

CITY LIFE IN RELATION TO TUBERCULOSIS. A PLEA FOR BETTER SURROUNDINGS FOR FACTORIES AND BETTER HOMES FOR THE WORKING CLASSES.

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Tuberculosis has been called the "Universal disease" because it prevails in all portions of the globe and effects all classes of society. It is, however, less prevalent in the arid regions, and the well-to-do suffer less than the poor who are crowded into tenements in our large cities.

Until the latter part of the nineteenth century the attitude of the general public and of the medical profession towards consumption was one of despair, the disease being considered incurable. Most of the efforts of the physician were expended in making his patient comfortable and practically nothing was done to prevent the disease. There were, however, men who held other views and who endeavored to cure the disease. As early as 1840 George Boddington of Warwickshire, England, wrote an essay "On the Cure of Pulmonary Consumption on Principles Natural, Rational and Successful," in which he advocated life in the fresh air under medical supervision, with an abundance of food. He insisted that cold never injured the patient. He established a sanatorium for the treatment of the disease according to his views but so great was the opposition that it had to be abandoned.

In 1856 Herman Brehmer advanced similar views in a thesis for his doctor's degree and three years later, in the face of great opposition, opened at Gördersdorf, the first successful sanatorium for the treatment of the disease.

The work of these men and their followers was like a single candle flickering in the darkness which obscured the professional view regarding tuberculosis. Nevertheless the flame was kept burning and was fanned into a bright blaze in 1882 when Koch announced that tuberculosis is caused by a germ which is to be found in the expectoration of those suffering from consumption. This was the beginning of a new epoch in the treatment and prevention of the disease. With a knowledge of the cause it would be possible to prevent it to a certain extent. Despair has given place to hope and optimism which means conquest of the "Great White Plague" or at least a great reduction in its ravages.

Today the entire world is organized to combat tuberculosis. Thousands

of men and women in all portions of the globe are enrolled in the great campaign against it; they are giving their time and money to the cause and yet it seems that most of the energy is being expended in overcoming the results of the disease rather than in removing the cause.

To successfully combat any disease we must know the cause and the mode of its transmission from person to person, and must remove the cause and close the channels of transmission.

The causes of disease may be divided into exciting (direct) and predisposing (indirect).

The direct cause of tuberculosis is a bacillus which is found in the expectoration and other discharges of those who have the disease, depending upon the location of the infection. It is also found in the milk of cows which have the disease, and in the flesh of tubercular cattle, hogs and other animals. The dust in our houses and that of the public streets contains many of these germs. Probably every one of us breathes or swallows a large number of tubercular bacilli every day, but nature has provided the healthy body with means of overcoming this invading host or no one would escape the disease.

The indirect causes are impure air, lack of sunshine, dampness, overcrowding, dissipation in any form, working in a dust-laden air, poor food, the sweat shop and the tenement. These lower the vitality of the body so that the tissues are no longer able to overcome the invading bacilli and so the body beomes infected. These causes operate more actively in the great centers of population than in the sparsely inhabited districts.

Tuberculosis can be transmitted to man through the medium of infected milk or food, but more especially by the inhalation of the germs in the minute droplets of mucous which are expelled from the mouth during the act of coughing. The breath of a consumptive is in no way a danger to the community or those with whom he associates.

Dr. L. F. Fleck (1) in a recent paper gives the following as the essentials in the crusade against tuberculosis:

1. Control of infection.
2. Disinfection.
3. Life in the open.
4. Proper food.

In the great campaign, which has enlisted so many enthusiastic workers, and which is rendering such service to mankind, attention has been directed largely to the first and second of the above propositions, and the question of procuring better food and pure air for the poorer of our people has not received the attention that its importance demands.

In this paper it is not intended to consider the prevention of the disease in all of its phases, but rather to dwell upon environment as a cause, for unless we, in our endeavors to combat tuberculosis, make radical improve-

ments in the housing and feeding of the less fortunate of our fellow beings we will accomplish no lasting benefit to the nation nor to those who are exposed to the disease. Should we be so fortunate as to reduce the ravages of tuberculosis to the insignificant number now claimed by small pox, some other disease would take its place. Pneumonia is already a strong candidate for the position of "Captain of Death."

The following table shows the death rate per 100,000 from tuberculosis of the lungs in the urban and rural districts of the registration area of the United States as shown by the returns of the Census Bureau for the ten years ending with 1909:

	Urban.	Rural.
Connecticut,	156	117
Indiana,	174	148
Maine,	162	128
Massachusetts,	162	157
Michigan,	100	80
New Hampshire,	146	122
New Jersey,	183	128
New York,	194	124
Rhode Island,	181	155
Vermont,	144	126

Not only is the death rate from tuberculosis greater in the cities but the reports of the Census Bureau show that for the ten years ending with 1909 the death rate from all causes was higher in the cities than in the rural districts, the rates being 17.0 per thousand in the cities and 13.8 in the rural districts. There are a few diseases which are more prevalent in the rural districts, the principal one being typhoid fever.

Dr. E. E. Graham of Philadelphia, in an elaborate study of the infant mortality states (23) that epidemic diarrhea (the principle cause of death in young children) is a disease of large towns and cities.

We have seen that disease and especially tuberculosis is more prevalent in cities; let us see if there is anything in the city air that may help to account for this. Observations taken in Paris have shown (11) that there are on an average 4,790 bacteria to the cubic meter of air in the center of the city, while at the Observatory of Montsouris in the suburbs there are but 345 per meter.

Aitkins (12) found the average number of dust particles per cubic inch of air in the country to vary from 8,000 to 100,000 while in the city the figures were found to be from 1,000,000 to 50,000,000. The dust in the air of cities is largely composed of soot. It has been estimated that London burns about 30,000 tons of coal per day and generates therefrom 300 tons of soot.

Dr. J. B. Cohen, speaking of smoke producers, says (14): "The smoke banners which fly from their chimneys are the black flags of piracy. They are pirating the pure air which is the property of every one."

The dust and smoke in the atmosphere has a direct effect upon the lungs of those who breathe it. Autopsies have shown that the lungs of the dwellers of cities are darker than those of persons who reside in the country. This difference is due to the deposit of carbon (soot) in the tissues surrounding the air cells. In time this lowers the vitality of the tissues and so predisposes to tuberculosis and other diseases.

Laboratory studies have shown that the condensation of vapor takes place very slowly in a dust-free atmosphere even though the temperature be reduced far below the point of condensation. A certain number of dust particles appear to be necessary to furnish nuclei around which the condensation takes place. The conditions which obtain in the atmosphere of our large cities is exactly the opposite from the dustless chamber of the experimenter and the smoke and dust are largely responsible for the mantle of fog which hangs over so many large cities. In London the number of days of fog has increased from 51 during the five years ending with 1875, to 74 during the five years ending with 1890 (13).

There is also a chemical difference between city and country air. Angus Smith examining the air in Dundee at night found the carbon dioxide in the center of the city to amount to 0.042, while in the suburbs at the same time the amount was 0.028. Burning coal not only produces soot but also generates sulphurous gases which, combining with the watery vapor in the air, makes acids which irritate the mucous membrane of the breathing apparatus, and also destroy the stone and iron work of buildings. The air in the town of Leeds, England, was found to contain 11.6 milligrams of SO_3 per 100 cubic feet of air, while in the outskirts the amount was 5.5 milligrams (12).

In large cities there is always more or less pollution of the air by illuminating gas. In London, during six months of 1908, 110,000,000 cubic feet of gas leaked from the mains (16). This contains carbon monoxide which is highly poisonous.

It is said that "Buffalo Bill" was struck with the resemblance between the streets of New York and the cañons of the West, and is said to have first called Broadway, "Broadway Cañon." He was not far from right for there is but a difference in name; both have precipitous walls which exclude the sunlight, and from a sanitary point of view the cañon is the better of the two. Sanitation requires that no building should be higher than the width of the street on which it is situated, but in most American cities a much greater height is allowed, and in New York and other of the larger cities there is no limit to the height of buildings.

In this respect we are certainly far behind the cities of Europe where there are strict regulations limiting the height of buildings. There is, however, a movement on foot in New York to have such regulations enacted, but one of the most influential papers in the country is actively

opposing it. One of the greatest objections to tall buildings is that they cut off the sunshine from the streets and from the opposite houses. Sunshine is one of the most efficient disinfectants and the lack of sunshine is one of the factors which causes the increased mortality in large cities.

There is a great difference between the amount of sunshine in the city and that of the suburbs. The average number of hours of sunshine for the year in London is 1,026, at Greenwich it is 1,227, and at Kew just outside the city the number is 1,399.

The death rate increases with the density of the population which is shown by the following table which Kober (4) of Washington quotes from Rohe:

	Mean number of inhabitants to each home.	Average annual death rate per 1,000 inhabitants.
London,	6	24
Berlin,	32	25
Paris,	35	28
St Petersburg,	52	41
Vienna,	55	47

Kober also states (17) that in certain cities in Europe there are laws fixing the maximum density of population. Such laws would be most beneficial in this country.

Tuberculosis is largely a house disease of the large cities, and is more prevalent where people are crowded together in badly ventilated buildings. In New York state the incidence of the disease in large cities is twice as great as in the rural districts.

Lilian Brandt, who has analyzed the statistics of tuberculosis for the Charity Organization of New York City, says (18): "All those occupations with a noticeably high mortality from consumption belong primarily to the cities and large towns, while among those with a consumption death rate below the average of 2.4 per 1,000 are found almost all that are carried on in small towns or the country." She also presents the following table which shows the death rate from consumption per 1,000 according to occupation (24):

Occupation.	Death rate.
Laboring and servants,	3.8
Clerical and office,	3.0
Public entertainment,	2.7
Manufacturing and mechanical pursuits,	2.6
Personal service, police and military,	2.5
Professional,	1.8
Mercantile and trading,	1.7
Agriculture, transportation and other outdoor pursuits.	1.5

Dr. R. H. Babcock of Chicago says (2): "Brave-hearted, philanthropic men and women are battling against this terrible disease (tuberculosis), but their efforts will be in vain as long as the vile tenements and sweat shops are tolerated in our midst."

Dr. John R. Walker (3), who has made a study of tuberculosis amongst the Oglalla Sioux Indians has shown that the Indians suffered but little from tuberculosis while living in tepees, but that the mortality began to increase as soon as they built houses. The difference being that the tepees were better ventilated and were moved as soon as the ground became filthy, while the houses are badly ventilated and soon become filthy, but cannot be moved.

Dr. S. A. Knopf (5) estimates that in 1900 over seventeen millions of the American people were engaged in indoor occupations, and that counting all the time spent indoors the greater part of the people pass their lives indoors.

If these statements be true, and there is no reason for believing otherwise, it would seem that the question of housing should be of the greatest importance in the prevention of tuberculosis.

The housing of the working classes in our large cities is a disgrace to the nation. Crowded into tenements where the streets are narrow and badly kept, a large number of them occupying rooms that are badly ventilated or without ventilation, many of which are entirely dark, they live in the most favorable environment for the development of tuberculosis.

Not a few of our people think the housing problem has been settled and that with the Tenement House Commission, and the Factory Inspectors, all that can be done is being done. A careful study of the subject will convince at once that, although these agencies have done much, there is much more to be done. In New York City there are 356,000 dark rooms without windows which are occupied by more than 300,000 persons. There are also in the largest city in our country several thousand open sink privies in the tenement house district. These conditions are being remedied very slowly and at the present rate it will be over fifty years before all the dark rooms in New York are abolished.

The Committee on Congestion of Population (New York) found (7) that in one block in the lower portion of the city 34 per cent. of the families occupied two rooms and that 18 per cent. occupied one room. One sixth of the rooms in the block housed four adults. The great majority of the families were paying 25 per cent. of their income for rent and some paid more than 50 per cent.

Dr. Antonio Stella (7), investigating the condition of the Italian population of the city of New York, says: "On Third Avenue, near Twenty-sixth street, a family of eleven—four adults and seven children—and three clerks were living in a dark middle room, and a large bare rear room, an average of seven people to the room. In the section of the Bronx, bounded by East 148th and 153d Streets, Morris, Courtlandt and Park Avenues, I found some of the very worst conditions. In a rag shop on Morris Avenue there were no less than eighteen people, men and women, working, eating,

and sometimes sleeping in a double, new-law tenement. In this section I found 1,100 people, divided in 130 apartments not counting all the night lodgers."

Such crowding of persons of both sexes is not only insanitary but degrading and Doctor Stella has called attention to the rapid spread of venereal disease amongst these people. According to his observations many of those infected are innocent of any crime, the disease being contracted through sleeping in the beds that have been occupied by infected persons or by using their linen or towels.

Doctor Stella says that the Italian children of New York City are not as robust as those brought up in the rural districts and that the proportion of the Italian recruits rejected in New York City is greater than in Italy. Many of the Italian women born in New York are sterile. All of these defects he attributes to bad housing and lack of proper food.

The late Professor Harrington of the Massachusetts Board of Health said (22): "It is well known that a large percentage of the deaths among people whose working days are spent within the walls of industrial establishments is due to consumption." Statistics from the Henry Phipps Institute of Philadelphia show that "houseworkers, mill workers, factory workers, cigar makers and weavers supply vastly the majority of cases" of *tuberculosis*.

Such persons are poorly paid and work long hours in factories which are generally badly lighted and poorly ventilated, and in many cases after the day's work is over spend their leisure and sleep in much worse surroundings. It is but natural that such persons should resort to the saloons which are warm and brilliantly lighted, where there is company, and they are welcome as long as they spend something. Such a life predisposes to tuberculosis and if the disease is to be eradicated particular attention must be paid to this class of persons and the sanitary condition of their homes and working places must be improved. How best to do this is a question which should receive the careful consideration of every factory owner.

The average duration of a case of tuberculosis is about two years, during which time the work turned out is not up to the standard so that the disease causes a loss to the employer as well as to the employee.

There have been many honest efforts to better the condition under which the working population is housed. About ten years ago a number of citizens of Washington organized the Washington Sanitary Improvement Company for the purpose of constructing homes for the working classes of the National Capital. They adopted the two-family house plan, one apartment above the other, each having a separate entrance, bath, toilet, and yard. The rents were so arranged that after deducting operating expenses there would be a 5 per cent. dividend. So far they have constructed two hundred houses, all of which are rented. A novel feature of their plan is to allow the tenant all of the twelfth month's rent that is not re-

quired for repairs. This insures permanence of tenants and a minimum of damage to the property. During the year ending March, 1906, the apartments were occupied by 778 adults, and 380 children, a total of 1,158 persons. There were 39 births and 8 deaths, a death rate of about seven per thousand, while the general death rate amongst the whites of the city was 15 per thousand.

In our campaign against tuberculosis and other diseases we have, to a large extent, adopted the "soup-house" plan. Free medical treatment and free food and clothing can be had in almost any city, but fresh air is not to be had in many of our cities. Dr. L. R. Williams (6) is authority for the statement that there are about 800,000 persons in New York City who never escape beyond the confines of the city. In 1903 over thirty-three thousand persons were sent out of the city for seven days' fresh air.

It is my opinion that the only way we can make any permanent headway against tuberculosis is to scatter the population that is now congested in the large cities. This can only be done by removing the establishments in which they work to the rural districts. I am well aware that this is a radical departure and in direct opposition to the trend of business and that it is often difficult for factories situated in the rural districts to obtain workmen. There are, no doubt, other disadvantages, but to offset them are the lower rentals, cheaper land, lower taxes, and greater and above all the saving of human life.

This is not a matter for the factory owner alone, but also one in which the workmen should cooperate. The labor unions should use their influence to induce workmen to avail themselves of the opportunity for living in the country and the labor leaders should endeavor to supply the factories that are situated in the rural districts with the most skilful and reliable workmen. Despite what may be said to the contrary, I am convinced that there is no valid reason why a large majority of the factories in New York City and other cities should not be moved out into the surrounding country. Move the factory to the country where the workers can be well housed in cottages, where he can have flowers and vegetables in his yard and above all where his children can have pure air and grow up amidst the green grass and the trees. Here there will be fewer temptations and better citizens will be produced.

The ideal factory from a sanitary standpoint would be located in the midst of a park, surrounded by trees, through which should run wide streets lined with the cottages of the workmen. This may not appeal to the average employer and many will say that it would not pay. One manufacturer, whose friendship I prize highly and who has made a business success by his own efforts, tells me that such a movement would be a failure, that the trend of business is towards the cities. Yet, I believe, that the same spirit which made him succeed in his business in the city would have

made him successful under the conditions which obtain in the country. A great deal of the manufacturing in New England is done in the small country places.

The success of the Sanitary Improvement Company in Washington has shown that there is money to be made in housing working people in good buildings and this will add not a little to the receipts of the factory which moves to the country.

Prof. J. Van Pelt, an architect of New York (10), has planned a cement cottage of eight rooms for working people, which can be built for \$3,000. To net 6 per cent. this would have to rent for \$15 per month, which would allow 4 per cent for dividends and 2 per cent. for sinking fund and repairs. If the Washington plan of remitting all of the twelfth month's rent not required for repairs were adopted the damage to the houses would be very small.

It is true that there is a steady stream of men and women from the rural districts pouring into the great cities. They leave their homes to escape the monotony of country life and because they have before them the example of other country-bred men and women who have been successful in the great centers of population. Some do, indeed, become great and many of the greatest of our citizens have come from the country districts, but the great majority of these emigrants will be lost in the maddening rush of the city life and never attain anything at all.

Dr. F. A. R. Russell of London (19) is authority for the following statement: "As a matter of fact, it has been ascertained that very few families survive in central London for more than four generations, and many die out in three generations. A true Londoner of the fifth or even the fourth generation is rare. A large proportion, probably the majority, lose the fine stock of health they brought with them from the country within two generations."

Each year a few of the city dwellers move to the country. They are mostly men in advanced years who have been successful in life but who find the confinement of the city too much for them and move to the freer life of the country. The editor of *American Medicine*, discussing the question of the location of colleges, says, "City life is very deadly to the young," and advises that colleges be located in the country saying, "Send the boys out of the city." President C. W. Eliot of Harvard University is authority for the statement that many schools are springing up on the outskirts of our great cities, that draw their patronage from the dwellers of the city who have found that it is impossible to obtain proper healthy surroundings for their children in the large cities.

Hon. Charles E. Hughes, governor of New York, says (20): "The man who regards with sullen indifference the congested life in our great city, who is content to pleasantly wrap himself in the garments of prosperity and think of his fellow creatures as ignorant and disorderly masses with

whom he has nothing in common, has but small right to pride himself upon the valor of his Revolutionary ancestors or talk of his patriotic devotion to his country."

Those who do not agree with me regarding the necessity of moving the population from the congested districts will at once call to mind the large parks recently established in many of our cities. To them it will seem that these breathing places are ample for the people, but they are not. In the first place there are too few of them and the air is the same polluted mixture that is to be had in the surrounding streets. Another objection is the "Keep off the grass" signs. I now have in mind a large park in one of the eastern cities which, in the days I first knew it, was a bare common always filled with children. It looked bad to the æsthetic eye and the recent movement to beautify the city has caused it to be planted with grass and shrubs and provided with winding walks, but alas, the playground of the children is gone, and they must stay on the walks.

If the city air is good why do we send out children to school in the country, and why do we leave the city in the summer for a sojourn at the seashore or in the country? If you wish to test this question spend July, August and September in New York City. Take a room in a small hotel or boarding house on a side street, and spend the evenings walking through the region east of the Bowery. It will be a lesson that will never be forgotten. There you will see a mass of human beings filling the streets and sitting on the steps gasping for a breath of fresh air. More than once will the cough of the consumptive attract the attention and you will hear the cry, "Breath—breath—give me breath," uttered by some person in the last agony of tuberculosis.

This is an appeal to the patriotic citizens of the country, the employer of labor, to the laborer, and to those who obtain their living by the labor of others to do what they can to better the condition of the workmen of the country, especially those who are unskilled. This is a patriotic duty. Under the present conditions we are rearing a race of degenerates who will some day make trouble for the country, besides many innocent persons are being murdered by the foul air and the bad food they obtain in our large cities. We are becoming a very patriotic people in that we have many societies which commemorate the deeds of our forefathers. In all of the older cities there are many tablets marking spots sacred in the history of the country. Boston is literally placarded with them. All this is solemn mockery when within sight of these inspiring monuments there are thousands who are being starved, and degraded by our greed for riches and the comforts which they can bring us.

I ask the readers who are owners of stock in business enterprises to learn something of how the workers in the business are living. Use your influence to obtain for them shorter hours, better surroundings, and a fair

share of the profits of their work. Do this and you will be helping to eradicate the "Great White Plague." Such a policy may reduce the dividends of the company but you can make it up by saving what you have been giving to charity and to educate the heathen. Help to make our people independent, and strive to prevent them from becoming pauperized by accepting charity.

Those who are in business for self remember that you are the guardians of the health of those who toil for you and take a real interest in their physical welfare. Be liberal with their allowance of vacation. If your children need three months in the country and you find it necessary to spend the summer in the suburbs how much more do your employees and their children who live in the crowded portions of the city need a vacation. When you see one of your employees looking badly give him a vacation and if needs be turn a deaf ear to the man who asks your aid for foreign missions.

I have before me an appeal from an officer of the army calling upon the American people to vote more money for guns and soldiers to provide for a remote possibility of war. If these are needed let them be forthcoming, but also let us have liberal appropriations and laws with which to combat the enemy (tuberculosis), which is now in our midst and is destroying over two hundred thousand of our citizens each year. Tuberculosis is sapping the strength of the nation and the conditions which predispose to it, and against which I ask your united efforts, are also those which predispose to crime and degeneration. No nation can continue unless its citizens are strong, healthy, and clean in body and mind. Ruskin says: "The strength of the nation is in its multitude, not its territory; but only in its sound multitude." Guns and warships are valueless unless manned by men of brains and strong muscles. The weakling will find no place in our military or commercial warfare. Therefore, let us build up the race by removing the causes of degeneration so that our citizens may be able to fulfil any demands made upon them. I believe that the prevention of disease, especially of tuberculosis, is a national duty and comes within the meaning of the portion of the Constitution which says "to provide for the common defense."

The purpose of this paper is not to condemn any one but rather to ask your coöperation in the endeavor to eradicate the "Great White Plague."

The ills from which the country suffers are not to be charged to any one person or any group of persons but rather to the whole people, for they alone are responsible for the laws under which we live and for their enforcement.

This is a plea for charity, morality and temperance in the highest sense that these terms can be used.

Charity which has not fulfilled its mission by giving food and cast-off

clothing to the less fortunate, but a charity which strives to make our people independent of the "soup kitchen" and the relief station.

Morality which goes beyond our own selfishness and aims at the uplifting of the degraded by providing them better environment and by removing the cause of their degradation and accomplishes results, not by the enactment of laws with penalty clauses attached, but by the education of the people to do what is right because it is right.

Temperance which goes beyond the question of drink, and aids us to use moderation in all things, especially in eating, drinking and in dressing. Many who do not drink to excess are intemperate in their food and dress. It is just as bad to pay an excessive price for a hat or a coat or a dinner as it is to drink or eat more than is good for us. Many and many a man and woman has been ruined by extravagance.

For the sake of humanity let us stop this extravagance which makes so many live beyond their means, and which causes a continual war between the employee and the employer, which beats down wages and runs up prices and swells the mortality bills from tuberculosis.

Each of us has his part in the great crusade against tuberculosis, depending in magnitude upon our social and financial standing, but there is something for each one to do.

Let us bring into this work the "Spirit of Christmas, Peace on earth good will towards men." A spirit which will make us a happy nation and will abolish the slums and banish tuberculosis from our land.

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