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WHAT THE AMERICAN SOLDIER  
NOW FIGHTING IN FRANCE SHOULD  
KNOW ABOUT TUBERCULOSIS

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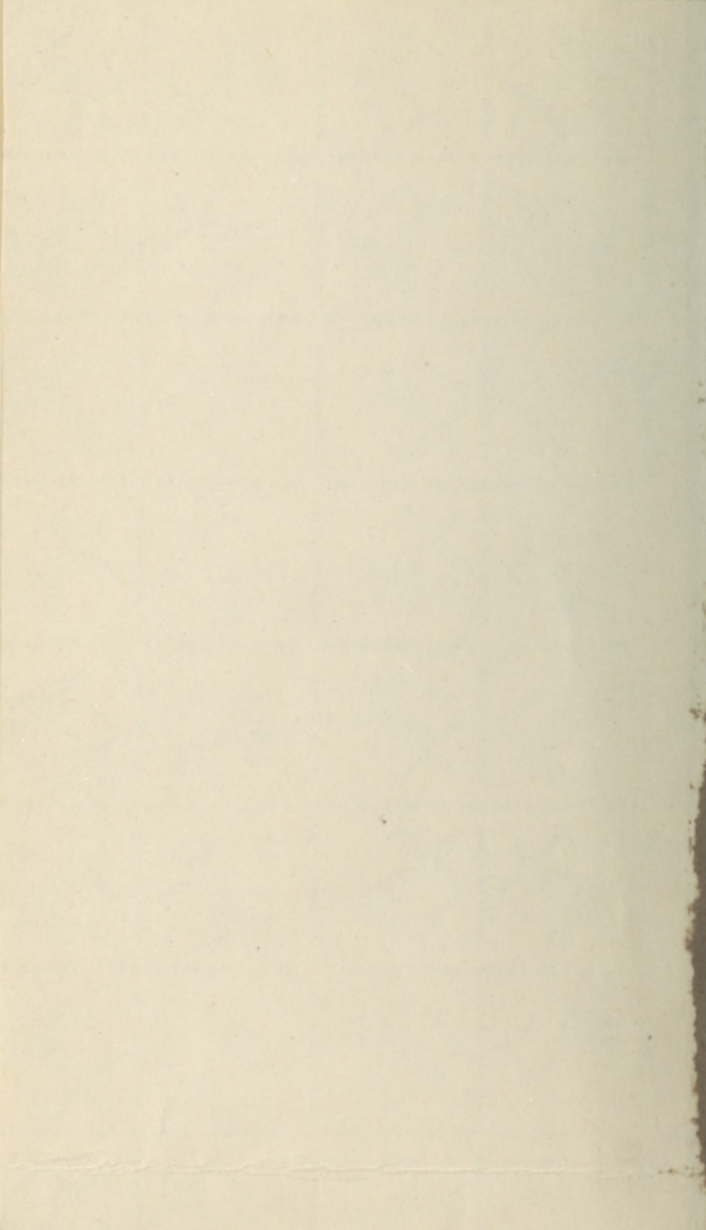


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*Pocket Edition for  
the Soldier in the Field.*

**What the American Soldier  
Now Fighting in France  
Should Know About  
Tuberculosis**

By

S. ADOLPHUS KNOPF, M.D.

Captain Med. Res. Corps

U. S. Army

Published by authority of the Surgeon  
General of the United States Army

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REVISED EDITION

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# What the American Soldier Now Fighting in France Should Know About Tuberculosis

By S. ADOLPHUS KNOPF, M.D.  
Captain Med. Res. Corps, U. S. Army

1918  
Rev. ed.

Our American soldiers in the field, and also our French brethren in arms, should know as much as possible about tuberculosis, its causes and its prevention, in order that they may be able to fight this insidious and invisible enemy as victoriously as they are now fighting the visible powers which brought upon the world the indescribable catastrophe of the present war. To present this knowledge in as practical a way as possible, the subject matter is arranged in the form of questions and answers.

*What is tuberculosis, particularly the most common type known as pulmonary tuberculosis or consumption?*

It is the most prevalent of all diseases, and is chronic, infectious, communicable, preventable, and curable. All these terms are self-explanatory, except perhaps the word "communicable," which I prefer to the word "contagious." To illustrate the difference between the words "communicable" and "contagious" let us take the two diseases smallpox and consumption as examples. Smallpox is a highly contagious disease, the word "contagious" coming from the Latin *contingere*, to touch. No matter how clean or conscientious the smallpox patient may be, no matter how well conducted the smallpox hospital, it is most dangerous to touch

the smallpox patient, and it is most unsafe to visit a smallpox hospital unless you have been vaccinated and revaccinated recently. On the other hand, the honest and conscientious tuberculosis patient who takes care of his expectoration in the manner which will be described later on, can be associated with and touched without any danger of contracting the disease. The sanatorium or tuberculosis hospital where all precautions concerning the proper disposal of infectious spittle or expectoration are religiously observed and the patients taught to be conscientious, is the safest place not to contract consumption.

*What is the direct cause of tuberculosis?*

The direct cause of tuberculosis, or consumption, is always the bacillus of tuberculosis, which is a microscopic organism found in the affected parts of the body. Pulmonary tuberculosis, or tuberculosis of the lung, is the type of tuberculosis most frequently found; but all other organs of the body (bones, intestines, etc.) can become affected by tuberculosis.

Tuberculous disease is locally characterized by countless tubercles, that is to say, small rounded bodies, visible to the naked eye. The bacilli, lodged in these tubercles of which they cause the formation, are parasites belonging to the lowest scale of vegetable life, and must be considered as the specific cause of all tuberculous disease. This parasite, so small that it can only be seen with the aid of a powerful microscope, not only gradually destroys the lung substance through ulcerative processes, but at the same time gives off certain poisonous

substances called toxins which cause various, and often serious, symptoms. In the secretions or excretions coming from an affected lung, millions of bacilli can often be found.

*What are the early symptoms of pulmonary tuberculosis which can be recognized by the layman?*

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The important earlier symptoms of pulmonary tuberculosis are a long-continued cough with or without expectoration, hoarseness, loss of flesh, flushes or pallor in the face, feverish sensation in the afternoon, occasional night-sweats, chilly sensation in the morning, loss of appetite, sometimes a little streak of blood in the expectoration, loss of strength manifesting itself in easy tiring, frequent colds, a perceptible quickening of the heartbeats after slight exertion, a little change in disposition such as an increased irritability or a feeling of depression.

*What are the methods whereby tuberculosis is communicated from one human being to another, or from animal to man?*

The three methods by which the germ may enter the human system are by inhalation, ingestion, and inoculation. The tuberculous sputum, when dried and pulverized and mingled with the dust of the air, may be inhaled. Tuberculous meat or milk taken as food is prone to produce tuberculosis, particularly in children. Inoculation may take place when an open wound or abrasion of the skin comes in contact with tuberculous substance.

*How can these infections be prevented and the germs destroyed?*

The main method of contracting tuberculosis is by inhalation. Whoever coughs and expectorates, whether it be in the trenches, dug-outs, barracks, armories, or other confined places, should endeavor not to deposit the sputum where it has a chance to dry up, unless it can be where exposure to direct sunlight will render it harmless. The spittle dried in dark places will become pulverized and mingle with the dust in the air without losing its dangerous qualities, and when this germ-laden dust is inhaled by a predisposed individual, he is likely to contract the disease by inhalation. When one coughs or sneezes let him always hold his handkerchief or hand before his mouth and nose. By observing this precaution he will prevent small particles of saliva, or droplets, which may contain tuberculosis, influenza, or other kinds of germs, from being scattered and becoming a source of infection.

Of course, it is out of the question to speak of the use of spittoons placed on the floor (Figs. 1 and 2), pocket spittoons (Figs. 3, 4 and 5), or even pieces of cloth

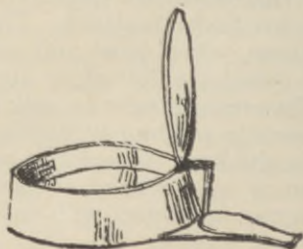


Fig. 1.—Metal Floor Cuspidor with large opening. Should be partly filled with wet sawdust or water. Cover worked by the foot.

to be used for expectoration in the trenches, dug-outs, or similar places; but when in ordinary places of human habitation, barracks, tents, armories, or houses of civilians, even



Fig. 2.—Metal Floor Cuspidor when closed.

if one expectorates only because of a simple cold, influenza, measles or whooping-cough, he should never do so on the floor or anywhere but in some kind of receptacle where he is sure that the contents cannot



Fig. 3.—Nickel-plated, Oval-shaped Pocket Flask, manageable with one hand. Funnel removable.

dry and become pulverized. Whenever a receptacle is used it should be covered so that flies cannot have access to it and thus carry the germs of the disease on to food or whatever they may alight on. Spittle

should be either poured into the water-closet or rendered harmless by some anti-septic fluid (5 per cent. carbolic acid solution) ; pieces of cloth used to receive sputum should be burned and paper spit-cups with their contents should be disposed of in the



Fig. 4.—Pasteboard Sputum Purse.

same way. It must be remembered that even the germs of ordinary colds may produce serious results, particularly when inhaled by one whose general health has been undermined by fatigue, privation of sleep, want of food, etc. These precautions with the expectoration should be especially adhered to when the soldiers, after leaving the trenches temporarily or permanently, are billeted in peasants' houses in villages or citizens' homes in towns or cities.

Against the danger of getting tuberculosis from infected milk or meat, sterilizing or boiling the milk and thoroughly roasting or broiling the meat suffice for all practical purposes. It is also well to form the habit of washing the hands before touching food whenever this is possible. To protect oneself against getting tuberculous inoculation from any skin wound or scratch, it is best to let the wound bleed freely so as to wash away infectious substances, and then use a clean piece of cheesecloth or muslin, steeped in hot water or alcohol, and



Fig. 5.—Pasteboard Sputum Purse. Small Size.

tie up the wound until surgical aid can be obtained.

*What protects the healthy individual against contracting tuberculosis?*

It should be known to all those who fear to contract tuberculosis because they have been in contact with a tuberculous patient and believe they have inhaled some bacilli, that a healthy individual need not fear to become tuberculous unless he is constantly exposed to the inhalation of the germs. In health, when the human system is in good condition, it is provided with many means of defense against the accidental inhalation of bacilli. First of all, there is the mucous

membrane of the nose, the secretions of which have what is known as bactericidal—that is to say, germ-killing properties. In the nose a fine growth of hair offers a hindrance to the entrance of coarser particles of dust, while the throat is lined with very fine hair-like bodies known as cilia, which, by an upward waving motion, prevent the finer dust particles and germs from entering the deeper respiratory tract. Lastly, in the blood itself, the white blood corpuscles are active in destroying the bacteria. Similar powers are also ascribed to the secretions of the stomach. Besides these four sources of defense, there exist probably in most of us in our circulatory system what is known as antibodies, which likewise counteract the invasion of tuberculosis germs. Thus, any one possessing average good health need not be afraid of becoming tuberculous, even though he may from time to time come in contact with a patient who is not careful.

In order for tuberculosis to be contracted from the occasional inhalation of tuberculosis germs, or even the ingestion of tuberculous food, there must exist the conditions in which the tuberculosis germ can grow; in other words, the individual must be predisposed either by heredity or acquisition. This predisposition may be accounted for by the subject never having possessed or having lost the power of natural resistance to the germs. When an individual has never been robust and has never possessed the power of natural resistance to tuberculosis, he has probably inherited this predisposition.

*What constitutes a hereditary predisposition to tuberculosis?*

A tuberculous parent, particularly a tuberculous mother, when she has been actively ill with the disease during the time of pregnancy, may transmit to the child such a weakened system that it becomes a ready prey to tuberculosis. If the mother is careless she is sure to infect the child after birth, and because of this early after-birth or post-natal infection, tuberculosis is often considered hereditary.

However, for the comfort of those who may have a tuberculous parent, let me say here that by reason of the good care bestowed upon him, many such a child has grown up strong and well, and if he has not had tuberculosis by the time he has reached military age, and no disease has been discovered by the recruiting surgeon, he may safely consider himself free from the danger of developing tuberculosis if he leads what might be simply called a normal, healthy life.

Aside from this hereditary condition, there are, of course, many ways in which a predisposition or loss of natural resistance, producing the ready soil for the growth of the tubercle bacillus, may be acquired.

*How is the predisposition to tuberculosis acquired?*

First of all, there are certain diseases which often leave the system in a weakened condition. Among them are measles, whooping-cough, typhus and typhoid fever, grippe, chronic bronchitis, pleurisy, pneumonia, also all venereal diseases. Privation, want of food, lack of air and sunlight, insufficient

clothing, and the prolonged inhalation of irritating substances, as well as over-fatigue and lack of sleep, may also render the system susceptible to tuberculosis.

Excessive smoking, especially of cigarettes, when the smoke is inhaled, is apt to injure the respiratory system and make it more susceptible to disease, to weaken the action of the heart, impair the function of the nervous system, and lessen the general efficiency. One who has never smoked would better not acquire the habit.

One of the greatest predisposing causes of tuberculosis is the excessive use and abuse of alcoholic drink. When the alcoholic contracts tuberculosis the outlook for a cure is not nearly as favorable as in a man of temperate habits. Patients recovering from the above-mentioned diseases should be particularly careful to avoid prolonged contact with tuberculous individuals.

*What can the soldier in the field do to prevent becoming predisposed to tuberculosis?*

Since one of the greatest predisposing causes to tuberculosis is alcohol, it is of course best for the soldier to abstain entirely from the use of liquor and strong alcoholic drinks. As far as possible, he should eat regularly, keep his body clean, and rest when he can do so as to avoid over-fatigue. He should keep his bowels in good condition and drink plenty of good, pure water. He should also try to clean his teeth after meals, whenever this is feasible. When his garments have become wet from rain or snow, he should not lie down and sleep in them if this can possibly be avoided,

and he should be equally careful not to lie down on the moist ground without sufficient protection. But, of course, on the firing line and in trenches and dug-outs these precautions cannot often be carried out, so one must do the best he can.

If the air in the dug-outs and trenches seems to be vitiated—that is to say, foul and

lacking oxygen, whenever circumstances will permit it the soldier should go where the air is pure and take some deep breathing exercises.

The simplest one of all is to inhale deeply, raising the shoulders during the act of inhalation, moving them backward and remaining in that position, retaining the air for about 5 or 6 seconds, then exhale a trifle more quickly by moving the shoulders forward and downward. The accompanying illustration (Fig. 6) will help to explain this exercise. Repeat this exercise 6 to 8 times and, if convenient, repeat it after half an hour or an hour.

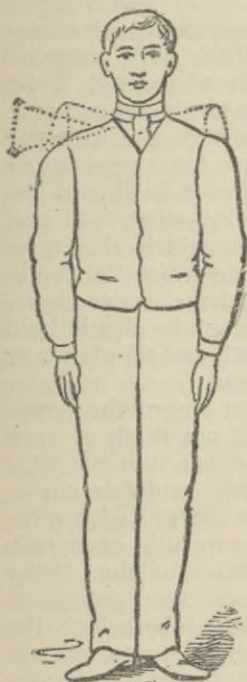


Fig. 6.—Breathing exercise with rolling of shoulders

If the dug-outs and trenches can be ventilated to admit fresh air, this should by all

means be done. In tents and barracks and all other sleeping-quarters the soldier should of course make it his business to see that those habitations are always well ventilated. Fresh air by day and by night is the best preventative, as well as curative, agent against tuberculosis.

*What should the soldier do so as not to spread tuberculosis?*

On page 3 the first symptoms of tuberculosis have been described. With these he should make himself familiar, and if he coughs and expectorates he should gather a specimen of his sputum and take it to the surgeon of his regiment for examination. Until he has seen the doctor he should use all the precautions possible—that is to say, spit in a piece of cloth, which should be burned, or in a receptacle which he should empty into the trench latrine, water-closet, or drain. During the cough he should hold his hand before his mouth and should never swallow his expectoration.

If the soldier perceives any of the symptoms described, he need not think at once that he has tuberculosis, but it is his duty as a soldier to report his condition immediately to the surgeon in charge of his company. He will then be carefully examined, and proper care will be taken of him. If the ailment is not tuberculosis, the examination will demonstrate it; if it is tuberculosis, the early diagnosis and timely treatment will save the individual's life; for let it be known right here that of all the chronic diseases human flesh is heir to, none offers so favorable a chance for cure as does pulmonary tuberculosis if discovered early.

*Should the American soldier greatly fear contracting tuberculosis while in France?*

First of all, let us consider that before the war the death rate from tuberculosis in France was twice as high as, for example, in New York City; that is to say, while in France there were, in each year, three deaths from tuberculosis for every thousand of population, in New York there were only one and one-half per thousand. Brave and beautiful France had to mobilize a great army, and had to do it quickly. The thorough physical examination, so essential for the discovery of tuberculosis, could not be made, and thus many a young man strongly predisposed had to enter the army in defense of his country. While military life, even in trenches and dug-outs, may be conducive to the increase of strength and vigor in the normal and healthy individual, the stress and strain of the soldier's life in war time, long marches, life in trenches and dug-outs, and the actual work on the firing line, will develop an active tuberculosis in the strongly predisposed, or in those already afflicted with incipient tuberculosis, often at an alarmingly rapid rate.

This must be the explanation for the relative frequency of tuberculosis among the fighting soldiers in France at the beginning of the war. At present the examination of recruits for tuberculosis is made as thoroughly as in peace times.

When hostilities began, sanatorium and hospital facilities for the tuberculous were not nearly as numerous in France as in the United States.

We must also admit that the French peo-

ple in general are not taught from their childhood the love of fresh air and the use of cold water as invigorating agents as is the average American boy or girl. This is the fault of their tradition, and their prejudice against the use of cold water and fresh and cold air by day and by night must be overcome in order to reduce the frequency of tuberculosis among the French people. Of course, the hardship this war has imposed upon the French civilian population, the deportation of many of them and the sufferings they had to endure during their enforced absence from home, are largely responsible for the prevalence of tuberculosis among these people.

All the sad conditions which predispose the individual to tuberculosis either by heredity or custom, and those which are acquired by privation, want, lack of food and air, physical and mental suffering, have combined to increase the number of tuberculous individuals throughout France. Fortunately for the American soldier, his early training in the love of fresh air and the use of cold water on his body have made him naturally more resistant to the disease, and to the honor of our military surgeons it must be said that the examinations at the recruiting offices are most thorough, so as to weed out those who are strongly predisposed to tuberculosis or already afflicted with the disease in the incipient stage. The examination is repeated after a few months' training so as to make sure that no tuberculous individual is in active service. Yet, the possibility that some of our soldiers may develop tuberculosis must be admitted. But even should

this occur, if the American boy now serving under arms in France will remember his obligation to his comrades, to himself, to his country and to his allies, and profit by these few words of advice, he will not be in great danger of the disease, and will be well taken care of if he should get it. There are, as already stated, a large number of institutions which will take care of him on his return home. Many public and private sanatoria throughout the United States have offered to take care of any of the American soldiers who may be returned from France as tuberculous invalids. Do not be discouraged, even if you should get a tuberculous infection. The disease is nearly always curable in the early stages.

*What can the American soldier now in France do to help in the fight against tuberculosis?*

The object of this essay is not alone to protect our American boys, but also to enable them by example and teaching to help combat this disease of the masses among their French comrades, as well as among the citizens with whom they come in contact.

Most French people and not a few Americans still fear the night air, and are too much afraid of drafts as being most dangerous and the cause of catching colds. First of all, the practice of sleeping with the window open at night in winter and summer should be taught by example and by word of mouth or by printed instructions. But this must be done with great tact so as not to offend. The people should be made to realize that night air is as good as day air and even

purser, for, as a rule, there is less traffic, less commotion, and less dust in the air at night. Drafts are only dangerous to the individual when he has perspired and the pores of his skin are open; at all other times drafts are beneficial, since air currents and winds tend to purify the atmosphere. Under ordinary conditions colds are never contracted from drafts, but are due to infection just as much as tuberculosis, for all gripes and colds are due to certain specific organisms. The germ of the former is known under the name of Pfeiffer bacillus, and the latter by the name bacillus of catarrh.

It is in the closed and badly-ventilated room that the ordinary germs of colds, influenza, measles, whooping-cough, spinal meningitis, and not infrequently, even the germs of pneumonia, are spread by persons coughing in the air. We have already alluded to the precautions every individual should take during the act of coughing, no matter whether he thinks he is ill or not.

Ordinary colds, gripe, measles, whooping-cough, bronchitis, pleurisy and pneumonia are often the forerunners of tuberculosis, and we should do all we can to prevent them by hygienic methods; we will thus reduce the frequency of tuberculous disease.

To clean the dust from furniture with the feather duster is still a favorite practice in French and in many American homes. It is in reality one of the most unhygienic ways of cleaning. It does not clean, but simply causes the dust to settle in another place, and the people who dust as well as those who live in rooms cleaned by this method are subject to inhaling the dust, which in

many instances is not free from disease-producing germs. It may be said that the same conditions result from dry sweeping of rooms or corridors.

The use of moist sawdust; or the moist used tea leaves of immemorial English custom, or newspapers torn up, moistened, and strewn on the floor suffices to allay the dust. Cleaning furniture with a moist or slightly oily cloth is far more hygienic and more effective.

To avoid the possibility of becoming infected, or of infecting others, you should never kiss any one, especially not a child, on the mouth. The French custom of kissing on the cheek is far more hygienic. Do not swap eating or drinking utensils, and see that they have always been thoroughly cleaned before use.

Any one who has never taken a cold-water bath and is fearful of not reacting—that is to say, of not getting warm again after its use, can easily become accustomed to this health-giving measure by beginning to take his cold water applications in the morning in the following way: Stand in a tub containing moderately hot water a few inches in depth and have within easy reach a wash-basin full of cold water in which a large sponge has been placed. Squeeze out the sponge full of cold water rapidly over the back, holding it at the neck, then in front over the throat, and over each shoulder, in such a way that the whole body receives an ablution of cold water. Dry yourself quickly, not necessarily very thoroughly, and return for a few minutes to the bed, which had been covered after leaving it so

as to retain the warmth. Reaction is thus absolutely assured. By this method any individual can train himself to the use of a cold ablution, shower-bath, douche, or cold plunge.

In many parts of France there is even a prejudice against drinking water. Now it should be distinctly understood that next to fresh air there is perhaps no greater factor in keeping a man well and strong than a plentiful ingestion of pure water. A moderate quantity (about a glassful) with meals and two glasses between meal times is most conducive to good health.

If the American soldier should come in contact with any comrade or man or woman of the civilian population in whom he should recognize, as a result of the study of this little brochure, the symptoms of a tuberculous disease, let him urge his friend to see a physician and institute such precautions as are necessary to avoid the possible conveyance of the disease to others.

*What are the agencies now at work to help the French soldier or French civilian who may have contracted tuberculosis?*

A number of sanatoria and special hospitals have recently been established in France, so that now, if the French soldier experiences any of the symptoms above described which may lead him to think that he is tuberculous, he may report at once to the medical officer of his regiment. He will then be carefully examined, and if thought to be tuberculous he will be sent to the base hospital or to the clearing station, where he will be observed for a number of days and re-examined by specialists so as to make

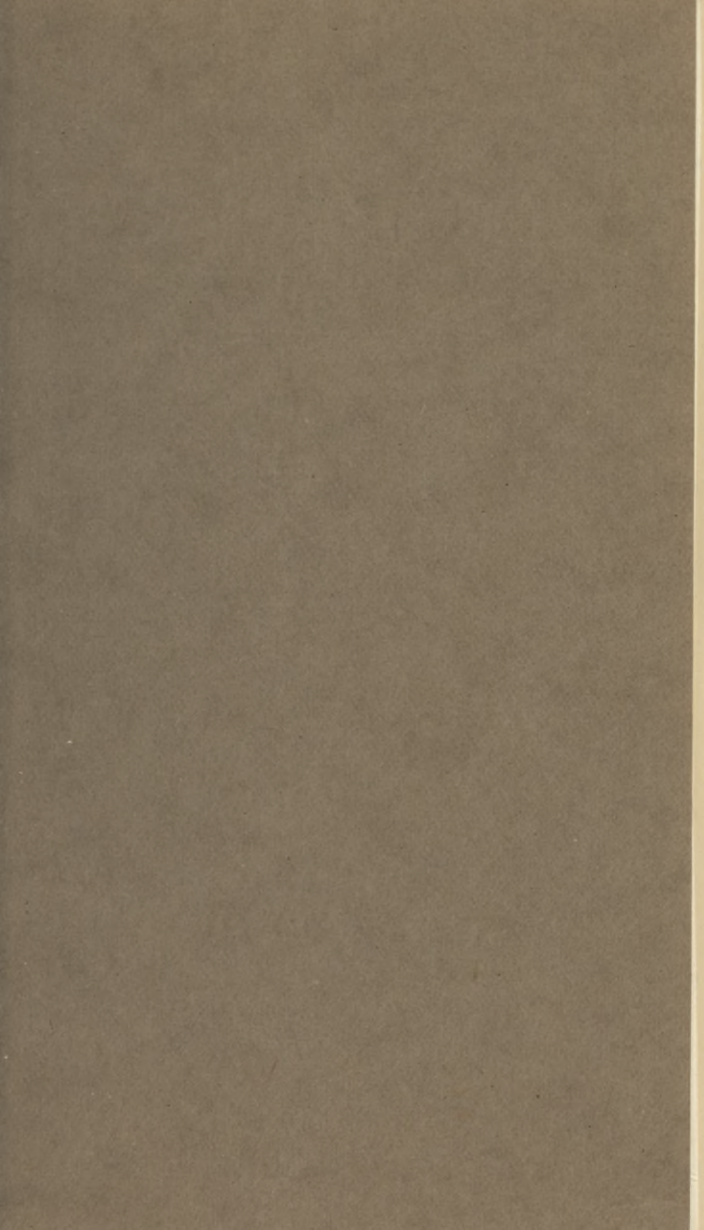
sure that no mistake has been made. If it is proved that he has tuberculosis he will be removed as soon as possible to a suitable sanatorium to complete his recovery. The civilian population will be taken care of in similar institutions, and in addition dispensaries or clinics are placed at the disposal of the men, women, and children, so that the tuberculous disease, if present in any individual, may be discovered at the right time and treated at the right place.

The Rockefeller Foundation Tuberculosis Commission, under the leadership of Professor Livingston Farrand, formerly the Executive Secretary of the National Association for the Study and Prevention of Tuberculosis, and a number of U. S. Red Cross units have been sent to France to cooperate with the medico-military and sanitary authorities to foster an educational campaign and establish additional tuberculosis sanatoria, special hospitals, preventoria, clinics, dispensaries, and agricultural colonies. In these institutions the best opportunity for recovery will be given to both soldiers and civilians, and they will learn by practical demonstrations what to do and what not to do to prevent infecting others and re-infecting themselves, and how to remain well once they have regained their health and strength.

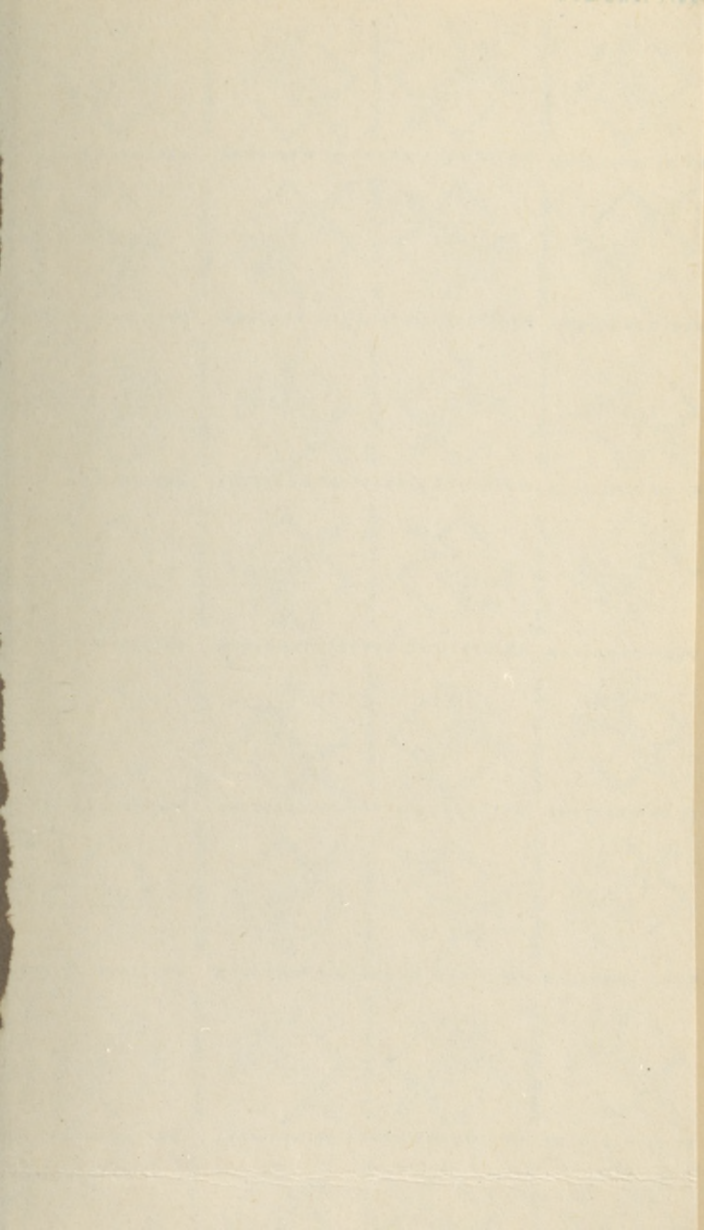
The soldier, if need be, will be able to enter again the ranks to defend his country and the civilian will be able to do his duty as a useful citizen. Their training will enable them to teach by word of mouth and example how to prevent the spread of tuberculosis.

*What may we hope for regarding the tuberculosis problem in all civilized countries after the successful issue of this war of democracy against autocracy?*

Since tuberculosis is as much a social disease as it is a medical disease, the prospect of combating the social causes will be brighter when militarism and autocracy will have disappeared from all countries. The countries which are now the enemies of the Allies will also become democratized, and there will be a united Europe as there is now a united America. Social justice for all will then be the maxim, and there can be devoted to the betterment of the social conditions of all peoples the countless millions of dollars that now are spent for maintaining fighting armies because one country would not consent to disarmament, but wished to dominate the world by brute force and uphold the maxim that "Might makes right." Medical science will then once more be able to devote all its energy to the prevention of diseases. All other branches of science, now utilized in the practice of war, will likewise be consecrated to the betterment and advancement of human happiness, comfort, health, and the enjoyment of life, and with these blessings attained, the disease which has justly been called "the great white plague," one of the greatest enemies of mankind, will disappear. Thus in the end the sacrifices of life, property and treasures beyond price made by millions of brave men, women, and even children, will surely lead to a higher civilization where lasting peace on earth and good will toward all men will reign supreme.









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