

**Sins against the laws of health : illustrated by the vital statistics of the Crosshill District : being a lecture delivered on behalf of the library of the Crosshill Young Men's Christian Association, 29th April, 1880 / by Eben. Duncan.**

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# SINS AGAINST THE LAWS OF HEALTH,

*Multa ex parvo — Et nihilo nihil, sed ex parvo multa*

ILLUSTRATED BY

THE VITAL STATISTICS OF THE CROSSHILL DISTRICT:

BEING A LECTURE DELIVERED ON BEHALF OF THE  
LIBRARY OF THE CROSSHILL YOUNG MEN'S  
CHRISTIAN ASSOCIATION, 29<sup>TH</sup> APRIL, 1880,

BY

EBEN. DUNCAN, M.D., C.M.,

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TO THE DEAF AND DUMB INSTITUTION, GLASGOW; LATE PRESIDENT  
OF THE GLASGOW SOUTHERN MEDICAL SOCIETY; ETC.

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GLASGOW:

PORTEOUS BROTHERS, 45 WEST NILE STREET.

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## SINS AGAINST THE LAWS OF HEALTH.

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MR. CHAIRMAN, LADIES AND GENTLEMEN—

In addressing you on behalf of the Young Men's Christian Association of Crosshill—an Association which has for its primary object the religious and moral well-being of young men, irrespective of sectarian distinctions, I have chosen a subject which has an important bearing on the religious and moral well-being, not only of young men, but of the whole community. In my daily avocation as a physician, I am constantly meeting with forms of wrong-doing which lead to serious mental and moral consequences, and which, as breaches of the law of God, are as much entitled to the designation of sins as lying, or theft, or murder, but yet are not generally recognised by religious people as sins at all. The Sabbath school teacher never speaks of them—the purely religious periodical never treats of them—and, although I have listened in many churches, I don't remember ever to have heard the particular sins of which I am to speak to-night spoken of by the minister of religion in the pulpit.

Religion was not always so divorced from sanitary law. More than three thousand years ago a divinely-inspired law-giver instituted a ministry of health among the Jewish priests, and laid down with the most extreme minuteness and particularity laws for the preservation of the bodily health of the Jewish nation. If you read over the book of Leviticus you will find a multitude of laws for the bodily purification of the Israelites, for the supervision of their food supply, and for their preservation from the spread of contagious disease. Not the one disease of leprosy, as most people think, for the different characters of the spots and blains spoken of in Leviticus point to a number of unnamed contagious diseases which were probably the ancestors of such contagious maladies as typhus fever, so prevalent in Asia Minor at the present day. The Jewish priests were divinely directed to stamp out these diseases by sanitary measures of the most stringent severity, comprising expulsion of the infected individual from the camp, destruction by fire of the infected clothing, and, in some cases, destruction also of the infected dwellings. As if still further to emphasize the regard He had for bodily health and beauty, the divine Law-giver admitted those only who were free from personal imperfection to act as priests in His temple, and only animals without spot or blemish to be laid upon His altar. The ancient Jew, like the ancient Greek, considered human beauty and per-

fection of body as analogous to, and symbolic of, the beauty and perfection of the Deity; and in ancient times in Greece, as in Judea, the ministers of religion were also the ministers of bodily health to the people.

In these divine sanitary laws we have, looking at the matter from the physical side, one great reason of the supremacy which the Jews obtained over the races in Palestine among whom they came as invaders and conquerors, and in these same laws, carried down and acted upon as they are to the present day by the Jewish priests, we have the great cause of the wonderful vitality of this remarkable people—a vitality which, at the present day, is proven in European countries to be greater than that of the populations among whom they dwell—greater in respect of freedom from infectious disease—greater in respect of length of life.

When we come down to later times, we find that for many centuries the leaders of religious thought in Christian Europe seem to have lost sight of and forgotten these divine commands. They began in the early centuries of Christianity to think of, and to speak of, the body as a miserable encumbrance, and to teach that time and attention occupied with material things, beyond what was necessary for the mere maintenance of life, were inconsistent with the higher interests of the spirit. The saints of those dark and ignorant times starved, and scourged, and ill-used in every possible manner, the bodily organism which the Creator had cared for so much, and in the constitution of which He had displayed the highest proofs of His wisdom and beneficence.

Let me give you some striking extracts from the life of Saint Anthony, as related with great admiration by Athanasius, to illustrate the lamentable errors into which these early Christian fathers were led by their mistaken ideas about soul and body as having separate and conflicting interests. He says of Saint Anthony that he ate only once a-day, sometimes only once in two days, often even in four days—his food being bread and salt, his drink nothing but water. He watched so much that he often passed the whole night without sleep. He lay mostly on the bare ground. Sometimes he lived for days together shut up in a tomb. Even when he was going to eat or sleep, he was ashamed when he considered the rational element of his soul, so that often when he was about to eat with other monks, he remembered the spiritual food, and declined, and went away from them, thinking that he should blush if he were seen eating by others. He ate, nevertheless, by himself, on account of the necessities of the body. He told the others that they ought to give all their leisure rather to the soul than to the body, and that they should grant a very little time to the body for mere necessities sake. His garment, which was never changed, was within of hair, without of skin; and, finally, he never washed his body with water, nor ever cleansed his feet. His disciple Hilarion, whose life is related by Saint Jerome, thus speaks of his own

body:—"I will force thee, mine ass, not to kick, and feed thee with straw, not barley; I will wear thee out with hunger and thirst; I will burden thee with heavy loads; I will hunt thee through heat and cold, till thou thinkest more of food than of play. He therefore sustained his fainting spirit with the juice of herbs and a few figs after each three or four days, praying frequently and singing psalms, and digging the ground with a mattock to double the labour of fasting by that of work, till he was so attenuated, and his body so exhausted, that it scarce clung to his bones."

Now, these were the errors of exceptionally noble men, and I do not relate them with any intention of detracting from the veneration which their virtues and the spiritual elevation of their characters inspire, but to point out that, although practised from the purest motives, this starvation of the body, this sleeplessness, this cruel self-torture led (as every physician knows such things do lead at the present day) to great mental derangement. In the constantly recurring accounts which we have in the lives of these men of strange miracles, sincerely believed in by themselves, and of dreadful conflicts with multitudes of demons, who appeared in horrible shapes with wild wailing and roaring voices, we see clearly the visions and fancies of a weakened and diseased brain. This was the kind of life which the religious teachers of the Middle Ages admired. They denied themselves the pure and elevating influences of family relationship and kindly social life; they forgot what the Jews had been taught of the necessity for bodily purity and sanitary law; then, when pestilence after pestilence spread terror and desolation throughout Europe, they opposed every sanitary measure as an impious interference with the will of God, and with what they considered His just chastisement for the sins of the people. It was certainly righteous chastisement for sin—but for what kind of sin? Let me describe to you the habits of the common people and the conditions of their life at the time when the Black Plague and the Sweating Sickness were devastating England. Erasmus, the physician of Cardinal Wolsey, tells us that in these good old times, as they are sometimes called, the streets of the towns and villages were narrow and crooked, and generally covered with clay and rushes, which had been emptied out of the houses, and sometimes remained undisturbed for twenty years, concealing a mass of filth not fit to mention, and exhaling a vapour not wholesome for the human body. The floors of the houses were generally made of loam, and strewed with rushes, usually put on fresh without removing the old, and impregnated by the excretions of men and of dogs. The land was marshy and undrained, giving rise by its damp and malarious exhalations to rheumatism and ague. The streams in the neighbourhood of the towns served the common purpose of sewer and water supply. The people were addicted to intemperance and gluttony, and rarely washed either their persons or

their clothing. They were "a nation of gluttons and drunkards, living in filthy, unventilated houses, in squalid, noisome streets, with their persons steaming in hot and uncleanly clothing." We can easily understand how these conditions formed a fitting soil for the terrible epidemics of the Middle Ages which caused a terror, distress, and desolation, that only those of you who have read Defoe's graphic account of the Great Plague of London can have any conception of.

Gradually, by the labours of a small band of sanitary reformers and philanthropists, and by the spread of education among the people, the conditions of life have been vastly improved, and the most terrible forms of epidemic pestilence have died out for want of a proper soil. They only linger now in the filthy lanes of Asiatic cities. Gradually, we are coming to see more and more clearly that our physical ailments depend upon sins against our bodies, either on the part of ourselves or of our ancestors, and we are further learning more clearly how mind and matter act and re-act upon each other. As truly as mental distress may lead to bodily disease, so bodily distress leads to mental disorder, mental depression, morbid irritability of temper, sometimes even vice and crime—and in our physical nature we are often more severely punished for our sins of ignorance than for our crimes.

Having thus briefly considered some forms of sin against the laws of health, as seen most largely in the past, let us now consider those most common amongst ourselves, individually, and as a community. By an examination of the Death Register of the Parish of Cathcart for the past six years, I have got some very valuable and instructive facts, a few of which I shall now place before you. The Parish of Cathcart, including the Burgh of Crosshill, contains a population, as estimated for the past year, of 10,000 people. The average death rate for last year was the lowest that has ever been known in this Parish, 13·1 per 1000. This "wave of health," as it has been termed, has, during the past year, affected beneficially the whole country. The Registrar-General's returns prove that 1879 has been the healthiest year that this country has ever had, as shown by the lowest death rate. The constant rainfall of 1879 so washed and purified the air as to limit the spread of disease particles to means of conveyance other than the dust of the air, and so contagious diseases were much less prevalent. The commercial depression of the preceding years checked imprudent marriages, and so limited the numbers of weakly, unhealthy children, who contribute so largely to swell the death register. The factories and workshops were less crowded, and the hours of labour shortened, so that our labouring classes had more time to spend in the open air, and, from pecuniary necessity, led more sober and temperate lives. In these various ways, bad times, when that expression means times which lead to frugality and deprivation of unnecessary and injurious luxuries,

and not to absolute starvation, may be looked upon as good times for the health and morals of the people.

You will see upon this table the death rate for the last six years, as compared with the death rate of Glasgow, excluding fractions smaller than one-tenth:—

Annual Death Rate per 1000—

	1874.	1875.	1876.	1877.	1878.	1879.	Average for 6 Years.
Glasgow, - -	31	28·5	25·4	25·1	25·7	23	26·4
Cathcart, - -	17	21·3 *	15	14	17	13·1	16·1

\* Year of the epidemic of Typhoid Fever in Crosshill.

I have also placed in a tabular form the three classes of disease which cause the greatest amount of illness and death in the community:—

Average Annual Death Rate from three great classes of disease in 10,000 of the population of Glasgow, as compared with 10,000 people residing in Cathcart.

	GLASGOW.	CATHCART.
1. Tubercular Diseases, - - - -	56	40·8
2. Inflammations of the Lungs, Pneumonia, } Bronchitis, &c., - - - - }	65·5	22·4
3. Zymotic Diseases, - - - -	55	22·8
Other causes, - - - -	88	74·4

NOTE.—I have not included 1879, because when I wrote the above the Registrar-General had not published his returns for 1879.

As far as the time at my disposal permits, I shall give you a brief account of the causes by which these diseases are produced, and the means which may be taken to prevent them. In the first place, I shall speak of contagious diseases, because these diseases are most easily traced to sins of ignorance and carelessness, and they correspond to the contagious diseases of the Israelites, for the prevention of which Moses, by divine command, laid down such stringent laws. Although the class of contagious diseases is third in point of fatality, it is really the class which causes the greatest amount of illness and distress. It is well known that almost every child born in this country suffers sooner or later from measles and hooping-cough, and that the majority of children suffer at some time or other from scarlet fever, and if you consider, further, that



very frequently these diseases, when they do not directly destroy life, leave behind them evil results, which are popularly expressed as the dregs of the disease, which develop in the child the seeds of any constitutional weakness which might otherwise have remained dormant, and so life-long suffering and premature decay.

*infection of molar* The word "zymotic," applied to these diseases means caused by fermentation, so that, when we speak of a zymotic disease, we mean a disease caused by some contagious particle entering the body, which acts like a ferment. I think I can give you a clear idea of a contagious disease by explaining how a ferment acts, and pointing out the striking analogy in almost every particular to the action of a contagious fever.

Here is a vessel containing a solution of honey in water, to which I added yesterday a small particle of yeast. We may look upon the vessel as the body, the sugar and water as the blood, and the cotton wadding as the clothing of a fever patient. For twelve hours after the inoculation with the yeast, no change took place, but at the end of this time the fluid began to ferment, and the heat of the liquid immediately began to increase. This evening I find that a thermometer inserted into it registers two degrees higher than the same instrument does when inserted into this other bottle which contains the same fluid, but without the ferment. From previously recorded experiments, I know that this fever will continue in the liquid for five days, and that the particles of yeast which I introduced into the bottle will increase a thousandfold, so that I might from this bottle inoculate a great many similar solutions. After the fever in the liquid subsides, I cannot reproduce it by again adding yeast. It is rendered incapable of again contracting the yeast fever. Well, if I introduced the poison of any one of these zymotic diseases into the body of a suitable patient, I would find the same series of changes set up. After a period of incubation, as it is called, during which no symptom appears, a rise in temperature takes place in the patient's blood, and by and by the characteristic rash appears on the skin, or the other symptoms of the particular affection result. This fever lasts for a certain well-known length of time, and is associated by an enormous multiplication of the poisonous particles, so that the patient becomes a magazine of infection, and after the disease subsides, that patient, with a few rare exceptions, is protected for life from any fresh outbreak of that disease. It is upon these, and a multitude of other facts which I have no time to speak of in this lecture, that the theory that all zymotic diseases are the result of living germs is founded. Every one of these infectious diseases has a different seed or germ which, when planted in the human body, always breeds true, *i.e.*, scarlet fever always produces scarlet fever, measles always measles, and so on. The degree of infectiousness of the disease depends on the part of the body in which the germ grows, and the manner in which, after its thousandfold multiplication, the resulting seeds or

germs are expelled from the body. When these contagious particles are dry and protected from sunlight, and from the free access of air, they may retain their virulent properties for years. When they are moist and exposed freely to the influences of sun and air, they die very rapidly. By the constant washing of the atmosphere by rain during a wet season, such as last year was, the spread of these diseases is greatly diminished. The effect of the sun's rays in decomposing animal poison was strikingly shown by Dr. Richardson of London. He exposed a bottle containing the poison of a venomous snake, the cobra de capella, to the direct rays of the sun for three days, at the end of which time he found that it had been rendered quite innocuous. Nature's great purifiers and disinfectors are fresh air, rain, and sunshine. *Whiskey, water, & vinegar*

Scarlet fever is the contagious disease which, on the average, destroys the greatest number in this parish. The characteristic symptoms are sore throat, a red rash on the skin, and fever. After the fever subsides and the red eruption disappears, the scarf skin is shed from the body in thousands of particles. This is called desquamation of the skin. These particles of skin carry with them the contagious germs of the disease. The secretions of the throat and nose are also highly contagious. During the whole period of desquamation, which lasts usually from four to five weeks, until every particle of the old skin is shed, the patient is a dangerous person, so that every scarlet fever patient should be isolated for at least six weeks, and then his house, his person, and his clothing thoroughly disinfected. Unfortunately, cases sometimes occur of such a mild character that the patient does not feel ill, having only a slight sore throat. Even if he does consult a physician, it is only when desquamation of the skin takes place, and he has been an active propagator of the disease for some time, that it is recognised as scarlet fever. Thus it is easy to understand how children recovering from mild attacks of the disease are permitted by parents to spread the contagion during their convalescence. They are sent back to school or to play with their companions. They are taken to visit relatives by cab, or omnibus, or rail, and deposit these infectious particles by the way. The children of dairymen and farmers are allowed to run about among the open milk dishes, filling the air of the apartment with hundreds of poisonous particles, which ultimately settle down in the milk; or persons recovering from scarlet fever are allowed to milk the cows, the poisonous particles falling off their hands into the milk; or again, children are sent out with the milk cans while recovering from the disease, and distribute contagion and milk together from door to door. Articles of clothing, after being wrapped about a scarlet fever patient, are carefully laid past in a drawer without disinfection, and have months and years after communicated the disease. A patient, while writing a letter to his friend with hands which are desquamating, encloses in the

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 envelope the poison of his malady; and the circulating library may disseminate with its novels and periodicals the virulent particles lurking in their pages. Of these and other means of conveyance, such as public washing-houses and laundries, I could relate many a sad and melancholy story. But in spite of all that has been written on these matters, and the frequent exposures which have been made of such cases, many people are still as selfish and indifferent to the safety of their neighbours as ever. I experience the greatest possible difficulty in restraining people from going back to business, or going down to lodgings at the sea side, long before it is safe even for themselves. Sometimes, even after representing, as I always consider it my duty to do in the strongest manner, the disease, misery and death which may result from such conduct, I find that people who have suffered from the milder forms of the disease refuse to believe in the danger to others, and go back to business or to social life before they are entitled to do so, either by the golden rule of doing to others as they would be done by, or by the law of this country. Let me read to you the penalties which the law of this country attaches to such criminal and dangerous conduct—

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

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

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

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

“ 5. Any person who lets a house, room, or part of a house, in which there has been infectious disease, without having such house or room, and all articles therein liable to infection, disinfected to the satisfaction of a qualified medical practitioner, is liable to a penalty not exceeding £20. This applies to public-houses, hotels, and lodging-houses.

“ 6. If any person who lets, or shows for hire, any house or part of house, makes any *false statement* as to the fact of there being then in such house, or having within six weeks previously been therein, any person suffering from an infectious disease, such

person *answering falsely* shall be liable to imprisonment, with or without hard labour, or to a penalty not exceeding £20."

The contagious particles of measles are disseminated by a desquamation of the skin, and by the secretions of the throat and nose, just as in scarlet fever, but the particles of skin are very much smaller and finer; on this account they are more numerous, and are carried further by currents of air, and so the contagion of measles is more active than the contagion of scarlet fever. Another circumstance which increases the difficulty of checking the spread of measles is, that it is highly infectious from the very first. For four days, while the symptoms are merely those of a bad cold, and before the characteristic rash which reveals its nature appears, the patient may be attending school and mixing freely with his playfellows, so spreading the malady. All the various ways in which scarlet fever is carried are equally made use of by the contagious particles shed from the skin of the measles patient. It is therefore important that during an epidemic, children suffering from cough and sneezing, etc., should be kept at home. Last year I attended, during one fortnight, nine families attacked by measles. In every case the child in the family who first took the disease was attending a particular school, and the other children in the house who were not attending school became subsequently infected through this child. Although no death occurred, this small epidemic caused a great deal of distress and suffering; one mother took the disease while nursing her children, was seriously ill, and greatly weakened by it. One child had a very long and dangerous illness, through a throat complication which threatened its life, and rendered the operation of opening the windpipe necessary to prevent death by suffocation. This is one example of the misery which may be brought upon a whole community by one child attending school before the period of desquamation is quite past. In measles, four weeks is the recognised period of infectiveness.

Another disease about which there is a terrible amount of carelessness is hooping-cough. Time after time I have expostulated with parents about their criminal negligence in allowing their children suffering from this disease to play as formerly with the other children of the neighbourhood; and I daresay we have all at some time or other been shocked to find ourselves in a railway carriage or a tramway car with a child in the full course of the disease. It is a common mistake to suppose that hooping-cough is a comparatively harmless complaint. The Registrar-General's returns show that it is one of the greatest causes of infantile mortality in this country, and, besides the actual deaths which occur during its continuance, the loss of food caused by the frequent vomiting after the cough, the loss of sleep, and the bronchial complications may lead in delicate children to subsequent tubercular diseases, such as consumption and water in the head.

Like measles, this disease is infectious from the very beginning, while the early symptoms are those of a common cold; and this is an additional reason why children suffering from a cough should be excluded from school. It is important in many cases that the children should get the benefit of the open air, but they should always be under the charge of some one whose duty it should be to prevent them from poisoning the children of others.

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The next disease on my list is diphtheria. When it comes in a malignant form, diphtheria is a very terrible disease, but, fortunately, it is not nearly so infectious as any of the other zymotic of which I have spoken. When the apartment is kept thoroughly ventilated and clean, there is really no risk to those who are not closely in attendance. But the nurse and the physician who are exposed to danger of having the contagious particles from the throat coughed upon them during the administration of remedies, are sometimes infected in this manner. In its milder forms it is a much more common disease than people suppose, and I meet with it very frequently in this parish. I would advise you, in any case of sore throat which occurs in your family, however trivial it appears to be, to examine the interior of the throat, and if you see any white patches you should immediately isolate the patient and send for your doctor. Use rags (which may be burned) instead of pocket handkerchiefs, and take care that no other person uses the spoons or dishes of the patient until they are disinfected.

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I think it prudent not to speak to-night about typhoid fever, because it would occupy us too long, and I have already published the history of the Crosshill epidemic of 1875. Since that time a large number of epidemics of typhoid fever have been placed on record, several of which have occurred in the neighbourhood of Glasgow. I think I am correct when I say that the majority of these epidemics have been traced to milk contaminated by the excreta of typhoid fever patients. Many of you know the exertions I have made in this neighbourhood to get people interested in securing a pure milk supply for this community. I believe that in this matter I have already done some good, but there is great need for further exertion. I cannot compress into a corner of this lecture any adequate statement of the lamentable sanitary defects of our farms and dairies. I shall take some other opportunity of exposing these things. Meantime, I can say, as the result of my enquiries during the last five years, that adulterated, contaminated, and diseased milk does more to destroy our infant population, and to spread contagious diseases, than any other cause that can be named.

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I shall now pass on to notice briefly the class of disease which causes the greatest amount of death in this, as in every other community in the country—tubercular diseases. I pass over non-tubercular inflammatory diseases of the lungs, as I passed

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over typhoid fever, because I cannot compress any instruction with regard to them within the limits of this lecture.

Tubercular disease includes consumption of the lungs, consumption of the bowels, tubercular meningitis (commonly known as water in the head), and scrofula. These various diseases, although affecting different organs of the body, are essentially the same. They are characterised by the formation of small particles of a substance called tubercle, which becomes disseminated like grains of sand through the organ effected—the lungs, as in common consumption; the glands of the bowels, as in consumption of the bowels; and the other glands of the body, as in scrofula; the membranes of the brain, in tubercular meningitis. These particles of tubercle sooner or later stir up inflammation around them, and if the disease be not checked, ultimately destroy the organ affected. The causes which produce these various tubercular diseases are the same, either acting upon the person affected or his ancestors. The particular organ in which the tubercle develops depends upon the age of the patient and the strength of the hereditary taint. If the hereditary taint is very strong and the child badly cared for, it develops either tubercular meningitis or consumption of the bowels. In some cases the hereditary taint is so strong that the offspring of tubercular parents is born only to suffer and die. Of these unfortunates the lines of Pope are too true—

“As man, perhaps the moment of his breath,  
Receives the lurking principle of death,  
The young disease that must subdue at length,  
Grows with his growth, and strengthens with his strength.”  
*And grows in non-sense such as this, at length.*

If the child is otherwise strong, and if the best means be not taken to eradicate his morbid tendencies, he lives only to die in later life of consumption of the lungs. The first and greatest cause of tubercular disease is the breathing of an impure atmosphere. Now, we have seldom much to complain of in the air of Crosshill; the prevailing winds of this neighbourhood are from the south-west, so that we rarely have any contamination from the smoke and chemical vapours which pollute the atmosphere of Glasgow. We are situated about twenty miles from the sea coast, and I have been told by tradesmen working on the roofs of houses that, during a gale of wind, they frequently taste the salt brine from the sea; and as there are no intervening hills, I see no improbability in the statement. We have not many unwholesome manufactories in this parish, and I am quite sure that if the air of our houses was always kept as pure as the air of our streets, the mortality from tubercular disease would not bulk so largely in the Registrar's returns. But my experience, both here and elsewhere, is, that however large a man's house may be, whether a flat or villa, he almost invariably chooses for the sitting-room of his family a small, badly-ventilated parlour. In the winter time, this room is

looked upon as being so nice and cosy. When I visit in the evening, I find crowded into those small places large families of children, and the air still further poisoned by three or four gas jets, every gas jet consuming as much air as three people. In ninety-nine cases out of a hundred, there is not the slightest attempt at providing any outlet in the upper part of the room for the sulphurous vapours and other impurities to find exit, nor is there any proper inlet for fresh air. The inlets which do exist are the awkwardly placed crevices left by badly-fitting windows and doors, through which currents of cold air are drawn by the draught of the fireplace. These things help to mitigate the evil; but most people, even educated and intelligent in other respects, do all in their power to shut up every crevice by which fresh air can enter. It is easy to understand the headaches, the bad appetite, the unrefreshing sleep, the tendency to catch cold, and the ultimate break-down in the ill-used lungs, which were meant to breathe the pure air of heaven. It has long been known that tubercular diseases could be produced at will in animals exposed to such conditions of bad ventilation. Some years ago a new monkey-house was constructed in the Zoological Gardens, London. No expense was spared to show hospitality to the tropical strangers. The house was made like an English drawing-room, with open fireplaces near the floor, but with no other means of ventilation. Above 60 healthy monkeys were placed in it. In about a month 51 of these were dead, and in every case it was found that death was caused by tubercular consumption of the lungs. The hot and contaminated air contained in the upper part of the room had no outlet, and so the monkeys were condemned to breathe over and over again their own exhalations, with a result as calamitous to the unfortunate animals as was the black hole of Calcutta to the English prisoners of Surajah Dowlah. When this defect was pointed out to the managers of the Institution by Dr. Neil Arnott, channels for ventilation were opened in the ceiling, and thenceforward healthy monkeys could live in that room. The want of provision for ventilation would be equally calamitous in many families were it not that they are not so completely imprisoned to their rooms as were these monkeys, and when the family is gathered in the room at night the air is partially changed by the occasional opening and shutting of the door. Dr. Guy some years ago pointed out that among the letterpress printers of London the number of men suffering from such symptoms as spitting of blood and chronic cough (symptoms of consumption) was in exact proportion to the amount and purity of the air in which the men worked. He calculated that among 10,000 letterpress printers, in a workroom with air space amounting to 800 cubic feet per man, 400 would die annually from consumption, while 10,000 men working in rooms with an air space of less than 500 cubic feet per man, 1200 would

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die in the same time, *i.e.*, as 3 to 1. Another important cause of tubercular disease of the lungs is the breathing of an atmosphere loaded with dust. There are certain occupations which should be carefully avoided by those who are prone to chest disease, on account of the dust which they give rise to. I shall not go into this question to-night. The only other point in this connection which I shall discuss is the bearing of what I have said about impure air upon the contagious nature of consumption. It has been proven that tubercular matter can be inoculated, by being introduced under the skin of an animal, and that from the inoculated part tubercles may spread to the lungs and other organs. It has further been proven that occasionally other substances in a state of decomposition, introduced under the skin of an animal will produce tubercle, and may in that way lead to consumption. The great French physician, Laennec, in making a *post mortem* examination of a patient who died of tubercular disease, cut his finger, with the result of causing a tuberculous sore. Some years after he died of consumption of the lungs, set up, it has been supposed, by infective material carried through his body from this sore.

In order that you may understand the bearing of these experiments on the question of the contagious or non-contagious nature of this disease, I show you a diagram of the particles found floating as dust in the air of a London hospital. 1st. Cells from inner surface of mouth. 2nd. Cells from skin. 3rd. Pus from suppurating sores. 4th. Fragments of hair with spores adhering. 5th. Linen fibre from clothing, with small fungus-looking bodies attached.

In the room of a consumptive patient we would also find, if we examined carefully, particles of the matter which is coughed up from the lungs, containing minute particles of this very tubercle which we know has been proven to infect animals when introduced under the skin. Now, a person in sound health might breathe these particles with impunity, because this infective material must get an inlet by a sore. But consider the case of a husband or wife breathing this impure air, and confined through weary weeks or months to the bad sanitary influence of such a sick room, and what it may be made by ignorance may be well illustrated by a lamentable case which I was called to see some time ago. The patient, a young lady about twenty years of age, had been ill for some months, and was confined entirely to bed. Her mother informed me that the chimney would not draw, and so it was not only unused, but to prevent a down-draught was blocked up. The door and window were carefully sealed up with cloth along all the seams; and in order to increase the warmth of the room, the gas was kept burning night and day, and, sad to say, this horrible combination of bad sanitary conditions, in which the patient was rapidly being choked by a mephitic atmosphere, was sanctioned by a man who pretended to the knowledge of a physi-



cian. The patient rapidly sunk and died, and I would challenge the combined skill of all the physicians who have lived, from the days of Hippocrates down to the present time, to have cured her in such an atmosphere. Well, the nurse, the husband, or wife, as the case may be, goes out of this hot, impure atmosphere, and is exposed to the inclemencies of a season like the present. From diminished strength and badly aerated blood he chills, and gets first a bad cold, and then presently a bronchitis, and so his lungs, weakened and diseased, become a fitting soil for the growth of this floating tubercle. It is in this way, and not by infection as understood in its ordinary sense (the communication of the disease to a healthy person), that consumption may be considered a contagious disease. Cold air of itself has no tendency to cause consumption. The nearer you get to the Arctic regions, the higher you ascend a mountain range, the rarer does consumption become. The kind of places which are most prone to produce this disease are warm, damp, low-lying localities. A cold, dry atmosphere is, in properly selected cases, where the disease is not too far advanced, a most valuable remedial agent. In South America it is common to send consumptive patients up the Andes to altitudes of 8,000 to 10,000 feet, where the air is very cold, with the most beneficial effects.

If we guard against chills, which in a room are the result of a bad form of ventilation, or of insufficient clothing, people in moderate health have no need to fear cold. I would here protest against the practice of covering over the faces of sleeping children with bed clothes, which is about the best way you can take for making them subject to chest diseases: every evil which I have spoken of is here tenfold intensified. You may watch with advantage the delight with which healthy children, properly clothed, disport themselves in the open air at a temperature approaching zero, showing what an invigorating effect may be got from cold itself, when the surface of the body is protected from chill. When harm is got from breathing a cold atmosphere, it is from the sudden transition from a close, stuffy, overheated room, where the lungs have been irritated by breathing impure air, to the damp, cold atmosphere either of an unwarmed bed-room or of the street. If, however, you ventilate your sitting-room, and keep it at a moderate temperature, say 60° Fahrenheit, you will not experience any harm from the change to a bed-room without a fire, or even with the window opened half-an-inch at the top. I remember reading lately a paper by a French doctor on the wonderfully curative effects of night air, and he detailed a number of cases of disease in which a cure was effected by treating the patient with a widely opened window at night. I am afraid, however, that in our climate this would only be safe in summer.

Having said so much about ventilation, both in connection with the treatment of contagious diseases, and also in connection

with the prevention of tubercular disease, I shall now explain how you may best secure it. There are three common outlets and inlets for air in every apartment—the door, the window and the fireplace. *Common Ven*

If you wish to change the air of an over-heated, badly-ventilated room rapidly, a very good plan is to use the door as a fanner, by moving it quickly backwards and forwards upon its hinges. We may learn a great deal by watching the bees, and among other evidences of their good sense we find that they are quite alive to the value of ventilation. If you could see inside a hive, you would find twenty bees stationed just inside the door flapping their wings backwards and forwards without a moment's pause, fanning out the used air and sending in fresh air. As one or two tired insects drop out from the line of fanners, fresh recruits fall vigorously to work, and so keep up the cheerful humming sound heard at the door of the hive. But the best inlet for fresh air in rooms which have not been fitted up with special ventilating appliances is the window. When you draw down the upper sash the air rushes in, not only at the top, but also between the sashes. To obviate the draught, which is sometimes very disagreeable and, in cold weather, dangerous to health, a good plan is to fix at the top of the window, in the space between the Venetian blind and the upper sash, a narrow box made of two pieces of perforated zinc, set about an inch apart in a wooden frame. The dimensions of these pieces of perforated zinc in the box which I have fitted up in my own dining-room are 42 inches across by 4 inches deep. The box thus made is filled with tow very loosely packed. This has the effect not only of breaking the current of air, but also of filtering it free from dust and smoke. This appliance was made for me by a joiner for half-a-crown. In very cold, foggy weather it will also be necessary to filter the air which enters between the sashes. This is very simply managed by means of a gauze or muslin bag filled with tow or cotton wadding, and made into the form of a long roll. If there are two windows in the room, these appliances should be fixed in the window farthest from the fireplace. Another plan for admitting air is to raise the lower sash of the window two or three inches, and place a piece of wood under it, so as to fill the opening at the bottom. You then have the air entering between the two sashes at the middle of the window, and sent up in a stream towards the ceiling. By turning the spokes of the Venetian blind up you have a *louvre* arrangement, which still further assists to divert the air into an upward current. When there is no fire in the room there is not so much tendency to the downward current, but a strong fire has a most powerful effect in drawing air down in the direction of the fireplace. This suction effect of the fire may be entirely prevented by supplying air to the fireplace by means of a tube leading directly out from it to the open air. The last method I shall refer to is the simplest of all. Take a large gimlet and bore a row of holes through the

*Shake the room door & watch the bees*

*Window with sash closed down & put a perforated zinc stuffed box at top. The to 2/6*

*also put in a muslin bag filled with tow*

*or raise the lower sash & fill the opening with a piece of wood*

*A stone or chair draws down air.*

*Lay a tube from the outside air to each room fireplace*

upper part of the window frame, sloping them down a little so as to send the incoming current in an upward direction, and to prevent the rain from getting into the room. By covering these holes over with a piece of gauze you will also have the filtering action already referred to. In addition to these inlets for pure air, to have perfect ventilation you must have an outlet for the heated impure air which rises to the ceiling, and only diffuses itself throughout the apartment because no means of escape are provided for it there. The chimney is the proper channel for taking off this impure air. There are two very simple and effective means by which it may be utilized for that purpose. One plan is to lead an open tube down the wall of the room from the ceiling to the fireplace, to open behind the jamb within the grate. The strong current rushing up the fireplace sucks down the heated air from the top of the room through this tube, and so it is carried off by the chimney. A zinc tube 3 inches in diameter is quite suitable for this purpose. It may be painted or papered like the wall of the room, and, if it is carried down the corner nearest to the fireplace it is not unsightly. Another method of effecting the same purpose is to make an opening into the chimney, near the ceiling, by taking out a brick and fitting a valve into the aperture so as to prevent a back draught. The valve I use in my own house is named "Crossley's Patent Valve," and I find that it answers the purpose. It is essential to the success of these valves that the throat of the chimney should be narrowed just above the fire, or if a register grate is used, the aperture may be narrowed by the register being partially closed. By utilizing in any of these ways the natural inlets and outlets of a room, all the more elaborate systems of ventilation may be dispensed with. They have their proper place in public buildings. It is, however, extremely difficult, in fact impossible, to get the masses of the people to take any trouble in these matters, and as so much of suffering and death from the two great classes of tubercular and zymotic disease can be directly traced to impurity of air in dwellings, factories, and workshops, I think it is high time that builders should be compelled to introduce some self-acting means of ventilation into every tenement of workmen's houses, and into every factory and workshop in the land. Mr. Boyle, the well-known sanitary and ventilating engineer, calculated that in a tenement of room and kitchen houses he could conduct a tube, from the ceiling of every room in the tenement, to a central shaft fitted with one of his patent appliances for drawing up foul air, and also provide a tube for admitting fresh air at, the expense of about 30s. for each house. I think that the compulsory introduction of some such simple self-acting means of ventilation would remove one of the greatest dangers to the health and lives of the community.

In conclusion, my endeavour to-night has been to arouse your interest in sanitary matters, to show what great mischief may

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arise from a few simple and easily preventible causes, and how much you can do to help yourselves. I have endeavoured to prove to you that attention to these matters should be looked upon as a religious duty. The laws of health are the laws of God, and as surely as a breach of God's law of moral purity is followed by its penalty, so surely will a breach of His laws of bodily purity meet with just retribution. I trust that what you have heard to-night may stimulate those of you who have not hitherto paid any attention to these matters to take advantage of some of the numerous <sup>useless</sup> popular works on health, which may be purchased for a mere trifle; and in connection with the subjects of contagious disease, of which I have been speaking to-night, I would recommend as one of the most instructive and interesting books you can read, the recently published <sup>very useful</sup> lectures of Dr. Russell (Medical Officer of Health for Glasgow) on the prevention and control of infectious diseases, the price of which is one shilling. *value unparalled.*

Not only from personal and family, but also from patriotic motives, it becomes us to exert ourselves to disseminate among the masses a knowledge of the dangers to which they are exposed. Year by year, in an increasing multitude, the population of this country flows towards our great cities, to be crowded together in unwholesome houses, to toil in unwholesome workshops, and be exposed to the influences of an atmosphere poisoned with smoke and chemical vapours emitted from the factories of unscrupulous men who are permitted to aggrandise themselves at the expense of the lives and health of the community. It is pitiful to look at the dwarfed and stunted progeny of the labouring poor in our great cities. Surely it would be better that cities like Glasgow should increase more slowly and nourish a healthy, manly race. Let me ask what money will do for us if we sap the foundations of that vigorous national health which has placed the Anglo-Saxon in in front of the other races of mankind? *for then they want the of laws.*

We have recently had among us a great statesman, who described in eloquent language the immense responsibilities of this empire; how the daily and inevitable calls of these responsibilities task and overtask the energies of the best and ablest of her sons; how this small island at the extremity of the globe has peopled the whole earth with its colonies, and subjects among the ancient races of Asia 240,000,000 of men to its rule; how it has disseminated over the world a commerce such as no imagination ever conceived in former times, and no poet ever painted, and yet, whatever is done in defending and governing these vast colonies with their teeming millions, in protecting that unmeasured commerce, must be done by the 33,000,000 who people the United Kingdom. *England has of course much to with take*

I would ask you, ladies and gentlemen, how these heavy and increasing responsibilities may be borne in the future if our countrymen lose their physical pre-eminence? If, under their new conditions, these vast city populations, either from apathy or ignorance, refuse to inform themselves, and will not listen to *reform?*

*Sanitas sanitatum omnia sanitas.*  
 them who tell them of their danger. If, as a nation, we neglect those things, not all the prestige gained by the great deeds of a hardy ancestry—not all our mineral wealth and commercial success—not even our fleets and armies, will save us from national decline. For, behind all these, there must exist the bone and sinew of a strong and vigorous people. I sincerely hope that although the new Parliament has not come in with the cry, "*Sanitas sanitatum omnia sanitas*," it may, nevertheless, devote some time and attention to these important matters. *viz Sewage & tubercles.*

