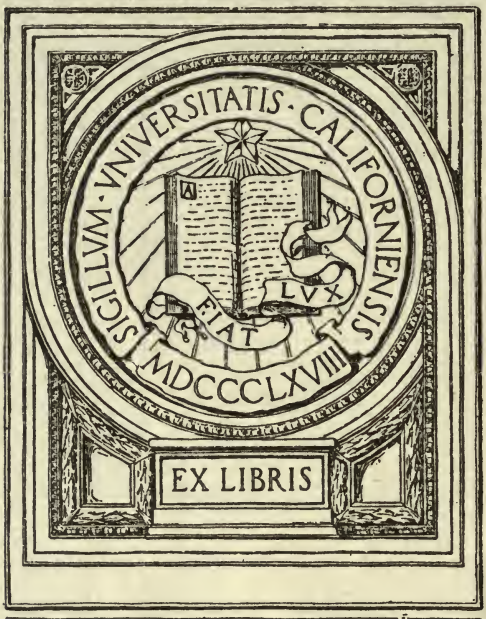
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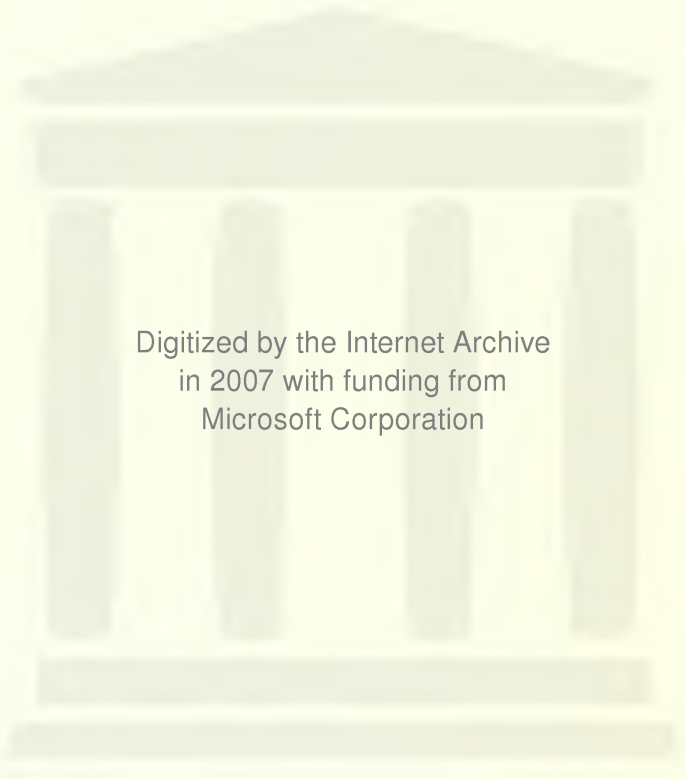


BULLETIN OF THE UNIVERSITY OF WISCONSIN

NO. 319

UNIVERSITY EXTENSION SERIES, VOL. 1, NO. 3, PP. 83-168.

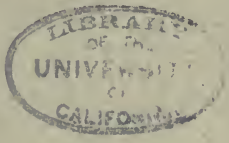
TUBERCULOSIS OR CONSUMPTION

WITH SPECIAL REFERENCE TO WISCONSIN CONDITIONS

BY

W. D. FROST, PH. D.

Associate Professor of Bacteriology
The University of Wisconsin



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OCTOBER, 1909

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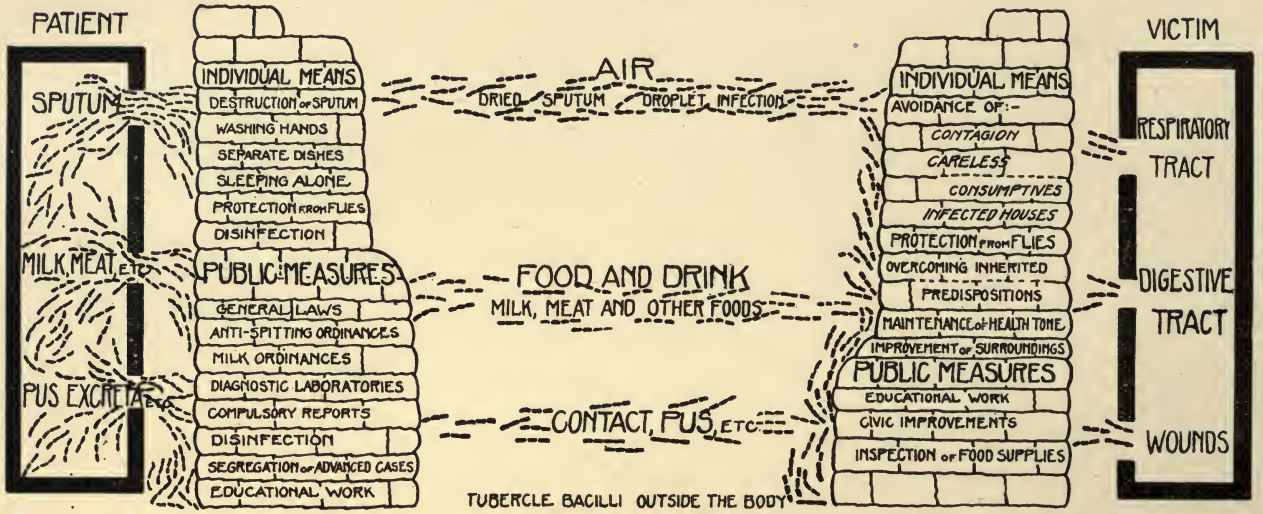
MEANS OF DISTRIBUTION AND METHODS OF PREVENTION OF TUBERCULOSIS



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TUBERCULOSIS OR CONSUMPTION

WITH SPECIAL REFERENCE TO WISCONSIN CONDITIONS

GENERAL CONSIDERATION

Tuberculosis is the greatest plague to which humanity is heir. Starting in a time previous to the dawn of medical history, its ravages have continued unabated to the present generation. Because of its insidious and chronic character, and also because of the hopefulness of its victims up to practically their last hours, it has become almost second nature to us. We are horrified at sudden outbursts of acute disease, and alarmed at many novices in mortality production, but unconcerned when the "Captain of the Men of Death" (as John Bunyan called tuberculosis) stalks forth at noonday, and slays great armies of our fellow men. Of all diseases common to mankind, it is the most widespread and most deadly. As has been correctly stated, other diseases have caused more dismay, more panic, and, occasionally, for short periods, wider destruction, but consumption has been the most constant and the most pestilential of all; and is aptly called "The worst scourge of mankind" or the "Great White Plague." Illinois Bulletin, p. 1.

PREVALENCE

Compared with Other Diseases

The death rate from this disease is greater than that from scarlet fever, measles, typhoid fever, diphtheria, whooping cough and influenza combined. (See Fig. I.) It is more fatal than smallpox, dysentery, cholera or the plague.

MORTALITY FROM TUBERCULOSIS COMPARED WITH THAT FROM CERTAIN OTHER DISEASES COMBINED.
(U. S. Census Report.)

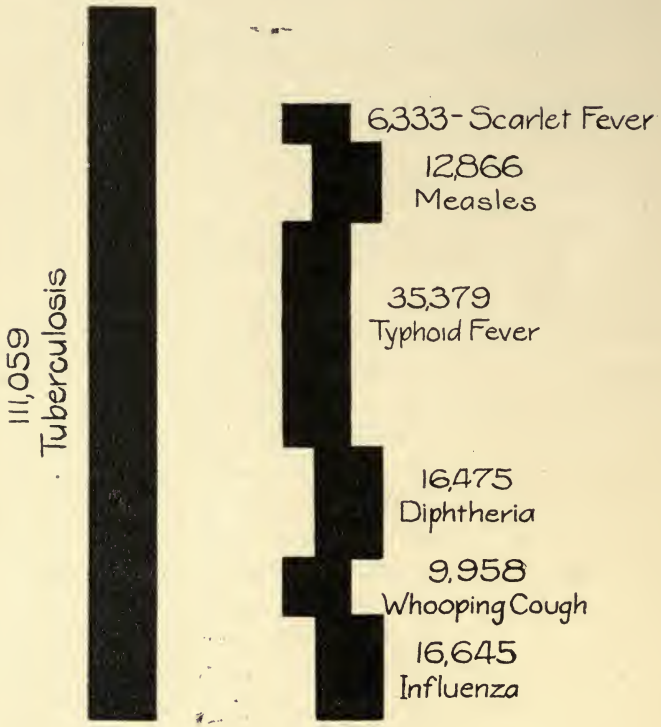


FIGURE 1

COMPARED WITH WAR

The ravages of war are insignificant compared with the deaths from tuberculosis, as a few examples will show. During the Franco–Prussian War, 40,951 men were killed or died from their wounds, but this is only about one-half as many as annually die in Prussia from tuberculosis alone. It causes in the United States, more deaths each year than occurred on both sides at the battles of Gettysburg and Waterloo. In the Civil War a great many lives were lost, in fact, it has been referred

to as the "great killing." Something over 205,000 men died, from the federal and confederate forces during the four years from 1861 to 1865, but the deaths from tuberculosis during the last four years in the United States are estimated, on a conservative basis, to be three times greater than that, i. e., 640,000. The nineteenth century was a century of many terrible wars and it is estimated that 14,000,000 died on the battle-field, but while these wars were going on, in the very same countries 30,000,000 died of tuberculosis. Japan lost, by bullet in an eighteen months' struggle with Russia, only about one-third the annual loss in the United States from tuberculosis.

Compared With Other Great Catastrophies

A few years ago when the earthquake occurred in San Francisco the sympathies of the whole country were aroused, and well they might be, but it is worth remembering in this connection that the lives lost in San Francisco at that time were only a trifle over one-half the annual death rate from tuberculosis for the city (463 to 813). More recently the world has been shocked by the earthquake in southern Italy. This is one of the greatest catastrophies of which we have any record, but the deaths, even though they approximate 200,000, only slightly exceed, if at all, the annual death rate from tuberculosis in the United States.

The Slocum disaster occurred on East River, New York, in 1904 and caused the death of 900 people. This terrible accident enlisted the sympathy of the whole nation and led to perfecting and enforcing laws regulating passenger boat traffic, not only in New York but throughout the country, and well it should; but it is worth remembering that the deaths here were less than one-tenth part of the deaths from tuberculosis which occurred in New York city alone that same year.

The Iroquois fire in Chicago in 1903 consumed the lives of over 600 people, and a horrified nation read the details in every paper in the land, but who has read of the more than twelve times that number that have died in Chicago of tuberculosis each year since then?

STATISTICS

Death-Rate

Each year the following deaths are caused by tuberculosis:

Annual death rate for the world..... 1,500,000
Annual death rate for Europe..... 1,000,000
Annual death rate for United States 150,000 to 200,000

The death-rate in the United States is about an average one when compared with the other countries of the world as will be seen by studying Fig. 2.

Number Infected at Present Time

Unless something is done radically different from the past, Norton says, "Of the 80,000,000 people living today in the United States, over 8,000,000 will die of this disease." There are, in all probability, in Wisconsin, 12,500 people infected with tuberculosis. And of those now living in the state not far from 250,000 individuals will contract the disease unless a different régime is inaugurated from the one we have had in the past.

Economic Loss

The tremendous loss from tuberculosis is suggested very strongly by a consideration of the pecuniary loss to which we are subjected by its ravages.

Various estimates have been made of what this loss amounts to in the United States. Mr. Hoffman estimated it in 1904 at $240,000,000.00. Dr. Biggs of New York city has estimated it at $330,000,000.00. More recently Mr. Hoffman (1906) has reached the conclusion that if we consider the deaths of the productive males only, the economic loss for a single year in the registration area alone is $275,030,910.00, and this area includes less than one-half of the population of the United States.

More recently still Professor Fischer has estimated the annual loss to the United States to be $1,100,000,000.00.

"This paper summarized the costs of tuberculosis in lives, disability, unhappiness, and money.

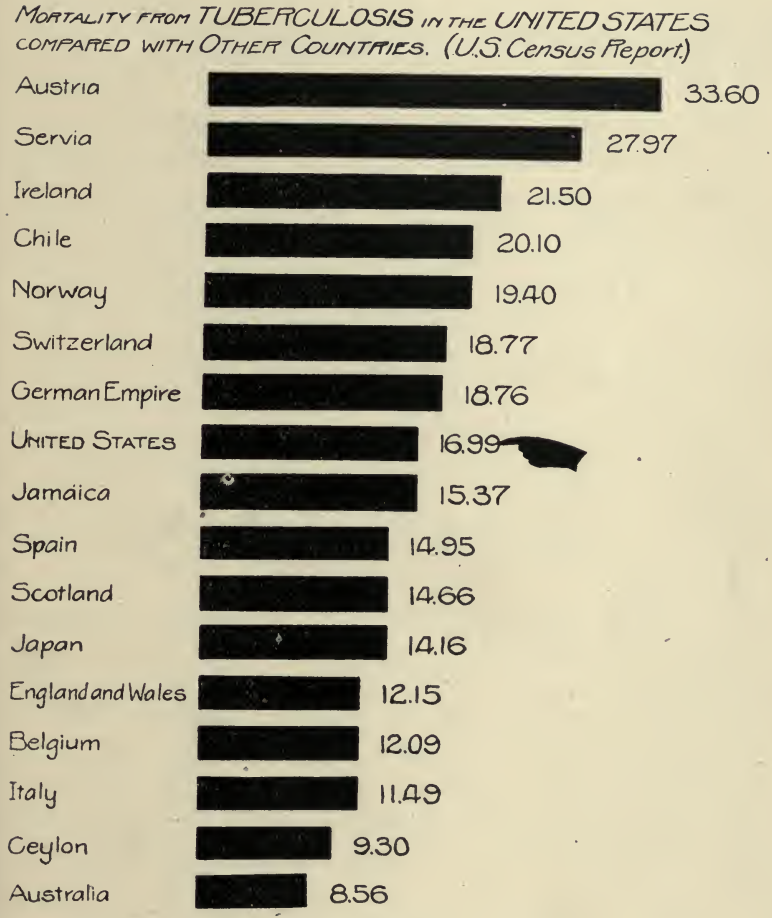

MORTALITY FROM TUBERCULOSIS IN THE UNITED STATES COMPARED WITH OTHER COUNTRIES. (U.S. Census Report)
Austria 33.60
Servia 27.97
Ireland 21.50
Chile 20.10
Norway 19.40
Switzerland 18.77
German Empire 18.76
UNITED STATES 16.99
Jamaica 15.37
Spain 14.95
Scotland 14.66
Japan 14.16
England and Wales 12.15
Belgium 12.09
Italy 11.49
Ceylon 9.30
Australia 8.56

FIGURE 2

The death rate from tuberculosis in all its forms in the United States is estimated at 164 per 100,000 of population, and the number of deaths in 1906 at 138,000. At this rate, of those now living in the United States 5,000,000 people will die of tuberculosis. The average age at death for males is 37.6 years; for females, 33.4 years. The "expectation of life" lost (though estimated on a specially high mortality rate) is at least 24 years, of which at least 17 fall in the working period. The average period of disability preceding death from tuberculosis exceeds three years, of which the latter half is a period of total disability.

The money cost of tuberculosis, including capitalized earning power lost by death, exceeds $8,000.00 per death. The total cost in the United States exceeds $1,100,000,000.00 per annum. Of this cost about two-fifths, or over $440,000,000.00 per annum, fall on others than the consumptive. An effort to reduce the mortality by one-fourth would be worth, if necessary, an investment of $5,500,000,000.00. The cost of treating patients at sanatoria is repaid many times over in lengthened working lives.

The erection of isolation hospitals for incurables is probably the most profitable method at present of reducing the cost of tuberculosis."

Dr. Melvin says, in a paper read before the International Congress on Tuberculosis, that for the United States it is fair to conclude that 10 per cent of the milch cows, 1 per cent of other cattle and 2 per cent of the hogs are infected and that this means an economic loss of not less than $14,000,000.00.

The loss, on the estimate of Professor Fischer, is compared with the value of various staple products in Fig. 3. These values are taken from the Census Report for 1900.

Indirect Effects of the Disease

"But monstrous as is this showing of tuberculosis, it is not all or even the worst half of the picture; for tuberculosis attacks every organ and tissue of the body, and hence travels under many aliases. Who then can measure the anguish, poverty, degradation, and sin which it causes! Our insane hospitals and orphan asylums, our homes and hospitals for crippled chil-

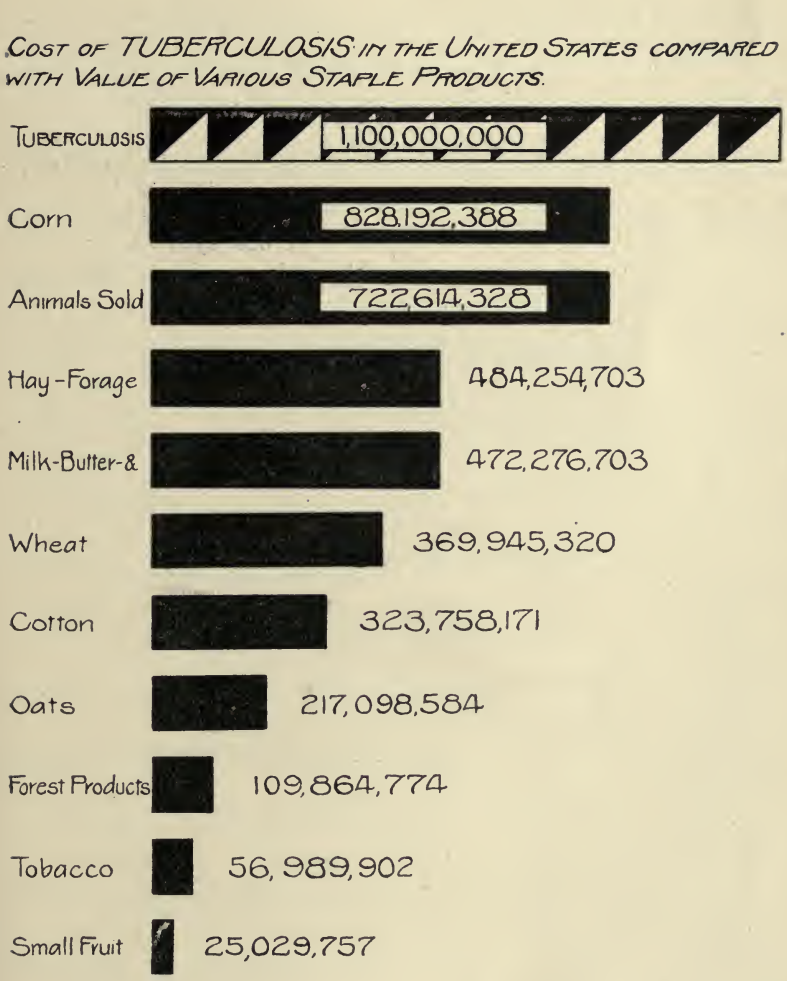

COST OF TUBERCULOSIS IN THE UNITED STATES COMPARED WITH VALUE OF VARIOUS STAPLE PRODUCTS.
TUBERCULOSIS
1,100,000,000
Corn
828,192,388
Animals Sold
722,614,328
Hay-Forage
484,254,703
Milk-Butter-&
472,276,703
Wheat
369,945,320
Cotton
323,758,171
Oats
217,098,584
Forest Products
109,864,774
Tobacco
56,989,902
Small Fruit
25,029,757

FIGURE 3

dren, our reformatories, prisons and penitentiaries, are filled with the indirect results of tuberculosis." (Flick)

"It is with a very real sense of melancholy that one contemplates the long death-roll of those of the world's great men and women who have succumbed untimely to the tubercle bacillus, which is and has been through countless generations by far the most potent of all death-dealing agencies. Had it not been for this detestable parasite, Bastien Le Page might have given us another Joan-of-Arc to feast our eyes upon; Rachel might for many years have continued to permeate the spirits of her audience with the divine fire that was in her. Our navy did well enough in the 1812 war, as all the world knows; but what a rip-roaring time there would have been if John Paul Jones had lived to take a hand in it. We might be reading some more of Stephen Crane's splendid war stories; we might have had some more of Robert Louis Stevenson's delicious lace-work; Schiller might have given us another Song of the Bells; we might have taken another 'Sentimental Journey' with Laurence Sterne; Henry Cuyler Bunner might have continued to delight us and to touch our hearts; John Keats might have given us another 'Endymion.' Had the tubercle bacillus permitted, Nevin might have vouchsafed us another 'Rosary;' von Weber another 'Euryanthe Overture;' Chopin might have dreamed another 'First Polonaise;' and the tender flute notes of Sidney Lanier might even now be heard. Maria Constantinovna Bashkirtseff, Zavier Bichat, John Godman, Rene Theophile, Hyacinth Laennac, Henry Purcell, John Sterling, Henry Timrod, Artemus Ward, Henry Kirke White, Henry David Thoreau, Baruch Spinoza—such names as these are but a moiety among those of the world's nobility, whose precious lives were cut off in their prime by the 'Great White Plague.'" (John B. Huber, in *Popular Science Monthly.*)

CONDITIONS IN WISCONSIN

Death-Rate in the State at Large

Census Figures (1900). Tuberculosis is the most important single cause of death in Wisconsin. The census report of 1900 shows that 2,175 people died of this disease in one year.

State Board of Health Figures (1908). This past year, 1908, 2,441 cases have been reported to the State Board of Health, so that it is certainly true that at least 2,500 people in this state die each year from this disease. (See Fig. 4).

Compared with Other States in the Registration Area. The death rate from this disease in this state when compared with that in other states in the registration area shows up well, as will be seen by reference to Fig. 5.

Compared with the State National Guard. What a terrible thing it would be to have every man in the National Guard for the state destroyed in a single year because of the outbreak of some death-dealing agency! Yet one will see, by reference to the accompanying figure, (Fig. 6) that the ordinary death roll from tuberculosis is nearly equal to the complete strength of our Guards and that the standing army of the tuberculous for the state is about five times the stength of the governor's Guard.

The distribution of the deaths about the state are shown in Fig. 7, where the number of deaths per 10,000 inhabitants are shown for each county. The approximate number is shown by the number of dots within the small square in each county (the actual numbers are given in each case in arabic numerals). Where a particular county has a death rate higher than the average for the state it has been cross hatched. It will be noted in a general way that the higher rate occurs in those counties bordering the great lakes, or those having a rather large urban population.

RELATIVE IMPORTANCE OF CERTAIN DISEASES IN WISCONSIN

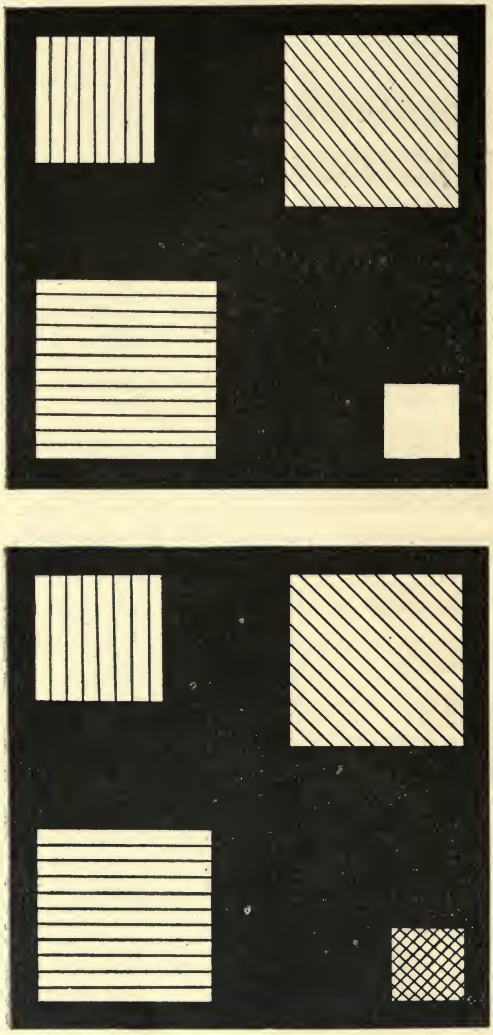


FIGURE 4

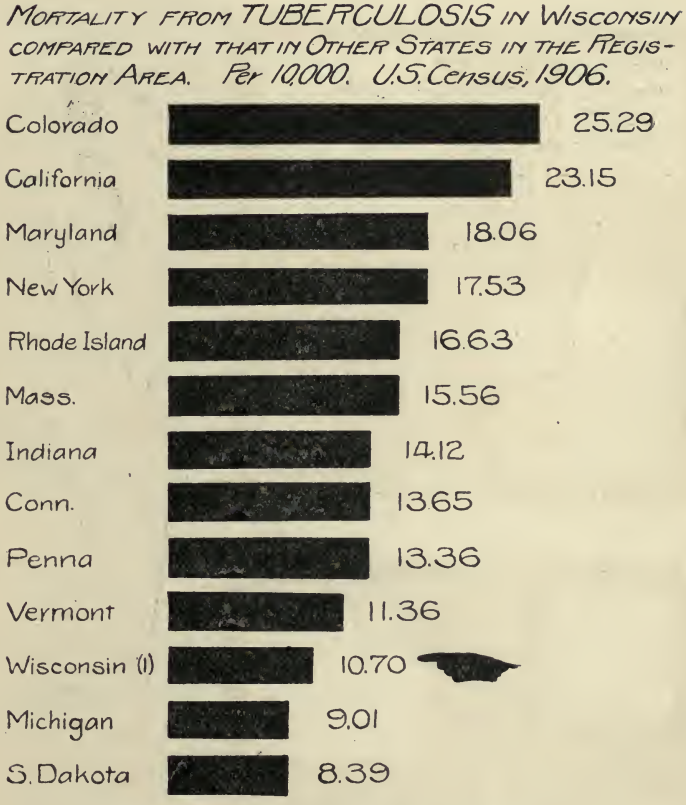

MORTALITY FROM TUBERCULOSIS IN WISCONSIN COMPARED WITH THAT IN OTHER STATES IN THE REGISTRATION AREA. PER 10,000. U.S. CENSUS, 1906.
Colorado
25.29
California
23.15
Maryland
18.06
New York
17.53
Rhode Island
16.63
Mass.
15.56
Indiana
14.12
Conn.
13.65
Penna
13.36
Vermont
11.36
Wisconsin (1)
10.70
Michigan
9.01
S. Dakota
8.39
(1) Rate for 1908, other not available.

FIGURE 5

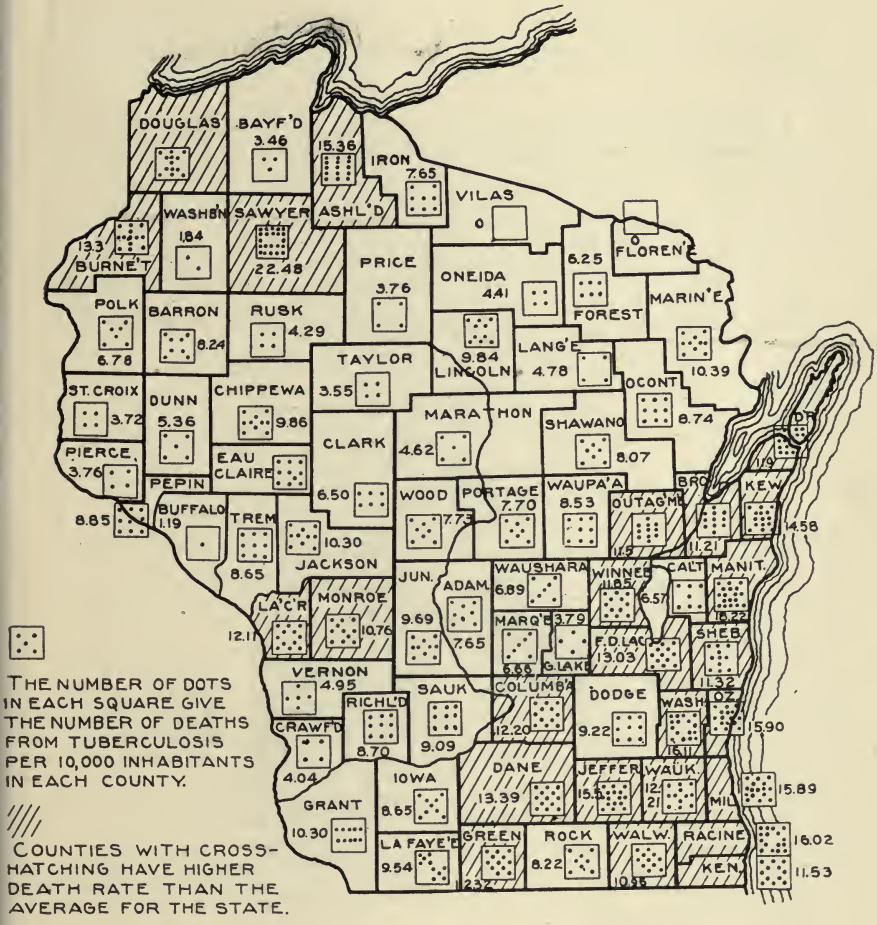
STRENGTH OF NATIONAL GUARD IN WISCONSIN COMPARED WITH THE ANNUAL DEATHS FROM TUBERCULOSIS, AND, ALSO WITH THE NUMBER OF LIVING CASES OF TUBERCULOSIS.

3000
State National Guard

2500
Annual Deaths from TUBERCULOSIS

12,500
Living Cases of TUBERCULOSIS

FIGURE 6



THE NUMBER OF DOTS IN EACH SQUARE GIVE THE NUMBER OF DEATHS FROM TUBERCULOSIS PER 10,000 INHABITANTS IN EACH COUNTY.

COUNTIES WITH CROSS-HATCHING HAVE HIGHER DEATH RATE THAN THE AVERAGE FOR THE STATE.

FIGURE 7—DISTRIBUTION OF TUBERCULOSIS IN WISCONSIN

The Disease in Milwaukee

Milwaukee, Wisconsin's metropolis, has a good share of tuberculosis. For some years the deaths have been about 400 per annum.

Compared with Other Large Cities. While this is a large number of people to lose each year, reference to Fig. 8 will show that many of the large cities of this country have a death rate exceeding 12.79 per 10,000 which is that of Milwaukee.

Distribution through the City. The distribution of the disease through the city is shown in Fig. 9. The number of dots within the squares in each ward indicates the approximate number of deaths per 10,000 inhabitants, the actual numbers are given in the arabic numerals.

Rural Conditions in Wisconsin

The death rate from tuberculosis is greater in the cities of Wisconsin than in the country districts as is indicated on p. 17, but it is surprising how much is found in the open country. This is very forcibly brought to mind by studying a paper prepared by Dr. Fred Johnson[1] of North Freedom.

In his paper Dr. Johnson contends that the disease in the country runs a mild course and if death results it is only after a protracted illness. He advances the idea that the death rate in the cities is appreciably augmented by the influx of country stock already infected and which, under the less favorable environment of the city, develops an acute form of the disease. This is a point well worth considering.

---

[1] This is from a paper, read at the Milwaukee meeting of the State Medical Society, appearing in the May number of the *Milwaukee Medical Journal*, an advance copy of which was kindly sent by Dr. H. E. Dearholt.

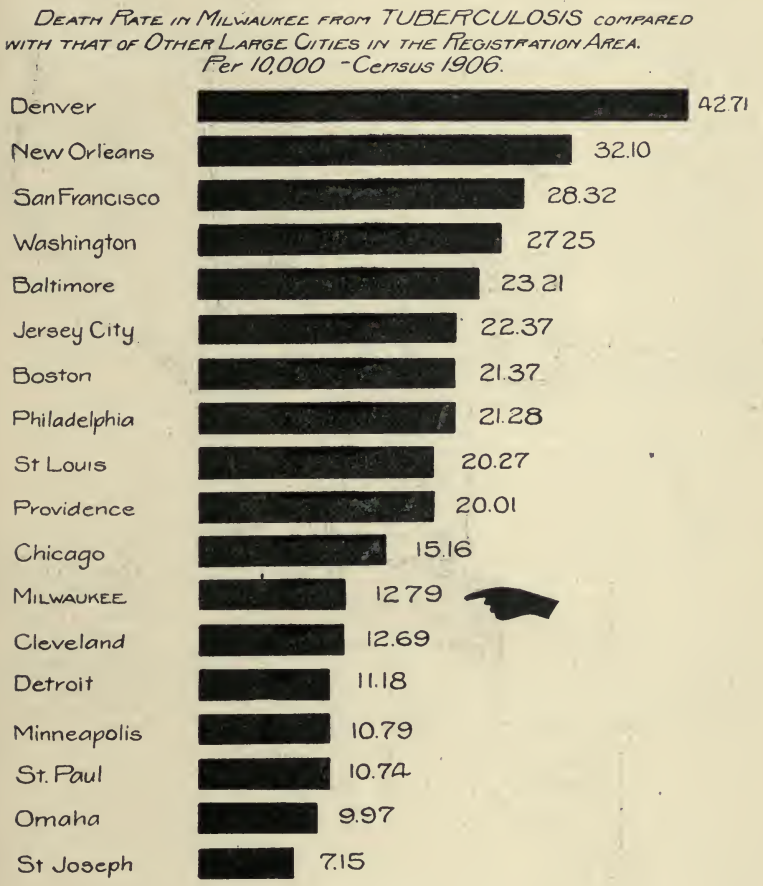
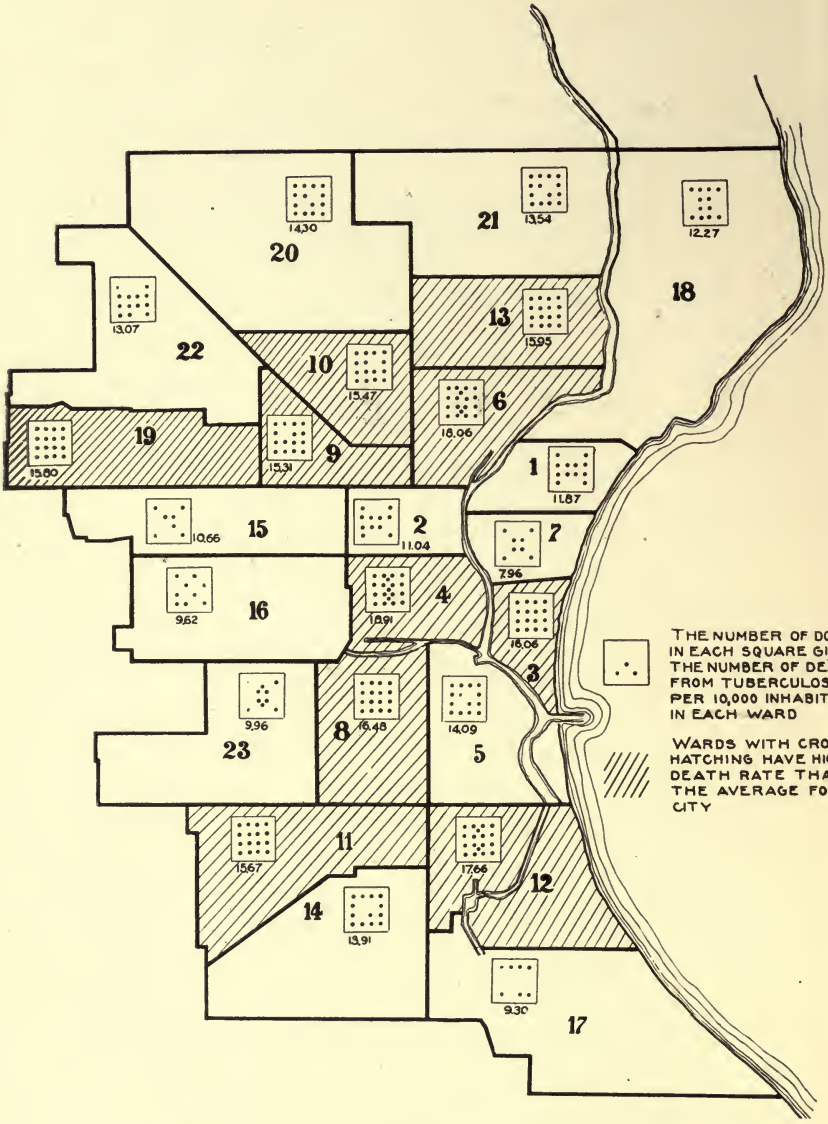

DEATH RATE IN MILWAUKEE FROM TUBERCULOSIS COMPARED WITH THAT OF OTHER LARGE CITIES IN THE REGISTRATION AREA.
Per 10,000 - Census 1906.
Denver 42.71
New Orleans 32.10
San Francisco 28.32
Washington 27.25
Baltimore 23.21
Jersey City 22.37
Boston 21.37
Philadelphia 21.28
St Louis 20.27
Providence 20.01
Chicago 15.16
MILWAUKEE 12.79
Cleveland 12.69
Detroit 11.18
Minneapolis 10.79
St. Paul 10.74
Omaha 9.97
St Joseph 7.15

FIGURE 8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15.31
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15
10.66
2
11.04
7
7.96
16
9.62
4
10.91
16.06
3
9.96
23
8
16.48
14.09
5
11
15.67
17.66
12
14
13.91
9.30
17
THE NUMBER OF DOTS IN EACH SQUARE GIVE THE NUMBER OF DEATHS FROM TUBERCULOSIS PER 10,000 INHABITANTS IN EACH WARD
WARDS WITH CROSS-HATCHING HAVE HIGHER DEATH RATE THAN THE AVERAGE FOR THE CITY

FIGURE 9

THE NATURE OF THE DISEASE

Tuberculosis is a germ disease and is caused by the growth of the Bacillus tuberculosis. When this germ gets into the body it grows in the tissue, causing the destruction of the body cells in its immediate vicinity. This leads to the emigration, from the blood vessels, of the white blood corpuscles to the focus of infection and, later, to an increase in the number of tissue cells immediately surrounding the focus of infection, causing the production of nodules or tubercles, hence the name, *tuberculosis*. This germ may grow in any part of the body. In men the most frequent seat of infection is the lungs, but it may occur in any part.

Tuberculosis, when it attacks the skin is spoken of as lupus vulgaris; when it attacks the spinal column; as Pott's Disease; when it is in the hip joint, it is hip joint disease; when it is in the glands of the neck, it was formerly spoken of as scrofula.

It may attack the brain, producing hydrocephalus, or the coverings of the brain, producing meningitis. It may attack the intestines, or the glands of the mesentery, producing tabes mesenterrica, etc.

When the disease is located in the lungs, and especially when secondary infection has taken place, it is spoken of as consumption. The relative frequency of consumption to the other human forms of the disease in the United States is as nine to one.

SYMPTOMS OF THE DISEASE

Tuberculosis, in its early stages, differs in different individuals, so that it is not possible to give any definite rules for its detection, but, as we shall see a little later, it is very important that an early diagnosis be made so that treatment can be begun early. Among the first symptoms of the disease that may be mentioned is loss of appetite or falling away in weight, fatigue on slight exertion, a general feeling of languor and lack of energy and ambition. In the early stages of the dis-

ease fever frequently makes its appearance in the afternoon and evening, and night sweats appear. A cough is usually present, which is more noticeable in the morning than at night. If any of these symptoms persist, one ought to have a careful examination made to determine whether or not the disease has been established. "As the disease progresses, these symptoms become more distinctive. An evident wasting, daily fever, the unnatural brightness of the eyes, the flushed cheek, the night sweats, the continued cough and expectoration, indicate more definitely the invasion of the disease. Hemorrhage from the lungs, following or associated with these more or less characteristic symptoms, will point with reasonable certainty to the existence of consumption."

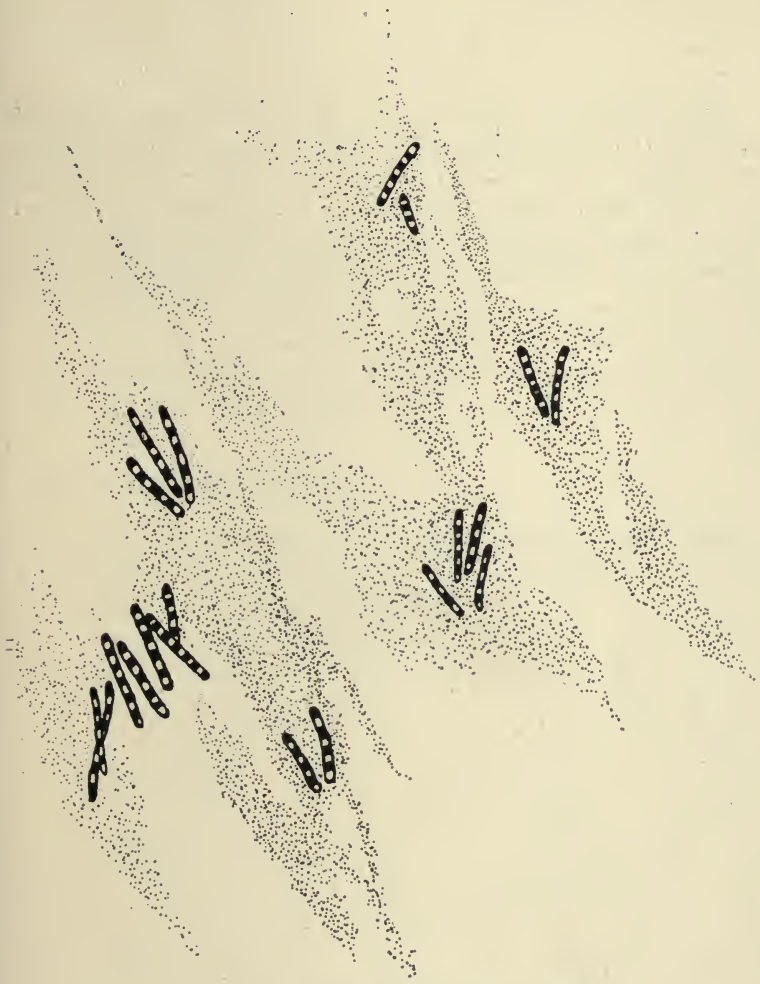

FIGURE 10—BACILLUS TUBERCULOSIS

THE CAUSES OF TUBERCULOSIS

Exciting Cause

The Bacillus of tuberculosis was discovered by Robert Koch in 1882. It is a rod shaped bacterium, and, while the different individuals vary somewhat in size, it is usually about 1/8000th of an inch long. (Fig. 10). It is a strict parasite, although it can be cultivated outside of the body on special culture media; it grows well in glycerine bouillon, or broth; on potato to which a little glycerine has been added, and on hen's eggs which have been coagulated. Cultures can be inoculated into animals, and the various natural manifestations of the disease can be reproduced. There is no doubt that the germ is the cause of the disease.

Predisposing Causes

While tuberculosis can not occur unless the germ of this disease enters the body from without, it is also true that this germ may enter the body, even many times, without producing the disease, because of the natural resistance of the body. There are many influences, however, that tend to weaken these natural powers of resistance, or increase the susceptibility of the individual to the disease. These factors, or influences, are frequently spoken of as predisposing causes. Some of the most important are age, unhygienic surroundings, race and heredity.

Heredity. Until quite recently it has been very generally believed that tuberculosis was an inherited disease. Tuberculosis may be transferred from parent to child, and a small number of such cases are on record. But, compared with other means of distribution, the disease is so infrequently acquired this way, it can be neglected as a means of distribution. A predisposition may, it is claimed by some authorities, be conferred by inheritance. By this is meant an increased susceptibility to the disease, due to a lowered health tone, weak lungs, narrow chest, etc.

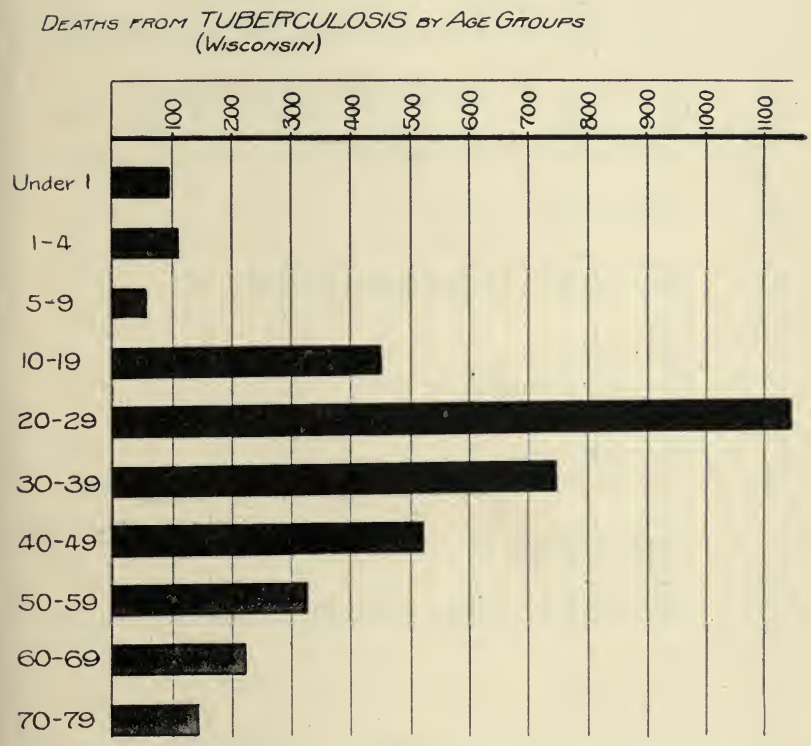

FIGURE 11

1909

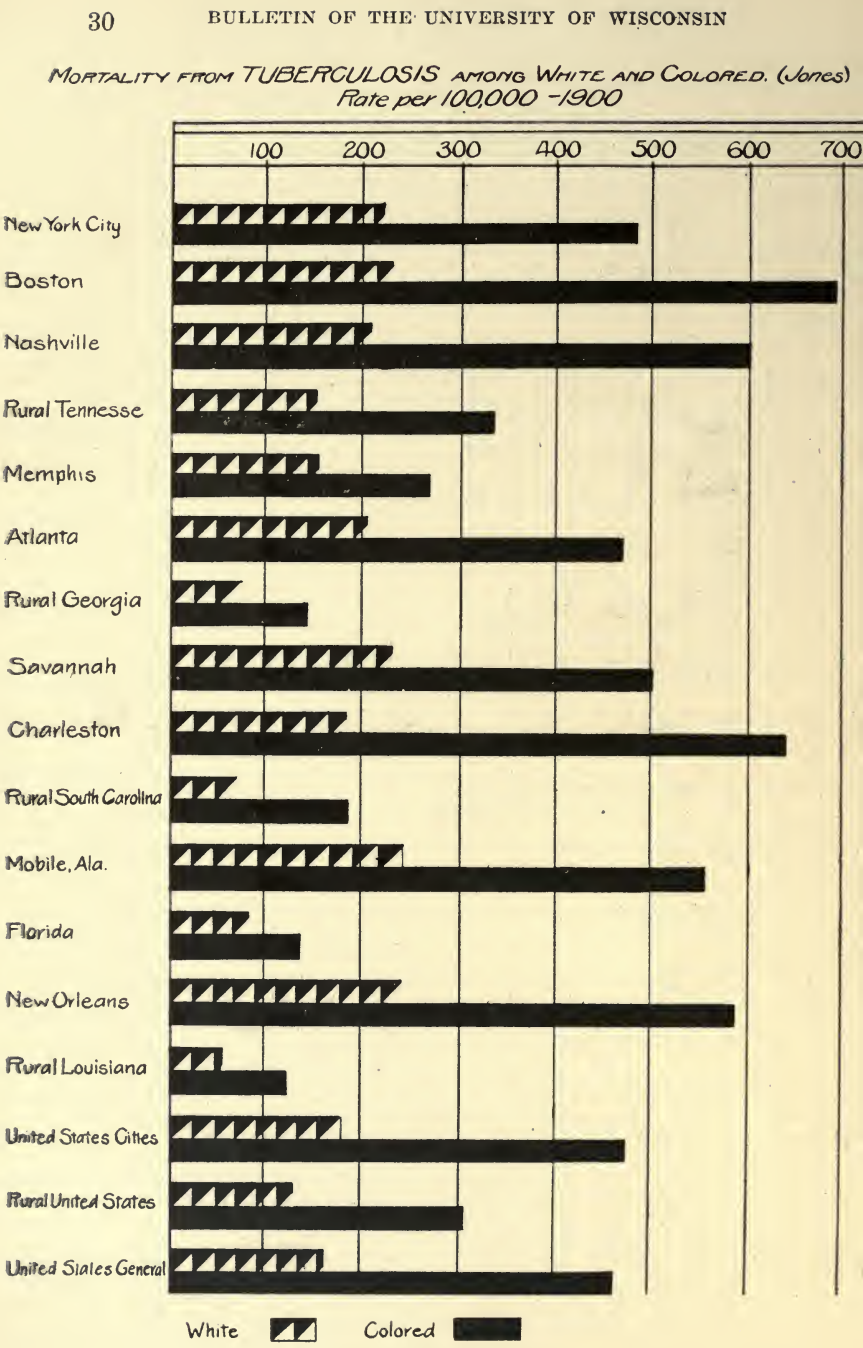
MORTALITY FROM TUBERCULOSIS AMONG WHITE AND COLORED. (Jones)
Rate per 100,000 -1900
100
200
300
400
500
600
700
New York City
Boston
Nashville
Rural Tennesse
Memphis
Atlanta
Rural Georgia
Savannah
Charleston
Rural South Carolina
Mobile, Ala.
Florida
New Orleans
Rural Louisiana
United States Cities
Rural United States
United States General
White
Colored

FIGURE 12

Age. Tuberculosis not only kills a greater number of people than any other one disease, but it carries them off in the very prime of life, cutting them low when they are most useful to themselves and to others. (Fig. 11).

Race. The influence of race is marked. The death rate from tuberculosis among the colored people and the Indians is much higher than among the white people. Fig. 12 indicates the relative prevalence of this disease among the white and black people in some of the leading cities in the United States, and it will be noticed that in all cases the death rate among the colored is far in excess of that among the white people. So that it is true that among the negroes every other death in the prime of life is due to tuberculosis. Tuberculosis before the Civil War was not as prevalent as at the present time among the colored people, but while the death rate has continually decreased among the whites it has annually increased since the war among the blacks, due to change of conditions. Before the war the negro was the white man's property and as such was cared for much better than now that he is his brother simply. The Indians are also very susceptible to tuberculosis at the present time. In their native state they were probably quite free from the disease, but now the death rate from this disease among them far exceeds that among the whites.

Occupation. One of the most striking predisposing causes is occupation. The effect of different occupations is shown in Fig. 13. Laborers and servants lead the list, while agriculturists and other outdoor workers are at the foot.

The relative importance of outdoor and indoor occupations as predisposing causes is shown in Fig. 14.

One of the most important factors is the amount and character of the dust in the air. Certain irritating dusts produce a high death rate even in out door occupations, as seen in the case of quarrymen, while an excessively high rate occurs among cutlers, file makers, etc.

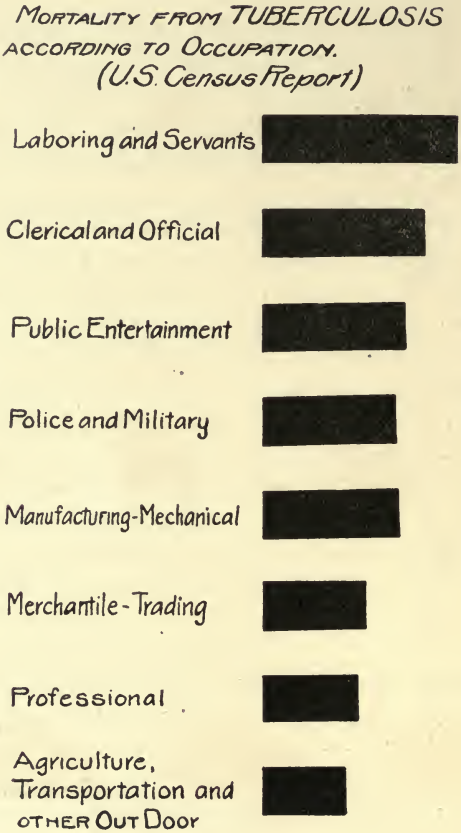
MORTALITY FROM TUBERCULOSIS
ACCORDING TO OCCUPATION.
(U.S. Census Report)
Laboring and Servants
Clerical and Official
Public Entertainment
Police and Military
Manufacturing-Mechanical
Merchantile-Trading
Professional
Agriculture, Transportation and OTHER OUT DOOR

FIGURE 13

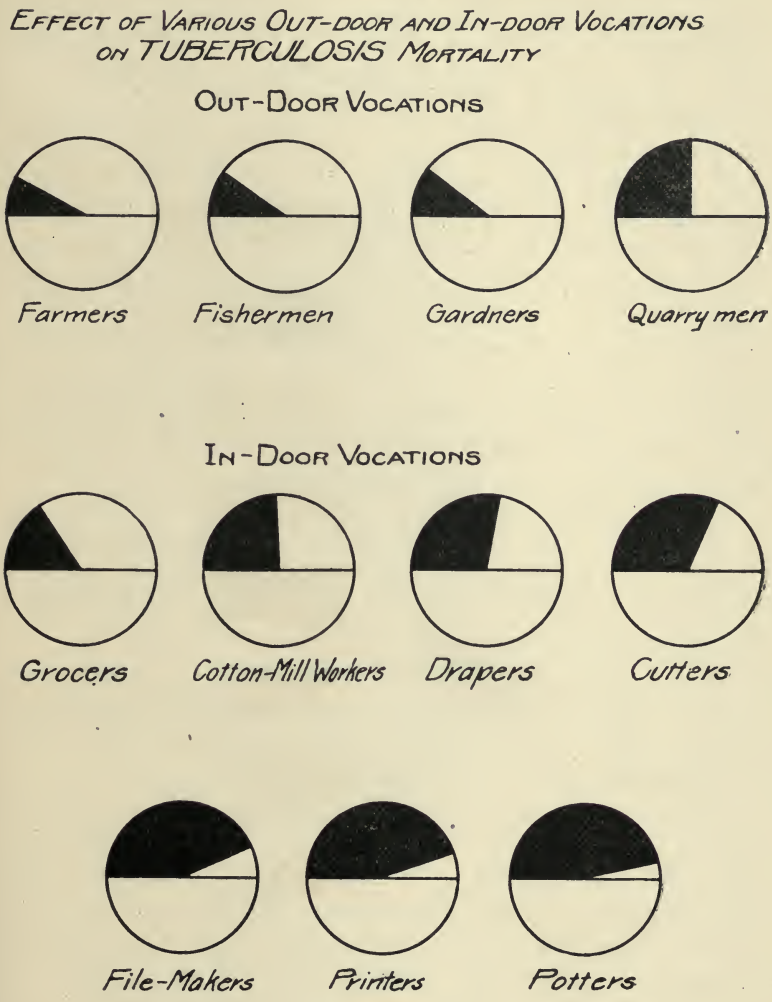
Effect of Various Out-door and In-door Vocations on TUBERCULOSIS Mortality
Out-Door Vocations
Farmers
Fishermen
Gardners
Quarry men
In-Door Vocations
Grocers
Cotton-Mill Workers
Drapers
Cutters
File-Makers
Printers
Potters

FIGURE 14

Crowding. The effect of crowding is also marked. The death rate is higher in the densely populated sections of a great city than it is in the less crowded portions. In the great cities, however, over-crowding may be necessary in our present state of development but in the smaller towns and rural districts such conditions as those shown in Fig. 16 are not necessary. The effect of outdoor vocations in contrast with indoor vocations is strikingly shown in Fig. 14. That those employed out of doors are not free from the harmful influence of irritating dust, however, is shown in the high rate from tuberculosis among quarrymen.

Bad Housing. This is an important factor. Too frequently, in the country, as well as the city, houses are constructed with little or no thought of the effect on the health of the occupants. They are poorly lighted, damp, while important rooms, such as living and bed rooms, are over crowded.

Poor Ventilation. The lack of proper ventilation in the house or work room is a powerful factor in predisposing towards the disease. Far too many buildings are without proper means of ventilation, but it frequently happens that the facilities provided are not properly used.

Houses are too frequently in an *unsanitary condition,* due to lack of cleaning, or improper methods, as dry sweeping and dusting, damp and dirty cellars, halls, and back yards, defective plumbing, etc.

Dust, either inside or outside, is a predisposing cause. Certain dusts are much more irritating than others and are, therefore, more harmful. The effect of this is shown in Fig. 14 where the death rate of indoor and outdoor occupations are compared.

The smoke nuisance is a real danger, and as communities become more and more enlightened this will be obviated.

A number of the predisposing causes of tuberculosis are graphically shown in Fig. 15.

Infected Buildings. Where careless consumptives live in a house for some time, the house becomes infected. Such houses are not uncommon, and when these houses are bad and then are occupied by careless consumptives they become veritable hot beds of the disease. In the larger cities, there are whole blocks


IMPORTANT PREDISPOSING CAUSES OF TUBERCULOSIS
INTEMPERANCE AND OTHER EXCESSES.
THE CLOSED WINDOW.
OVERWORK.
CROWDED SLEEPING LIVING AND WORKING ROOMS.
SMOKE AND DUST.
MOUTH BREATHING OFTEN DUE TO ADENOIDS.
NEW YORK STATE DEPARTMENT OF HEALTH.

FIGURE 15

known as "lung blocks." Wisconsin undoubtedly has many of these infected houses. The Tuberculosis Commission shows such a block in a map of a portion of the city of Milwaukee. (Fig. 16).

Constant Association with the Disease. Constant association with the disease and contact with infected quarters are a fruitful source of the disease, and many a family has suffered nearly as badly as the family whose record is indicated in Fig. 17.

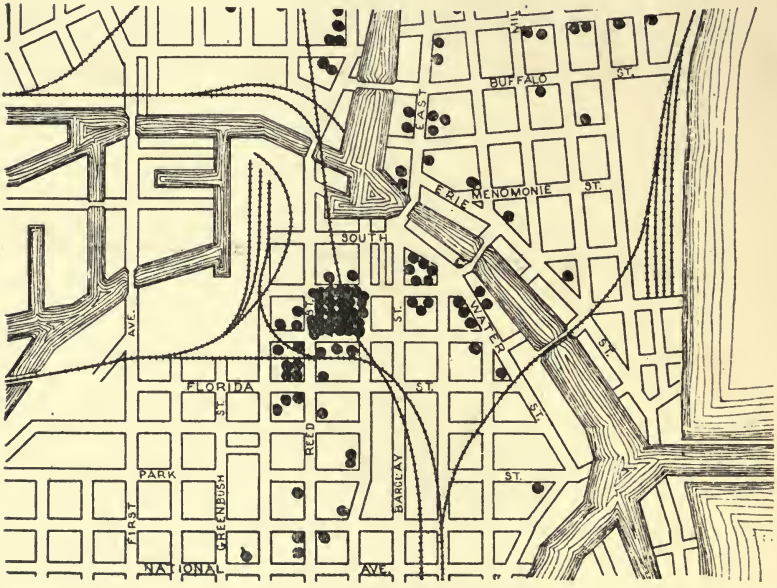

FIGURE 16.—SECTION OF A PORTION OF CITY OF MILWAUKEE, SHOWING LOCATION OF TUBERCULAR CASES RECEIVED AT COUNTY HOSPITAL FROM 1893 TO 1903.

Thirty-one cases came from three street numbers in one block south of the river. As these represent only cases admitted to the hospital, the total number of tubercular cases would be greatly in excess of this.

EFFECT OF CONTACT AND EXPOSURE—MARYLAND TUBERCULOUS FAMILY FOUND BY A NURSE

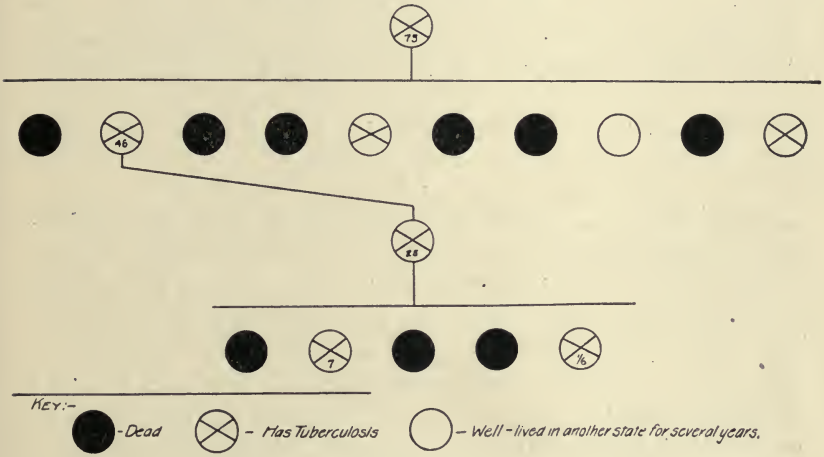

FIGURE 17

MEANS OF DISTRIBUTION

The germ of *tuberculosis* does not grow in nature outside of the body of its host. It may persist for sometime outside of the body but does not increase in numbers. The disease is therefore communicated more or less directly from one individual to another.

Hence in considering the method of distribution of this disease it will be necessary to discuss the ways in which the germ leaves the body of its victims; the means by which it may be transported from one individual to another, and the avenues by which it gains entrance to its new host, or its portals of entry.

Ways in Which the Tubercle Bacillus Leaves the Sick Person

Dried Sputum. The germ of *tuberculosis* leaves the diseased body through various avenues, but particularly, when the disease is located in the lungs, through the sputum. It has been estimated that a consumptive in the last stages of the disease may give off in a single 24 hours as many as 7,000,000,000 of these germs. The sputum containing these dries and thus the germ gets into the air. The tubercle bacillus is unable to grow outside of the body, but it possesses very pronounced powers of resistance, and may remain in a living condition for weeks and months, especially if the sunlight cannot get at it very directly. Dirt, dampness and darkness are the friends of the tubercle bacillus and help it to prolong its life outside of the body for a long period of time.

Droplet Infection. While the germs do not leave in the breath, it must be noted that tuberculosis may be transmitted by what is known as "Droplet Infection." When one speaks especially loudly or forcefully, coughs or sneezes, there is driven out of the mouth a fine spray, composed of finely divided sputa. These "droplets" contain, in the case of consumptives, the germs of tuberculosis, and, if these are breathed in by a susceptible individual, may cause the disease. The danger is great only when one remains very near a tuberculous

patient for a considerable length of time. At a distance of three or four feet the danger practically ceases. From a consumptive these droplets are constantly falling on the floor and various articles of furniture, and it is necessary that this source of danger should be avoided.

Pus, etc. In the case of tuberculous ulcers, abcesses, etc., the discharge contains the germ and must be carefully handled to prevent the possibility of infection.

Excreta. Recent investigation by the United States Department of Agriculture has shown that cattle suffering from slightly developed tuberculosis may give off tubercle germs in the excreta, and the more general the infection the greater the number. Milk becomes infected by getting manure in it.

Man's excrement may contain the germ, especially where sputum is swallowed, or where the disease is located in the intestinal tract and, perhaps, under other conditions also.

Milk. Cows even when suffering from tuberculosis, do not usually cough and hence there is little danger from their sputum, but the milk may contain the tubercle germ not only, as claimed a few years ago, when the udder is affected but also when the infection exists in other parts of the body.

Meat. In cattle, especially, the disease is located in the internal organs and not in the muscles, hence the danger of infection is not so great as it might otherwise be, nevertheless, it has been shown that the germ is present in the meat from tuberculous cattle, and were it not for the fact that meat is usually cooked before it is eaten it would be a more important factor in the distribution of the disease.

Vehicles of Transmission

Air is a common vehicle of transmission for the tubercle bacillus. The probability, however, is that the germ is not carried great distances, and even at short range it seems likely that a rather large number of germs would be necessary to produce infection, so that prolonged exposure to air ladened with the germ of tuberculosis would be necessary.

Droplets of sputum have been mentioned and are undoubtedly of great importance.

Food, such as milk and meat from infected animals and other foods which have become contaminated by flies, or otherwise, may be the means of conveying this disease germ.

In this connection it is necessary to call attention to the importance of the house fly as a means of carrying the germ from tuberculous sputum to food. Experiments have shown that the fly can carry great numbers of germs on its body and the enormous numbers of these pests in the homes of even people who claim to be decent, make the possibilities of infecting food in the same and neighboring houses a matter of no little concern.

Avenues of Entrance to the Body

Respiratory Tract. The common belief is that the germ in the dried sputum is breathed into the lungs and there starts up an infection in the vast majority of cases.

Digestive Tract. It is also possible for the germ to be taken into the system through food and drink, and this means of ingress is undoubtedly of very great importance.

A few years ago, Robert Koch made the statement that human and bovine tuberculosis were two distinct diseases, and that they were not intercommunicable, but since then a great deal of work has been done, and Ravenel and others have very conclusively shown that bovine tuberculosis can be communicated to man. This is especially true in children, and the chief danger to the young is undoubtedly due to this source of infection.

Inoculation. It is possible for a person to become infected through a cut or wound. This sometimes occurs with veterinarians, and others who work on the bodies of animals which have died of this disease, but as a general means of distribution it is not important.

METHODS OF PREVENTION

Tuberculosis is a preventable disease. It is quite generally believed, among the well-informed, that it could be wiped out in a generation or two if it were possible to put into operation the measures already known to be effective. The methods to be used are well worthy of the most careful consideration. For convenience it is well to divide this subject into those methods which are within the means of the individual and those which can only be carried out by means of public measures.

Individual Measures

Those sick with the disease are the chief source of danger, and it is to them that attention should first be turned.

Care of the Sick; Early Diagnosis. This is of the utmost importance. If the disease is suspected every possible effort should be made to arrive at an early diagnosis. If a person is suffering from this disease, that individual should know it just as soon as possible. Physicians should tell their patients the facts at the earliest possible moment and begin specific treatment—any other course is criminal neglect.

Destruction of Sputum. In the campaign against the tubercle bacillus, the individual can do much. We have seen that the sputum is the chief means of spreading the disease. It is, then, of fundamental importance that the sputum of the consumptive should be destroyed before it has had time to dry. This can be done in several ways. In the first place, it is true that the consumptive does not need to cough nearly so often as he thinks he does; much can be accomplished by schooling the sick to exercise great self-control in this regard. The control is as beneficial to the patient as to those surrounding him. It should be emphasized, however, that the consumptive should never swallow his own sputum, and if it is necessary to cough, the material should be coughed up and spit out into a properly prepared spittoon or other receptacle. If ordinary spittoons are used, they should be partially filled with a disinfecting solution, raised from the floor and placed on stands, in niches or elevated boxes. Good forms of these are seen in Fig. 18.

TYPES OF SPITTOONS

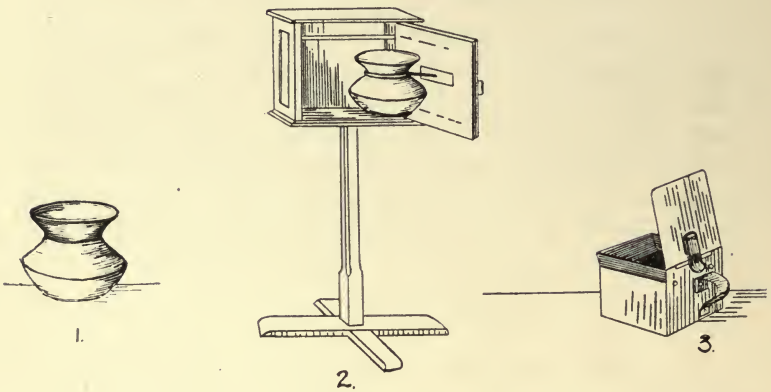

FIGURE 18

These should be very carefully cleaned at least every 24 hours, and, if the disinfectant is not used, burned. In the house or at the bedside, a paper spitting-cup is quite ideal. This, with the contents should be burned daily. It is especially important that flies should be kept from the sputum, since they are able, and frequently do, carry the bacilli from sputa to various articles of food. For the individual out of doors, a pocket sputum cup is frequently desirable, but not necessary. Handkerchiefs should never be used. It is best to carry in one pocket small folded pieces of paper, and in another, a paper bag. A piece of paper should be used each time it is necessary to spit, and then put in the paper bag. When convenient, or at the end of the day, this paper bag with its contents should be burned. The handkerchief should never be used, since its use supplies practically ideal conditions for the spread of the germ.

Washing the Hands with hot water and soap, or in a disinfecting solution, is necessary before each meal, and whenever they become soiled with the material from nose or throat. Persons suffering from consumption should be very careful about shaking hands with others, since, as Flick says, this is a "handy way of distributing the disease." Kissing or fondling others,

especially babies, should not be done. Mothers affected with the disease need to be especially careful.

Separate Dishes. Consumptives should have their dishes washed separately and sterilized by keeping them for some minutes, 10 or 15, in boiling water and should not use the same dishes as the rest of the family, unless they are all sterilized.

Sleeping Alone. Consumptives, furthermore, ought to sleep alone, and, if possible, in separate rooms. The rooms should be as simply furnished as possible, kept scrupulously clean and, if of necessity within the walls of the house, perfectly ventilated.

Flies. Special care should be taken to keep the sick room free from flies.

Disinfection. When a consumptive leaves a house or moves from one room to another in the same house the vacated apartments should be thoroughly disinfected with formaldehyde gas, directions for which are given in the appendix. A periodic disinfection of the apartments of a consumptive would be a safe and rational procedure. Formaldehyde gas should be used and wood work and furniture washed with a disinfecting solution (see appendix).

Other points in the care of the sick room worthy of consideration are:

"Young children should not be allowed to play in the sick room of members of the household having any disease of the lungs. Children should be absolutely prohibited from playing *on the floor* of the sick-room.

"Personal cleanliness of a tuberculous individual is extremely important. This is especially true of those in the advanced stages of the disease.

"The room for a tuberculous patient should be carefully chosen and equipped. It should have a southern exposure if possible. Painted or whitewashed walls are better than papered walls. The furniture should be plain and without upholstering. If cushions are used on chairs or couches they should be covered with washable material, which should be frequently laundered, or with cheap goods, which should be destroyed and replaced from time to time. The bed clothing should all be of washable material. Quilted coverings should not be used.

"The floor should be washed quite frequently with a hot soda-lye solution. The floor should be bare or covered with rugs that can be easily disinfected by washing.

"Heavy curtains should not be permitted in the room. Curtains of washable material may be used over the windows. Roller shades are not objectionable unless they exclude too much sunlight.

"The room should not be dry-swept or dusted. Remove the dust from the furniture, etc., with a cloth wet with a disinfecting solution (see appendix).

"The windows of the room should be kept open as much as possible.

"The cardinal principles to be observed in the sick-room of a tuberculous patient are CARE OF THE SPUTUM, CLEANLINESS, SUNLIGHT, AND FRESH AIR.

"The washable clothing of a tuberculous patient should be placed in a disinfecting solution (see appendix) at once upon removal from the room." Minnesota State Board of Health.

Care of the Well

Avoidance of Contagion. Now that we know that tuberculosis is not inherited but is always contracted from some previous case, it is very important for everyone to do all in his or her power to avoid contracting the disease.

Following out this idea, it is important first of all to avoid too close contact with one suffering from the disease, especially if such a person is careless in the care of himself.

The Unteachable Consumptive. The careful consumptive, who is informed in regard to the means of distributing the disease, is not a dangerous person to live with; but many consumptives are ignorant and careless and, what is much worse, are unteachable. Such persons are dangerous to live with, and must, in the future be forcibly removed to a place where they are not liable to infect others.

Tuberculosis "Nests." Another thing to be avoided is the infected house. Whenever one suffering from the disease vacates an apartment, it should be disinfected; a person moving into such rooms, however, should not take it for granted that

disinfection has been properly performed but should have sufficient proof, or see that it is done over again.

Undoubtedly everyone living in a populous community breathes in the germ of tuberculosis, perhaps frequently, and this can not be avoided until all consumptives take proper care of their sputa.

The healthy individual can, however, largely avoid danger to himself from this source by forming the habit of nose breathing.

Overcoming Inherited Predisposition. When one has inherited tendencies to the disease, special means must be taken to avoid the danger, and the advice of a physician should always be sought in such cases.

Maintenance of Health Tone. It is important that all people should strive, as few do now, to maintain at a high pitch the health tone. The maintenance of bodily vigor which should become a habit and a set of rules, which everyone ought to habituate himself to carry out sub-consciously, are those suggested by Allen in *Civics and Health* (Ginn & Co.), pp. 212–213, and are as follows:

1. Throw the bedding over the foot of the bed.
2. Close the window that has been open during the night.
3. Drink a glass of water.
4. Bathe the face, neck, crotch, chest, armpits (finishing if not beginning with cold water), and particularly the eyes, ears, and nose. If time and conveniences permit, bathe all over.
5. Cleanse the finger nails.
6. Cleanse the teeth, especially the places that are out of sight and hard to reach.
7. Breakfast punctually at a regular hour. Eat lightly and only what agrees with you. If you read a morning paper, be interested in news items that have to do with personal and community vitality.
8. Visit the toilet; if impracticable at home, have a regular time at business.
9. Have several minutes in the open air, preferably walking.
10. Be punctual at work.
11. As your right by contract, insist upon a supply of fresh

air for your workroom with the same emphasis you use in demanding sufficient heat in zero weather.

12. Eat punctually at noon intermission; enjoy your meal and its after effects.

13. Breathe air out of doors a few minutes, preferably walking.

14. Resume business punctually.

15. Stop work regularly.

16. Take out-of-door exercise—indoor only when fresh air is possible—that you enjoy and that agrees with you.

17. Be regular, temperate, and leisurely in eating the evening meal; eat nothing that disagrees with you.

18. Spend the evening profitably and pleasantly and in ways compatible with the foregoing habits.

19. Retire regularly at a fixed hour, making up for irregularity by an earlier hour next night.

20, 21, 22. Repeat 4, 6, 8.

23. Turn underclothes wrong side out for ventilation.

24. Open windows.

25. Relax mind and body and go to sleep.

Improving Surroundings. Few people are so poor, and few landlords or employers so unreasonable that surroundings affecting health cannot be improved. The important thing is to realize the necessity for better surroundings and then embrace every opportunity to make the desirable changes. Much can be done by creating a sense of pride, by stimulating a spirit of rivalry. Instances of what can be done are the back yard contests such as have been held in Milwaukee. The making of parks and pleasure grounds and drives are of the very greatest importance. The work which the Madison Park and Pleasure Drive Association has done in the last few years is a health asset to the citizens of Madison, and in no inconsiderable way prevents tuberculosis. Looked upon at long range, the work of the Forestry Commission in establishing a permanent forest reserve is an act of great hygienic importance.

Public Measures

When the individual has done all that is within his or her power to escape the disease personally or for those dependent upon him, much still remains to be done. But these necessary things can be done only when wise public measures are enacted into laws and religiously enforced.

Wisconsin Laws. Fortunately this state has already on its statute books, laws so worthy that they received the first prize at the Washington International Congress on Tuberculosis in open competition with the world.

The Wisconsin law pertaining to infectious and contagious diseases and their control, are especially applicable to tuberculosis.

Section 1. Section 1, chapter 192, laws of 1905, is amended and made a section of the statutes of 1898, to read: Section 1416—1. It shall be the duty of every physician to report to the department of health in every town, incorporated village or city, in writing, the full name, age and address of every person suffering from any one of the infectious or contagious diseases following, to-wit: Measles, smallpox, diphtheria (membraneous croup), scarlet fever (scarletina), typhoid fever, tuberculosis (of any organ), rubella (rotheln), chickenpox, typhus fever, plague, erysipelas, Asiatic cholera, whooping cough, cerebrospinal meningitis, yellow fever; and it shall be the duty of every person, owner, agent, manager, principal or superintendent of any public or private institution, or dispensary, hotel, boarding or lodging house, in any such town, incorporated village or city, to make a report, in like manner and form, of any inmate, occupant or boarder suffering from any of the said infectious or contagious diseases.

Section 2. Section 2, chapter 192, laws of 1905, is amended and made a section of the statutes of 1898, to read: Section 1416—2. It shall be the duty of every physician to report forthwith in writing to the said department of health, the death of any person who dies from, or while suffering with or from any infectious or contagious disease, and to state in such report the specific name and type of such disease, and in the absence

of an attending physician, it shall be the duty of any keeper of every boarding house or lodging house and the proprietor of every lodging house or hotel to report forthwith to the department of health, all known facts in regard to any person who died in any such house or hotel under his charge suffering from any of the following infectious or contagious diseases: Measles, diphtheria (membraneous croup), scarlet fever, typhoid fever, tuberculosis, smallpox, chickenpox, Asiatic cholera, typhus fever, rubella (rotheln), plague, whooping cough, within twenty-four hours after the death of such person.

Section 3. Section 3, chapter 192, laws of 1905, is amended and made a section of the statutes of 1898, to read: Section 1416—3. It shall be the duty of every person having knowledge of the existence of any person afflicted with any one of the following infectious or contagious diseases, to-wit: Measles, diphtheria (membraneous croup), scarlet fever, typhoid fever, tuberculosis, smallpox, Asiatic cholera, typhus fever, rubella (rotheln), plague, and whooping cough, or has reason to believe that any person is so afflicted, to at once report to the health department of such town, incorporated village or city, all facts in regard to the case, and no person shall interfere with or obstruct the entrance, inspection or examination of any building or house, or the occupants thereof, by the health officer, commissioner of health or his assistants, of such town, incorporated village or city, or any officers of such department, when investigating a reported case of one of the infectious or contagious diseases above specified, as existing in such house or dwelling, nor shall any person interfere with or obstruct, mutilate, or tear down any notices of such department posted in or on any premises within such municipality.

Section 4. Section 4, chapter 192 laws of 1905, is amended and made a section of the statutes of 1898, to read: Section 1416—4. 1. It shall be the duty of every physician or person, or owner, agent, manager, principal or superintendent of each and every public or private institution or dispensary, hotel, boarding or lodging house, in any such town, incorporated village or city, to report to the department of health thereof, in writing or to cause such report to be made by some proper and compe-

tent person, the name, age, sex, occupation and latest address of every person afflicted with tuberculosis, who is in their care, or who has come under their observation, within one week of such time.

2. It shall be the duty of every person sick with this disease, and of the authorities of public or private institutions or dispensaries to observe and enforce all the sanitary rules and regulations of such health department for preventing the spread of pulmonary tuberculosis.

Section 5. Section 5, chapter 192, laws of 1905, is amended and made a section of the statutes of 1898, to read: Section 1416—8. In case of the vacation of any department or premises by death from tuberculosis, or by the removal therefrom of a person or persons sick with tuberculosis, it shall be the duty of the person or physician in charge, to notify the commissioner of health of such town, incorporated village or city, aforesaid, of said removal, within twenty-four hours thereafter, and such apartments or premises so vacated shall not again be occupied until duly renovated and disinfected as hereinafter provided.

Section 6. Section 6, chapter 192, laws of 1905, is amended and made a new section of the statutes of 1898, to read: Section 1416—9. In case of the vacation of any premises or apartments as set out in section 5 of this act, the commissioner of health, or health officer, shall immediately visit said premises, and shall order and direct that such premises or apartments and all infected articles therein be properly and suitably disinfected. In case there shall be no remaining occupants in such premises or apartments and same shall be vacant, then the commissioner of health or health officer shall cause a notice in writing to be served upon the owner, or agent of the owner of such premises or apartments, ordering the renovation and disinfection of such premises or apartments, under the direction of and in conformity with the regulations of the local department of health.

Section 7. Section 7, chapter 192, laws of 1905, is amended and made a new section of the statutes of 1898, to read: Section 1416—10. In case any orders or directions of the commis-

sioner of health or health officer requiring the disinfection of any articles, premises or apartments, as hereinbefore provided, shall not be complied with within thirty-six hours after such orders or directions shall be given, then it shall be the duty of the commissioner of health or health officer to cause a placard in words and form as follows, to be placed upon the door of the infected apartments, or premises, to-wit:

NOTICE

Tuberculosis is a communicable disease. These apartments have been occupied by a consumptive and may be infected. They must not be occupied until the order of the health commissioner or health officer directing their renovation and disinfection has been complied with.

This notice must not be removed under a penalty of law, except by the commissioner of health, or an authorized officer.

Section 8. Section 8, chapter 192, laws of 1905, is amended and made a new section of the statutes of 1898, to read: Section 1416—12. Any person who shall violate any of the provisions of this act, and any person, who without written authority from the commissioner of health or health officer shall remove, or cause to be removed any placard placed upon premises or apartments which are or have been occupied by persons sick with any of the diseases mentioned in section 1416—1, upon conviction thereof, shall be fined not less than five dollars nor more than one hundred dollars, or by imprisonment in the county jail for not less than five days nor more than ninety days.

Section 9. Section 9, chapter 192, laws of 1905, is amended and made a new section of the statutes of 1898, to read: Section 1416—13. The provisions of this act shall not be construed as a limitation upon the officers of the common council of any city to pass such ordinances in aid of the officers of the commissioner of health as may tend to promote and secure the general health of the inhabitants of such city.

Section 10. Section 10, chapter 192, laws of 1905, is made a new section of the statutes of 1898, to read: Section 1416—14. All acts or parts of acts, including the provisions of any spe-

cial charter, contravening the provisions of this act are hereby repealed.

Section 11. There are added to the statutes of 1898 four new sections to read: Section 1416—5. Any person affected with tuberculosis of the lungs or larynx, or any other disease whose virus or infecting agent is contained in the sputum or other secretions shall not deposit his sputum, saliva, or other infectious secretion, in such a place as to cause offense or danger of contracting the disease to any person or persons.

Section 1416—6. It shall be the duty of every person afflicted with tuberculosis of the lungs or larynx, or any other disease whose virus or infecting agent is contained in the sputum, saliva or other infectious secretion, to provide himself with a sputum flask or receptacle in which to deposit his sputum, saliva, or other infectious secretion, while traveling in any public conveyance or attending any public place, and the contents of said flask or receptacle shall be burned or otherwise thoroughly disinfected.

The Wisconsin Statutes, relating to tuberculosis quoted above, were passed by the Wisconsin Legislature of 1907, and are believed to be of exceptional value for the following reasons:—

1. Tuberculosis is put on a similar basis with other infectious and contagious diseases that have long been a subject of special laws for their prevention and control. By this method, submission to rules and regulations are more easily obtained. By statutory provisions the State Board of Health is empowered to make special rules and regulations governing infectious and contagious diseases classified in the statutes, having the force of law, with penalty clauses.

2. The State Board of Health has absolute power governing not only physicians and local health officers in the enforcement of this law, but superintendents of any public or private institution and corporation, as well as individuals.

3. Notification enables the disinfection of all premises or apartments occupied by consumptives, which is not only of value in the individual case, but an important and *educational* feature in a community.

4. Placarding, unless disinfection is done, prohibits the occupation of a house or premises by other individuals.

5. The power of a sheriff, given to railway conductors or persons in charge of common carriers, is a powerful factor in the enforcement of the rules and regulations of the State Board of Health on public transportation.

6. By notification, it is possible to send to each subject a pocket leaflet containing rules for the sick.

7. Penalty clause valuable.

Ordinances against Expectoration or Spitting. Very evidently, if it were possible to destroy all the tubercle bacilli given off by consumptives, one of the greatest sources of danger would be destroyed. The saying then that "No Spit, no Consumption," is very largely true, and its importance cannot be over-estimated.

A great many cities have passed anti-spitting ordinances, and all municipalities should have and enforce laws which will make promiscuous spitting in public places an impossibility. A copy of an ordinance of this kind is given here in order to show what it should cover.

Wilmington, Delaware. An ordinance to prevent spitting in certain public places in the city of Wilmington:

Be it ordained by the council of Wilmington:

Section 1. It shall be unlawful on and after the passage of this ordinance for any person to spit on the sidewalk, crossing or footway of any public streetway, park or square or upon the floor of any hall or office in any hotel, apartment house, tenement or lodging house which is used in common by the guests or tenants thereof, or upon the floor, platform, steps or stairs of any public building, hall, church, theater, railway station, store or factory, street car or other public conveyance.

Section 2. The term "spitting" as referred to in this ordinance shall be defined as follows: the act of expelling anything from the chest, throat, mouth or nose.

Section 3. Any violations of this ordinance shall be punishable with a fine of not less than one dollar nor more than five

dollars for the first offence, and not less than two dollars nor more than five dollars for each succeeding offence.

Approved October 26, 1907.

Milk Ordinances. Since milk is undoubtedly a very important means of spreading tuberculosis, and since tuberculosis in cattle is so easily and certainly determined by the use of tuberculin, there is really no excuse for the use of contaminated and dangerous milk. The selling of milk from cows suffering from tuberculosis should be made a misdemeanor and punished severely. All municipalities should see to it that wise laws are made and enforced in regard to this important subject. In order to show the scope to be covered, the one recently adopted at Madison, Wisconsin is here given.

SECTION 1. *Licenses:*—It shall be unlawful for any person, association or corporation to sell, offer for sale or delivery in the city of Madison any milk or cream without first having obtained a license therefor from the clerk of said city as hereinafter provided.

SECTION 2. The clerk of said city shall, upon application made in writing, setting forth:

1st. The name, residence, postoffice address and the exact location of the dairy of the applicant

2nd. The number of cows from which milk or cream is obtained for sale or delivery or controlled by the applicant.

3rd. If the applicant does not keep cows then the source or sources from which he obtains milk or cream for sale or delivery.

4th. Said applicant shall also present written consent from each person from whom he obtains milk or cream granting permission to the board of health or their authorized representative free and open access to his premises for the purpose of making an inspection of the sanitary condition of the same and upon the recommendation of the board of health of said city to the effect that applicant has complied with the provisions of this ordinance, that he has made a personal examination of the proposed dairy and certifies that in his judgment the proposed location and surroundings are in a good, sanitary condition, sufficient and proper in every way for the conduct of the

proposed business and that all said animals are free from disease and that in his judgment the applicant is a proper person to conduct a dairy and has complied with the terms of this ordinance and on payment of one (1) dollar, said clerk shall issue a license showing that the person, association or corporation to whom the same is issued has complied with this ordinance and the rules and regulations adopted by or in pursuance of it in the name of the applicant and the location of the dairy.

SECTION 3. Each license shall expire on the 15th day of April following the date of issuing the same, unless sooner revoked as herein provided.

SECTION 4. It is further provided that each building or conveyance employed in distributing or delivering milk or cream shall have marked on it in plain figures, the license number of the person or corporation in whose service it is employed, and further that the driver or person in charge of each such conveyance or building shall have in his possession while engaged in the sale, distribution or delivery of milk or cream, a certified copy of the license issued to him or to the party by whom employed, and that said license or copy thereof shall be produced for inspection at any time when requested by any patron or official in the city of Madison. The certified copies required herein shall be furnished by the city clerk on application therefor.

SECTION 5. *Sanitary Conditions:*—The board of health shall from time to time make such further rules and regulations respecting the sanitary conditions of the stables and sheds in which said cows are kept, the manner of handling the same, the person, buildings, conveyances, bottles and cans in which milk and cream are handled and such other rules and regulations respecting the obtaining, sale and distribution of milk and cream in the city of Madison as said board shall deem proper.

Any such rules and regulations before going into effect shall be published in the official paper at least three times.

SECTION 6. *Tuberculosis:*—No license shall be issued until all the cows of the applicant have been examined and tested for tuberculosis by the tuberculin test and found free from tuberculosis and the milk or cream of no cow or cows shall be sold or offered for sale which milk or cream shall become the prop-

erty of any licensed person until such cow or cows have been examined and tested for tuberculosis by the tuberculin test at the expense of the applicant by some competent person approved by the city health officer or by the state veterinarian or by the state live stock sanitary board and the tuberculosis certificate filed with the city clerk, which certificate shall give an accurate description of the different cows, stating age, breed and distinctive markings, with complete temperature record before and after injection for such test.

The health officer of said city may require at any time a test or retest of any herd furnishing milk in the city suspected of unsanitary or diseased conditions and shall require such a test at least once annually.

If after the issuance of the license any of the cows of any licensee be disposed of and replaced by others or if additional cows be added to the number stipulated in the certificate of health herein before mentioned, or if any change be made in the location of the dairy or the place of business the owner must forthwith inform the board of health in writing of such change or increase in the number of cows. If after the issuance of the license there are introduced into any herd new cows or any which have not been examined or tested as hereinbefore provided no milk or cream shall be sold or disposed of from such herd in said city until said new cows have been examined and tested as herein provided.

Whenever it shall be found that any milk producing cow is affected with tuberculosis or any other disease rendering the milk impure or unsanitary, no milk or cream from the cow or from the herd in which she is kept shall be sold or offered for sale in this city until such cow or cows have been removed or killed or such disease cured.

SECTION 7. *Standards:*—No person, association or corporation producing milk or cream or obtaining milk or cream from others shall sell or offer the same for sale, unless it meets the following standards:

Standards:—Milk containing less than three (3) per cent of milk-fat or milk containing less than eight and one-half (8 1-2) per cent of milk solids, not fat, shall be termed and mean

adulterated milk, and it shall be unlawful to sell or offer for sale any milk which shall contain less than eight and one-half (8 1-2) per cent of milk solids or to sell or offer for sale any cream which contains less than eighteen per cent of milk-fat; provided however, that skimmed milk may be sold to any person who is informed at the time of each sale of its character but only from cans painted and distinctly labeled in white letters "skimmed milk" each and every letter being at least one inch high and one half inch wide, said words to be on the side or top of said container in such a position as to be most easily seen when such milk is sold or delivered.

No person shall sell or offer for sale in this city as pure milk any milk to which any preservative has been added.

SECTION 8. *Inspection and Examination:*—The board of health or any inspector designated by said board of health shall have the right to enter any building, wagon or place where milk or cream is kept or exposed for sale within the limits of the city of Madison, to ascertain whether or not the owner or occupant is complying with the provisions of this ordinance and shall have the right to take samples of milk or cream not to exceed one pint (1), from any can, vessel or bottle, for the purpose of inspecting, testing, analyzing, or for the microscopic examination.

And whenever a sample or samples so taken shall not correspond with or shall be in violation of the requirements of this ordinance such person, persons, corporations or company, in whose possession, care, custody or control such milk or cream shall be found shall be deemed guilty of misdemeanor and punished as hereinafter provided. Any person, association or corporation that shall not permit such examination by said Board of Health or their representative, shall forthwith forfeit his, her or their license or licenses and shall be punished as hereinafter provided.

SECTION 9. *Fines:*—Any person, association or corporation who shall violate any of the provisions of this ordinance or rules of the board of health made in pursuance hereof shall be fined not less than five dollars nor more than fifty dollars or be imprisoned in the county jail for not less than five days nor more

than thirty days on conviction thereof for each offense and on the third conviction within any one year, his license shall ipso facto stand forfeited.

SECTION 10. *Complaints:*—Upon complaint in writing by any resident of this city and filing the same with the board of health that any such licensee sold or offered for sale milk or cream that is impure, unhealthy or unsanitary or that the dairy or place in which said cows are kept is filthy or unhealthy or that the milk sold by such person is drawn from cows that are affected with tuberculosis or other disease rendering the milk unhealthy or unsanitary or that he is violating any of the provisions of this ordinance or rules of the board of health made in pursuance thereof the board of health shall cause an examination of such premises and animals and of such milk or cream to be made and if conditions warrant the board of health shall summon such person or persons to appear before them within three days after the date of service of such summons to show cause why his or their license or licenses shall not be revoked. The board of health shall proceed to hear such matters and in their discretion if the allegations of said complaint are true, and in their judgment sufficient, revoke the license or licenses of such person complained of.

And in case of difficulty of determining the character of the milk sold, a chemical and bacteriological examination may be secured and the sale of milk which does not conform to the following standards shall be prohibited. Chemical analysis: Standards hereinbefore stated. Bacteriological analysis: Milk 500,000 bacteria per cubic centimeter. Cream 800,000 bacteria per cubic centimeter.

SECTION 11. *Effect:*—This ordinance shall be in force and effect from and after the first (1) day of July, 1908, except section 3, relating to testing of herds with tuberculin and sale of milk from tuberculosis cattle which shall become operative on and after the first (1) day of November, 1908.

Approved July 9, 1908.

Inspection of Food Supplies. Meat inspection is important, and tuberculous meat ought not to be allowed on the market. Since, however, meat is practically always cooked before it is

eaten, the danger of contracting disease from it is very much less than in the case of milk.

Public measures should be promulgated also to control and improve the conditions of manufacture and sale of the various articles of food likely to be contaminated, e. g., bread, nuts, etc.

Diagnostic Laboratories. In order to encourage early and correct diagnoses, laboratories must be provided for the examination of sputum free of charge either for individuals, physicians or, at least, for health officers.

Wisconsin has a State Hygienic Laboratory located at the University, Madison, where this work is done.

This laboratory, in conjunction with the State Board of Health, furnishes sputum cups and napkins at cost to any person applying for the same. Dr. M. P. Ravenel is director of this laboratory.

Reporting Cases. Tuberculosis is now generally recognized as a communicable disease and, as such, all cases of the disease should be reported to the local health authorities. In a few states, including Wisconsin, this matter is covered in a state law, but in many states this is not provided for and must be taken up by the various communities. The importance of this factor can not be over-estimated, as it is the foundation of all true progress in the study and control of the disease.

Public Disinfection of Houses. When a case of tuberculosis dies or moves out of a house, it is absolutely essential that the house be disinfected. This ought not to be left to the pleasure of the attending physician or landlord, but should be insisted on by the health officer. Furthermore, the disinfection should be tested for its thoroughness—a thing which can readily be done with the co-operation of a bacteriological laboratory.

Care of Advanced Cases (Segregation). In a great many cases, it is impossible for people suffering from this disease to get for themselves proper care, and they become great burdens to themselves and sources of great danger to their friends and the public generally, especially during the last stages of the disease. The public should provide places for the care of the sick. In larger communities, dispensaries should be established and maintained for those who need advice and aid

in the various stages of the disease. For those in the early stages, sanatoriums should be provided, and for those beyond the hope of recovery, hospitals, where the last days of the sufferers can be made comfortable, and, particularly from the public health standpoint, where they can be kept from spreading the seeds of disease through a susceptible circle of friends and associates. This work can be undertaken and carried forward in a small way in the smaller communities, and is not entirely a work for large cities. The importance of this work cannot be over-estimated.

Educational Work. The public should also take a hand in the educational work. This includes lectures and talks before various bodies, but perhaps especially before the lower classes, and in schools, this work should be continued, until every one who has reached years of understanding realizes that tuberculosis is a communicable disease, a preventable disease, and, if treated in its early stages, a curable disease. Most important work can be done by nurses paid to visit, teach, and minister to those afflicted with the disease.

Educational work in Wisconsin has been carried on for a number of years. For many years the University has given popular as well as technical instruction, on the matter of both human and bovine tuberculosis, in the class room and outside. More recently the University Extension Division has put a considerable amount of energy into popular education along this line, circulating an exhibit, independently at first, and later in co-operation with the Wisconsin Anti-Tuberculosis Association, furnishing lectures and publishing bulletins.

Important work in studying the relation of this disease to the poor of Milwaukee has been done by Mr. T. W. B. Crafer, a fellow in sociology from the University, while living at the University Settlement at Milwaukee. A paper embodying the results of this work was read at the International Congress in Washington and will appear in the proceedings of the Congress.

Civic Improvements. The Milwaukee Medical Society has also done much by bringing the National Tuberculosis Exhibit to Milwaukee, raising funds for the Blue Mounds Sanatorium and establishing, in co-operation with other interests, a dispensary in Milwaukee.

Important work has been done by the Wisconsin Committee of the International Congress on Tuberculosis. This committee aroused no little public sentiment by an unusually effective newspaper campaign, and assembled an exhibit at Washington that attracted widespread and favorable attention.

The members of the International Congress in this state were organized into the Wisconsin Anti-Tuberculosis Association in the fall of 1908 and, in co-operation with the University Extension Division, are endeavoring to carry forward the work to a manifold fruition. The details in regard to this society are given in a circular which can be secured on application to the secretary's office, Milwaukee.

TREATMENT AND CURE OF TUBERCULOSIS

General Principles Involved

Our ideas of the possibilities of curing tuberculosis have been radically modified in the last few years. People had come to believe that tuberculosis was an incurable disease, and to tell a person that he was infected with this disease was like reading his death warrant. We look upon the disease now in quite a different light. It is a curable disease, not only theoretically but practically also. This change in our notion has not, however, come about because of the discovery of some new medicine, for it still remains true that we know of no specific for this disease. Quacks and patent medicines are a fruitful source of real suffering, for sufferers are buoyed up in hope of being benefited by some skillfully advertised medicine or "cure," whose effect is not going to give the expected relief, but which, in reality, is practically certain to delay honest and helpful treatment until the case is beyond help. The underlying principles of the modern treatment of tuberculosis are open air, rest, and an abundance of proper food.

It would be difficult to explain just why it is that the air of the open is better than the air of dwellings, particularly when these are well ventilated; but there is abundant evidence to show that this is true. A tubercular patient should be in the open air practically all of the time, day and night, summer and winter. That cold air is not harmful, but in reality helpful, is indicated by a saying in the Adirondacks, generally accepted as true, that "One winter is worth two summers."

Another fundamental requirement is rest. When there is fever, especially, it is absolutely necessary that there should be rest—complete rest, and to this end, the patient must occupy the bed and lounging chair constantly. The slight amount of exercise necessary must be carefully graduated so as not to overtax the strength. It is quite impossible for patients to work and at the same time take the proper care of themselves. The third requirement is abundant food, especially proteid food.

Climate is quite generally considered now as a negligible factor in the treatment of tuberculosis. By this is meant that tuberculosis can be cured in practically all climates, and for many a change of climate is financially impossible. It seems best, therefore, to treat tuberculosis at home or in sanatoriums close by.

Value of Discipline. The cure for tuberculosis resolves itself into a certain mode of life and the more nearly one holds himself to this life the better are the chances of recovery. This is borne out by the fact that patients in prisons make the highest percentage of recoveries, the soldier next, and the civilian last.

Sanatoriums and Their Work

The great value of the sanatorium life lies, first in the educational influence it exerts, and second, in the habits of life which it enforces; for these very reasons it is desirable to have patients treated in a sanatorium rather than at home, whenever it is possible.

Growth of the Movement. Brehmer was the first to prove the value of the treatment which we now speak of as the sanatorium treatment. About 1860 he established his sanatorium in the mountains of Selesia.

The first sanatorium in America was the Adirondack Cottage Sanatorium established in 1885 by Dr. Edward L. Trudeau. In the first years of its existence it was difficult to get patients to go and stay there. Now not one in twenty of the applicants can be received.

The first state Sanatorium was that of Massachusetts, established at Rutland in 1898.

Fifteen states now have them, and one state (Massachusetts) has provided for three.

Altogether in the United States there are 240 sanatoriums with 14,014 beds. (August 1, 1908.)

Wisconsin Institutions

The *State Sanatorium* is located about two miles from Wales, a small town on the Chicago and Northwestern Railroad, 28 miles west of Milwaukee and 54 miles east of Madison. There

are eight buildings. The patients occupy shacks. The elevation of the site is 600 feet above sea level. High hills surround the buildings on the north and west sides, which shut off the cold winds. It is intended for incipient and moderately advanced cases. It has a capacity of 80 beds, and the rates are $10.00 per week, or patients may be admitted as county charges. The institution cost $120,000.00. Dr. J. W. Coon is superintendent.

The principles followed in the selection of a site for this sanatorium are rather unusual and are worthy of study by those interested.

Blue Mounds Sanatorium is a semi-philanthropic institution, located about six miles west of Milwaukee. The service buildings consist of pavilions, donated by residents of Milwaukee. It is for incipient cases only, has a capacity of 34 beds and charges $7.00 per week. Some cases are cared for by philanthropic organizations.

River Pines Cottage Sanatorium is situated at Stevens Point, a small city very near the geographical center of the state. The site consists of seventy acres, covered with pine and hard wood timber and having an elevation of 1100 feet above the sea level. The buildings are on the cottage plan, each cottage affording accommodations for two patients. It has a total capacity of 24 beds, and is a private institution. Incipient and moderately advanced cases are received at the rates of $25.00 and $30.00 per week. The medical director and resident physician is Dr. Thomas H. Hay, to whom applications may be made, or to the associate director, Dr. H. E. Dearholt, of Milwaukee, Wisconsin.

Home Treatment

Lack of accommodations in sanatoriums, and many other reasons, make it necessary for many cases to be treated at home. An outline of the kind of treatment likely to yield the best results, is pertinent here. No originality is claimed. Most of the suggestions are taken from the references indicated.*

* Kress, *Maxims for Tuberculous Patients, Journal of Outdoor Life,* April, 1909.

Surroundings

As a general thing, the country is better than the city, and a moderate elevation better than the low land. The soil should be dry and of such a nature that it will readily drain. The sunny slope of a hill which will protect from the cold winter winds is desirable. It is desirable, also, that the should be an abundance of sunshine, a beautiful scenic outlook, if possible, facilities for obtaining good food and pleasant houses and surroundings. Avoid, if possible, a damp region; one that has temperature variations so extreme as to prevent the necessary outdoor life. Avoid also one that is dusty and subject to wind storms.

The House. This may be very inexpensive but its rooms should be all well lighted and easily ventilated. The light and air should be kept as near as possible to that of the open. The patient's living room should have a good exposure, preferably a southern one. The patient should also have a separate sleeping room and always a separate bed. Avoid dark, damp and poorly ventilated houses. Avoid also dry dusting methods in cleaning.

Furnishings of the Sick Room. Dr. Knopf says that all extra furniture, dust-catching curtains and carpets should be removed, but the room must not be made cheerless. A few rugs, washable curtains, and some cheerful pictures may be allowed.

Sleeping Outdoors. Where possible one should sleep out of doors. A shack or tent in the yard, a porch, or even the roof may be used. For those who sleep out, the following will be of interest and value:

"An ordinary iron bed with woven wire springs is the best. A moderately thick hair mattress will be found sufficiently warm by many people, especially if a blanket be spread under it. Several layers of newspapers under the mattress, or a blanket or a bed-pad of quilted cotton over it, will provide extra warmth. Some persons may even find two mattresses necessary in very severe weather, perhaps a woolen over the hair. Feather beds are undoubtedly warm, but they are now quite

generally condemned as unhygienic. Over the mattress of course, goes the usual cotton sheet. Blanket sheets are warm and for many persons are necessary. Individuals vary so in their sensitiveness to cold that it is impossible to fix upon any given quantity of clothing in all cases. However in a large sanatorium where sleeping-out is practiced even when the temperature is considerably below zero, the covering of the patients, unless they ask for more, consists of a blanket sheet, four pairs (eight folds) of blankets, one counter-pane and one comforter of lamb's wool. A comforter of eider-down is lighter and warmer than lamb's wool but less sanitary. On top of all a woolen horse blanket will be found of service in protecting the bed from rain and snow that may beat in, and there should be a blanket, quilt, shawl or some such protection suspended between the posts at the head of the bed.

"Some persons spread fur robes or fur coats over the bed, but the objection to them is their heavy weight, which presses down upon the body and leaves one in the morning with that tired feeling. The fur robe or coat will do well enough spread over the feet, but further up on the body they may cause decided discomfort.

"If additional covering be desired, half a dozen layers of newspapers, sewed between flannel covers, will be found both light and warm.

"If possible, the sleeper-out should go to bed in a warm room and have someone roll him out. If this cannot be done, a warm dressing gown should be at hand for use in going to and from bed. When it is necessary to leave the bed out all day it should be warmed with a hot water bottle before being used. A hot water bottle may also be left in one corner at the foot of the bed."*

"The 'Klondike bed' will appeal to most sleepers-out. It is made as follows: Make the bed in the usual way, allowing the covering to fall loosely on either side. Gather up the coverings on one side and pass them beneath the blanket sheet to the center of the bed. Do the same on the opposite side. Fold in the clothing at the foot of the bed beneath the blanket

* *Journal of Outdoor Life.*

sheet and the Klondike bed is ready to sleep in. The usual manner of placing the pillows will be found unsuitable for cold winter nights, when the thermometer drops below zero, as it does in the Adirondacks, for the cold wind is sure to blow down one's back. This may be overcome by arranging the pillows in the from of a V, with the apex at the head and the other ends reaching under the clothing."

Window Tents. Dr. Knopf says:

"To make open air treatment feasible by day and night, even in the homes of the poor living in the cities, I have made what I call a window tent. It consists of an awning, on the inside of the room. It is so constructed that the air of the room can not enter or mix with the air in the tent. By following the description closely it will be seen that the ventilation is as nearly perfect as can be produced with a simple device. The patient lying in bed, which is placed parallel with the window, has his head and shoulders resting in the tent. The tent is attached to the frame of the window, but it does not quite fill the lower half; a space of about three inches is left for the escape of the warm air of the room. By lowering the window this space can be reduced to an inch or less. The tent is constructed of four frames, made of steel or wood rods suitably formed and furnished with hinged ends; the hinges operate on a stout hinge pin at each end, with washers to insure easy folding.

"The frame is covered with extra heavy yacht-sail twill, properly fitted, and having long ends to tuck in under and around the bedding to prevent the cold air from entering the room. The patient enters the bed and then the tent is lowered over him, or, with the aid of a cord and a little pulley attached to the upper portion of the window, he can raise and lower the tent himself. Shutters can be used with the window tent as a screen from the neighbors, and in stormy weather as a protection. The bed should be placed by the window to suit the patient's preference for sleeping on his left or right side, so that he has the air in his face the most of the time. The window tent will not attract attention from the outside. A piece of transparent celluloid is placed in the front of the tent to

serve as a window for the nurse or members of the family to watch the patient if this is necessary. It also serves to make the patient feel less out of doors and more with his family, as he can see what is going on in the room.

"In the winter the patient's bed must be covered with enough blankets for his comfort and warmth throughout the night. In extremely cold weather, the patient while sleeping in the window tent, should wear a sweater and protect his head and ears with a woolen cap or shawl.

"Some patients complain that the light awakens them too early in the morning, and that they have difficulty in going to sleep again. I advise them to have some light weight but dark colored material (such as a black lisle-thread stocking) to put over their eyes.

"When beginning this fresh air treatment it must be done gradually. It should, however, be impressed upon him that night air is as pure as day air. It is best to begin by placing him in the open for a few hours at night, and a few hours during the day in a chair. The physician will regulate all this so as to get the patient gradually used to living in the pure cold air day and night."

There are other good window tents besides that of Dr. Knopf.

Social Surroundings. The social surroundings have a marked influence on the condition of those suffering from tuberculosis. The patient should have the cooperation of associates in his fight for health. As associates, the family of the patient is preferable to strangers provided that neither the family nor the patient are domineering. Friends should refrain from giving advice on treatment or mode of life, concerning which they know little or nothing. The advice of well meaning but ignorant friends has had and is always likely to have the most disastrous results.

Patient's Condition of Mind. It is a matter of the greatest importance in the cure of tuberculosis for the patient to be hopeful. A contented, happy, courageous person has a fighting chance when others are hopeless. A willingness to follow the instructions of the medical adviser, to the minutest detail, and an unwillingness to accept the advice of others is most

important. It is bad for the patient to allow his mind to dwell on his own condition and worse to talk about it. The voice should be saved. Excessive letter writing is also bad.

Diet. Three meals a day, with single in-between lunches of eggs and milk, are sufficient for patients able to be up and about. Food should be eaten slowly. The quality and quantity of food is important, but it is quite as important to have it properly cooked and attractively served.

The condition of the mouth and teeth must be guarded most carefully. Rest in a recumbent position, both before and after meals, often aids digestion. Disorders of digestion must be carefully attended to and never neglected.

Clothing. Just enough clothing should be worn to keep the body warm. Not enough underclothing should be worn to cause perspiration. The proper amount of outside clothing should be worn to keep warm in winter, in the shade or wind. If the body or feet become wet, an alcohol rub should be taken and dry clothing put on. All clothing should be loose so as not to interfere with the free movements of the body. This applies especially to women.

Baths. Cleansing baths should be taken once or twice a week; the water should be comfortably warm and as a rule they should be taken just before going to bed. Tonic baths are most conveniently given with a sponge. The water should be cold; it should cover the chest and trunk; the drying should be sufficient to bring a glow to the skin. They are best taken in the morning.

Fresh Air. Persons suffering from tuberculosis can not be out of doors too much. They should be in the open air as much as possible during the day, at least several hours, and out of doors or in a well ventilated room all night. There is no danger in night air; if anything it is purer than the day air. Cold air seems to be as good if not better than warm air.

Sunlight. The value of the direct exposure of the body to sunlight is uncertain. If it is done, it seems quite clear that the head should be protected and that the exposure should not be long enough to inflame or burn the skin.

Rest. This is one of the prime essentials in the cure of

tuberculosis. When there is a fever, continued rest is necessary. Rest must be taken religiously. Rest should always be in pure air. Later brief rests, just before and immediately after meals, are at least necessary. Rest of mind is quite as important as rest of body. Worry is especially to be avoided.

Exercise. The amount of exercise good for any particular case must be left to the physician. Muscular exercise, if not wisely taken, may be dangerous. More than one patient has walked or exercised himself to death. Exercise should not be taken, except on the advice of the physician, when the sputum is tinged with blood; when there is shortness of breath; or when there is palpitation of the heart. Patients with fever should exercise in the morning when the fever is not present, but only then upon the advice of a physician. No matter how small the amount of the exercise it should never be indulged in to the point of fatigue, as bodily fatigue is probably always harmful to a person suffering from tuberculosis.

Amusements, like exercise, if taken in just sufficient amount to relax the mind and body, without strain or effort, act as a tonic and are beneficial.

Sleep. This is most important, and a sufficient amount should be taken to satisfy all of the cravings of the body. If possible it should always be taken in the open air.

Medicinal Measures. "The cough is often a distressing symtom. The patient should teach himself to keep down the cough. Avoid and strive to overcome such a habit. Unnecessary coughing pulls and tears at the lungs and helps spread the germs from the diseased to the healthy portions of the lungs. A glass of milk, preferably warm, will often lighten the morning cough.

"Avoid patent cough medicines. They nearly always contain opium and alcohol. They suppress the cough but they do not do away with the things that cause the cough. Even though the cough is less, the disease is probably growing worse. These medicines also interfere with digestion and fasten dangerous habits on the system.

"For pain in the chest, local remedies like painting with iodine should be tried before opiates.

"In case of unexpected hemorrhage, try to avoid being excited. Few people die of hemorrhage. Get into a comfortable position, avoid talking, have the clothing loosened, the room cool and quiet, and then let the physician be your guide.

"Avoid cod liver oil and such like preparations unless prescribed by your physician as being good for your particular case.

"Avoid wine, whiskey and other liquors, unless prescribed in definite amount by your physician.

"Tonics are often valuable aids, but discrimination is needed in their use. Here, as in foods, what is good for one is poison for another.

"A word about the physician. The patient with tuberculosis who wishes to get well will content himself with one physician at a time. Such a patient will carefully obey the instructions of the physician, will not talk about his condition to other persons and will not let other persons give him advice. Time and again the harm of such advice has been shown. The disease is treacherous and hard enough to overcome at best, without having the patient in a whirlpool of doubt, wondering whether to experiment with this, that, or the other remedy, advised by this, that or the other person, who without intellectual knowledge or learning, is sure his particular remedy or advice will lead to prompt and decisive cure. Where trained or experienced physicians fail, the chances of failure are far greater for those who have no such professional learning or experience.

"Let your physician be taken as your guide. He will map out your mode of life, will try to keep you from falling into pit-falls of the hygienic-dietetic life, and will advise those lines of medication, which in his judgment seem best fitted for your particular case. He will individualize his treatment to make it fit your particular case. Individualization in treatment is of the highest importance in tuberculosis, and this makes necessary skilled medical supervision." (Kress. loc. cit.)

APPENDIX

DISINFECTION

Whenever a consumptive leaves an apartment, and at intervals during illness, all articles worn by, or that have come in contact with the patient as well as the room or apartment, should be disinfected.

Preparation of the Room. All articles in the room that can not be steamed or washed must be spread out on chairs, hooks or clothes lines. This would include clothing, bed covers, etc. Mattresses and pillows should be opened and set on edge. Trunks and bureau drawers should be opened, and the contents spread out so that no two articles are together. All of the windows and doors should be shut except an exit. Strips of paper should be pasted over the window and door cracks, key holes, fire places, stove holes and other openings.

Disinfecting with Formaldehyde. Formaldehyde is a gas but is put on the market in the form of a solution (40% formaldehyde in water). In using this solution, formaldehyde or formalin, to disinfect a room it is necessary to regenerate the gas. This can be very satisfactorily done by pouring the solution on crystals of potassium permanganate. For this purpose a metal pail is placed in a tub or on a piece of asbestos paper or on newspapers. The whole is then placed in the center of the room, but not near any piece of furniture. Into this pail, after it has been warmed, is placed one half pound of potassium permanganate crystals for each 1000 cubic feet of air space to be disinfected. Not more than one pound of the crystals ought to be placed in any one pail on account of the frothing. In large rooms several pails should be used. Pour formaldehyde over the crystals in the proportion of one pint or pound to one half pound of the crystals. The reaction takes place almost immediately and very soon the gas will be driven off in great clouds. As soon as the chemicals have been put together, one should go to the exit, but this need not

be shut until the reaction is completed, for the gas rises to the ceiling and then rather slowly comes down. By waiting until the reaction stops one feels certain that everything in the room is all right. The room should remain closed over night, or at least six hours. When re-opening, it is possible to rush in and open a window. If the odor of formaldehyde persists, it can be largely neutralized by hanging sheets or towels in the room and sprinkling them with ammonia water.

Disinfecting with Sulphur. Sulphur may be used instead of formaldehyde, but it must be remembered that five pounds of dry sulphur must be used to every thousand cubic feet of space (i. e. a room ten feet square and ten feet high). A smaller amount than this is insufficient. It should be remembered, furthermore, that moisture must be present if it is to be effective as a germicide. This moisture leads to the production of a bleaching agent, which destroys the colored clothes and furnishings in the house. The necessary conditions for satisfactory disinfection by this agent are obtained when dry sulphur is burned according to the "pot method." The use of sulphur under some conditions is preferable to formaldehyde, e. g. when animal life is to be destroyed. Formaldehyde will not kill rats, mice, bed bugs, mosquitoes, etc., while sulphur will.

Liquid Disinfectants. As liquid disinfectants for use in treating bed and body clothes, dressings, excreta, furniture, sputum, toilet sets, walls, wood work, etc., carbolic acid or corrosive sublimate may be used.

A solution of carbolic acid, approximately five per cent strength, is made by adding six ounces of liquid carbolic acid to one gallon of hot water.

A solution of corrosive sublimate is best made in the home by the use of compressed tablets, which can be purchased at almost any drug store. A strength of one tenth of one per cent (1:1000) is usually used. Directions for making the solution accompany the package in which the tablets are sold.

The above disinfectants should be allowed to act at least one hour and in the case of dressings, excreta, sputum, etc., two hours.

BOVINE TUBERCULOSIS

Importance. Tuberculosis is the most important disease of domestic cattle, either from an economical or public health standpoint.

Communicability. It is generally recognized as a communicable disease. The casual agent (Bacillus tuberculosis) is given off from the diseased animals, through the material coughed up from the lungs, through milk and through manure. These bacteria enter the healthy animals by way of the lungs, through the air breathed in, and by way of the digestive tract, through food. The disease is spread more easily from animal to animal, by the above means, because of the lowered resistance of cattle due to unsanitary surroundings, such as dark, dirty, damp and illy ventilated barns.

Tuberculosis is brought into the herd largely by the purchase of diseased animals.

Means of Detection. The presence of the disease in the cattle is not usually shown by the physical appearance, but it can be readily determined by means of the tuberculin test. This test is accurate and harmless as well as cheap and easy to apply.

Intercommunicability. There has been a long and vigorous discussion as to whether or not bovine tuberculosis is transmissible to other animals. It is now generally admitted that the disease is widely spread to hogs through the milk and manure of cattle.

It is also admitted now that tuberculosis can be transmitted from cattle to human beings (especially babies and young children) through milk. The only open question is in regard to the amount of human tuberculosis that is of bovine origin, i. e. whether any particular tuberculous cow will, during the course of the disease, infect few or many of those who use her milk.

Elimination of Bovine Tuberculosis. It is the economical thing for the dairyman to test his herd: First, in order that if the herd is free from tuberculosis he may keep it so, by buying only tested cattle, by feeding creamery skim milk, buttermilk or whey only after it has been heated (pasteurized)

and by the annual testing of the herd; second that if the herd is diseased it may be cleaned up. In Wisconsin there are three things that may be done with reacting cattle. If they are condemned they are slaughtered and the state pays two-thirds of the appraised value, or they may be slaughtered subject to federal inspection. If they pass this, their full carcass value may be obtained; or the diseased animals may be kept entirely separate from the healthy herd (separate farm, separate or divided barns). The calves should be removed at birth and fed on scalded milk. (Bang Method.) By means of this system it is possible to gradually build up a healthy herd from a diseased one. This method is especially advantageous when dealing with valuable breeding cattle.

Already fifty per cent of the cities of Wisconsin having over ten thousand population, and containing twenty-five per cent of the entire population of the state, have passed ordinances requiring all who sell milk to have their cows tuberculin tested, and it will probably not be long before all cities in the state will require that their milk come from tested cows only. In this connection it is interesting to note the prediction of Professor E. G. Hastings of The University of Wisconsin:

"Ere long the packer will find a way to make the producer and not the consumer pay for condemned cattle and hogs.

"Ere long customers will buy only of breeders whose herds are healthy.

"Ere long cities will receive milk only from healthy herds.

"Ere long every state will prohibit the importation of cattle not healthy.

"Ere long the national government will allow interstate traffic only in the case of dairy products known to have come from healthy herds."*

* Hastings, *Tuberculosis of Cattle.* Bulletin presented to the Washington Congress on Tuberculosis.

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Newsholme—*Prevention of Tuberculosis,* Methuen, London, 442 pages, 10s. 6d. An excellent book.

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Klebs—*Tuberculosis, a Treatise by American Authors on Its Etiology, Pathology, Prevention, Treatment, etc.,* D. Appleton & Co., N. Y.

Jacobs—*The Campaign against Tuberculosis in the United States.* Including a Directory of Institutions (Sanatoriums, Dispensaries, Associations, etc.), dealing with tuberculosis in the United States and Canada. Committee of the National Association for the Study and Prevention of Tuberculosis. New York, $1.00.

On Bovine Tuberculosis:

Write to the State Agricultural Experiment Station, or to the Bureau of Animal Industry, United States Department of Agriculture, Washington, D. C., or send forty cents to the Superintendent of Documents, Washington, D. C., for Bulletin 38, "Bureau of Animal Industry," Tuberculosis of the Food Producing Animals.