and are breathed in. They adhere to the mucous membrane of some part of the air passages, and, like other foreign particles, such as soot, get carried through the mucous membrane, probably by wandering white blood-cells. It is beyond the scope of this lecture to discuss the details of the process, or the numerous experimental and other difficulties which almost any one of the current theories will, on close examination, be found to present. Suffice it to say that in addition to the dust inhalation theory, most of us have now come to believe in the droplet theory, according to which minute droplets of liquid phlegm are expelled from the mouth as fine spray in the act of coughing, sneezing, or loud talking. So small are these droplets that they remain for several minutes afloat in the air. They are wafted about by air currents, and are liable to be breathed in with their contained bacilli. There is experimental proof that this can really occur.

Finally, an attempt has been made and supported by carefully planned experimental evidence to show that consumption is not due to the breathing in of the germs, but to their being *swallowed*. This is a very interesting and important question, but, in view of all that still remains to be said, I must refrain from discussing it.

Whatever be the exact mode of infection, the bacilli are mainly derived from matter expectorated by consumptives, and this must therefore be collected and disinfected or destroyed. Two classes of consumptives have to be dealt with. There are the advanced cases confined to bed or to the house, and the milder cases: people who are able to get about and attend to business. It is easy to deal with the advanced cases. They should be given a suitable spittoon, and not allowed to expectorate

anywhere else. In very poor households an old mug answers the purpose. Or, rags or Japanese paper handkerchiefs can be used and burnt afterwards. The contents of spittoons can be poured on to the fire or emptied into sawdust, which can afterwards be burnt, or they can be treated with scalding water. I do not advocate chemical disinfectants for sputum, as the matter is too viscid to allow of their proper penetration. In the absence of a fire, however, we must fall back on solutions of carbolic acid (1 in 20), lysol (1 in 50), cyllin, izal, or the like. In view of the danger from droplets, consumptives should be instructed to carefully guard the mouth with a pocket-handkerchief in the act of coughing. They should on no account sleep in the same bed with anyone else, more especially with a child. A child who should sleep with a consumptive would run a fearful risk.

For the second class of consumptives, those who are able to get about, small pocket-sputum flasks, of which several patterns are on the market, are to be recommended. In sanatoria, and places where the patient's condition is known, their use should be imperatively insisted on; but in the case of persons attending to their business in public, there is this objection to the use of the pocket sputum flask: it reveals the patient's secret, and, in view of the perfectly needless scare which at present exists in many half-instructed minds, discovery might subject such a patient to the risk of losing his employment. It is not right to require a person to subject himself to this risk; and I personally see no objection to the use of an ordinary pocket handkerchief, always provided that it is properly dealt with afterwards, not allowed to get dry in the pocket, and carefully scalded or boiled before being put with the rest of the washing. There are many minor details, such as the disinfecting of table utensils, into which I have not time to enter. Expectoration in public buildings or conveyances, otherwise than into receptacles provided for the purpose, should be made a punishable offence by every sanitary authority, and the by-law should not be allowed to become a dead letter. Even warning notices are useful. I have observed a great diminution of the objectionable practice since our Irish Branch of the National Association for the Prevention of Consumption put up such notices in tramcars and railway carriages. Much might also be done for the next generation by diligently inculcating on school children the importance of refraining from unguarded and needless expectoration. I should like to see reading lessons on this subject in elementary school books.

In cleaning houses, every care should be taken not to raise a dust. Floors and carpets should be strewn with moistened sawdust or tea-leaves

before being swept. The beating of carpets should be restricted by by-law to certain times, places, and persons.

Coming now to the danger from milk, we find Koch, the discoverer of the tubercle bacillus, expressing the deliberate opinion that both the disease and the disease germs, as they occur in the cow, are different from those that occur in man, and that bovine bacilli are harmless to human beings. This opinion, expressed in the year 1901, has not been borne out by subsequent investigation, and it would now appear that the bovine bacillus has an all-round greater degree of virulence than the human one. It does not, however, seem to produce pulmonary consumption in man to any great extent, but to settle down about the alimentary canal or in the glands, bones, or joints.

A great many milch cows suffer from tuberculosis, probably at least one of every four or five. We have a very delicate way of detecting it in the tuberculin test, but it would be a great mistake to suppose that every cow that reacts to tuberculin yields bacilli in her milk. The vast majority of such cows are but slightly affected, and their only danger would appear to be that they may become more gravely so, later on. The disease, when it occurs in the udder, causes the cow to produce milk which is swarming with bacilli and highly dangerous, more especially for children; but such cases are fortunately uncommon. Still they do occur here and there, and the mixed milk from a dairy, where there is such a cow, may be highly dangerous. Now, in warding off this danger one may begin at home, or one may begin at the cow. The way to begin at home is to boil or scald all milk intended for the use of children. By scalding, I mean the process often called pasteurising; that is, heating to such a temperature, short of the boiling point, as will kill any tubercle bacilli that may be present. This can be done by heating to 190 degrees F. for a couple of minutes. Lower temperatures may be used, but they must be kept up longer. Roughly speaking, if the vessel containing the milk be placed in a saucepan of water and the water be kept boiling for a few minutes, the object is achieved. Special vessels and sterilisers can now be bought very cheaply. Young children continuously fed on heated milk occasionally fail to thrive. A teaspoonful of the juice of some fresh fruit, such as the orange or grape, if given every day, will act as an excellent corrective.

By beginning at the cow, I mean action on the part of the sanitary authority, to insure that no milk containing the germs of tuberculosis reaches the consumer. This involves taking power to compulsorily enter and inspect all dairies and cowsheds, to make careful periodical examination

of all dairy cows, and to compulsorily acquire and slaughter all animals reasonably suspected of yielding tuberculous milk. The right of inspection, etc., must extend outside the district to all places whence milk is sent in, and there must be power to take and subject to bacteriological examination samples of the milk coming in from outside places. It would be very desirable if the managing committees of large institutions, such as workhouses, hospitals, and the like, would only give contracts for the supply of milk to dairymen producing a certificate that their entire stock had passed the tuberculin test.

The institutions needed in the campaign against consumption, are three: first, the hospital; secondly, the sanatorium; thirdly, the dispensary.

Hospital accommodation is urgently needed for advanced cases in poor circumstances. Their sputum is infectious, and their continued presence in the overcrowded and ill-ventilated dwelling is a source of great danger to other members of the family, and above all to the children. The ordinary hospital will not usually admit these last-stage cases because they are very chronic and the prospect of curing them is almost hopeless. Nor would it do to have a special consumptive hospital for them. The contrast with the sanatorium, which is for early and curable cases, would be too marked. The hospital for advanced cases would soon become labelled in the popular mind with the device, "abandon hope all ye who enter here." Many incurable consumptives are unable to realise the gravity of their disease, and even were they willing their relatives in many cases would dissuade them from crossing the fatal threshold. Inasmuch as the necessity for removal only presents itself in the case of the poor, it would seem reasonable to provide special accommodation for them in the workhouse infirmary, where they should be as far as possible isolated from the other inmates. All over Ireland we are striving to obtain this accommodation in the district hospitals. We encounter the difficulty that many of the poor strongly object to become paupers, and for this reason it is advisable to relax the regulations as to admission, departure, access of friends, etc., in the case of advanced consumptives who have presented themselves, not so much on the score of poverty, as rather in order to rid their homes of a source of danger. It is wonderful to see the improvement shown by many of those advanced cases after a few weeks in a comfortable, airy ward, with generous feeding and skilful nursing.

The sanatorium is the place where the attempt is made to cure the cases that are regarded as curable. This we hope to accomplish, not by drugs or complicated remedies, but by employing the agencies that Nature has left ready to our hand, and these are three, fresh air, plenty

of nourishing food, and rest of body and mind. That these will really bring about the healing of the damaged lung I can vouch from personal experience. The wealthier and leisured classes can always procure this treatment for themselves at the many well-equipped private sanatoria which have now become so numerous in these countries and abroad. But the placing of sanatorial treatment gratuitously or at excessively cheap rates within the reach of the working-class is quite another matter. In this Germany has given us a lead. There they have an elaborate system of workmen's insurance, under which every employer and every employee has to contribute a certain fraction of the weekly wage paid by the one and received by the other. The contribution is actually made by purchasing a stamp of the required value and affixing it to a card, which must be produced on request of the Government Inspector.

The vast sums, amounting to many millions sterling, that have been so brought together are administered by Regional committees for the benefit of the contributors, to be used in any emergency, such as accidents or sickness which may deprive them of their wage-earning power. When a worker is stricken down with an illness which does not tend to get well, but threatens to deprive him permanently of his working power, he ceases to receive sick-pay and comes on to what is called invalid pay, and this he is entitled to receive week after week as long as he lives. Now, as such cases are very expensive (people with pensions are said to live long), the administrative committees of the Regional Insurance Societies make every effort to keep workers out of the grip of consumption, which is by far the commonest cause of permanent loss of working power. Accordingly they have constructed sanatoria on a magnificent scale for their working-class members. Treatment is free; families receive assistance during the absence of the breadwinner; and the latest resources of medical science, such as tuberculin injections and elaborate systems of bathing are employed. All this costs money; but the insurance committees find that it pays them better to restore a workman's wage-earning power, or to keep him from losing it, rather than to let him become a chronic invalid and a permanent burden on their funds. The results are looked at, not so much from the purely medical, as from the economic point of view. Is the patient able to work? That is what they ask; and for how long after leaving the sanatorium has he been able to keep on working and earning his full rate of wages? Five years of restored working power is regarded as an economic cure. Having personally inspected some of these institutions, I am of opinion that their splendid results are ample justification for the vast sums expended upon them. I heartily wish we had equivalent institutions in this country.

There are, however, two conditions which are absolutely essential to success in sanatorial work. The first is that the cases must be in the very earliest stage, before the patients are willing, as a rule, to admit that they are ill. The diagnosis should be made, if possible, before the bacilli have appeared in the sputum. The recognition of the malady at such an early stage is a technical matter which cannot be entered on here, but one which I consider to be feasible with care. The second condition for success is, that after three or four months' course of treatment the patient must not be allowed to go back to his old bad methods of living. A visiting committee should see to the cleaning up and disinfection of the house during his absence, and to the removal of the family, if necessary, to more suitable quarters, and finally should endeavour to procure for the convalescent patient some outdoor occupation suitable to his strength and habits.

Lastly comes the third sort of institution for the combatting of tuberculosis, the special dispensary. This is worked by a skilled doctor, assisted by a staff of nurses. A systematic effort is made to induce people who suffer from protracted colds and progressive wasting, or weakness, to present themselves at the dispensary for examination and advice. The applicant is carefully examined, his physical condition noted, and thorough inquiry made into his circumstances and mode of life. In the German type of dispensary the co-operation of the medical profession is secured by the avoidance of all interference with the patient's relations with his own doctor. No fee is taken and no treatment is given, but the patient is referred back to his own medical man or to a hospital. Applicants are visited at their own home by specially trained nurses, who assist them with advice, see that they keep their rooms clean, and their windows open, and supply them, where there is urgent need, with additional beds, food, and sometimes with money also to meet their rent, or to buy some tools or stock-in-trade with which money may be earned. A leading feature is, that all applicants are required, when presenting themselves a second time at the dispensary, to bring all the other members of the household for examination. The result is the discovery of many early cases, which are thus put on the road that leads to recovery. From this summary description, only a very imperfect idea can be gained of the immense value of a rationally conducted tuberculosis dispensary (or consultation office as I think it might better be called) in a thickly populated urban district.

Notification has been provided for in the Bill that has been introduced for the prevention of tuberculosis in Ireland. In view of the alarm and misconception which the provision seems to occasion, it would be well to make it clear that it is not intended to make other than infective forms of the disease notifiable.

As regards medical inspection of school children, you have had it definitely introduced on your side of the water this year, and I trust that we, on our side, will follow, after a judicious interval to enable us to observe your results, and to avoid any flaws that may be found in your system. In Germany, sickly children tending to decline are selected by the medical inspectors from the ordinary elementary schools, and drafted out during the summer months to special open-air schools, the feature of which is that lessons are learnt and teaching is done altogether in the open air, or in open shelters when the weather is wet. The situation is in some wooded spot in the outskirts of the town, readily accessible by public conveyance. The children arrive at seven or eight in the morning, and leave at the same hour in the evening. They are fed at the expense of the authorities, and their physical condition is carefully attended to by a competent matron or nurse, who pays special attention to their bodily cleanliness and sees that they are bathed or douched, facilities for which are provided at the school. Each lesson lasts only twenty minutes, and the progress made by the pupils is found to be equal to that obtained in double the time at ordinary indoor schools. A doctor visits every day.

The subject of the cause and prevention of consumption is a vast one, and I have only been able to touch its very fringe. Tuberculosis is Nature's weapon, with which she punishes modes of living that conflict with her rules. The best way to prevent it is to bring our mode of living, as a nation, into greater conformity with nature's precepts. I will conclude by asking you all to do one thing, which is not very difficult, and that is, to let fresh air and sunshine enter freely into your houses. Keep your windows open; don't block out heaven's sunlight with unnecessary blinds or curtains, and you will have struck a blow to save yourselves and your families from *the great White Plague*, consumption.