

two, it is true, meet as one on friendly terms, on the street or at the club. But the man of Wall Street is entertained with scant courtesy within the four walls of the poet's house. It is within them that his true life is lived.

And his has been an eventful life. He tasted court life in Italy, while his mother was wife of the American min-

ister. He was a war correspondent in the Civil War—which inspired one of his finest poems, "How Old Brown Took Harper's Ferry." But in the end he discovered that journalism left him no time or means for his chosen literary work, and turning stockbroker and banker, secured more or less of both those requisites.

DISEASE GERMS

AND HOW TO AVOID SOME OF THEM.

BY JOHN H. GIRDNER, A.B., M.D.

THE MICROSCOPIC LIVING CREATURES THAT ARE THE MOST DEADLY AND DESTRUCTIVE ENEMIES OF THE PEOPLE OF THE UNITED STATES, AND THE SIMPLE PRECAUTIONS BY WHICH THEIR ATTACKS MAY BE RESISTED.

OF all the blessings that mortal man can receive and enjoy, there is none so great as good health. Riches, honor, fame, and all the other prizes for which men labor, are insignificant when compared to the possession of a sound mind in a sound body.

This is no new bit of wisdom. It has been said many times, ever since the days of King Solomon; but it comes with a new meaning in these modern days. For by reason of the enormous increase of our knowledge of the causes that produce many of the most common and fatal maladies, it has come about that in no period of the world's history could the individual do so much to protect himself and others from sickness and death as in these closing years of the nineteenth century.

The publisher of this magazine once said to me: "If you want to educate the public on any great question, the place to begin is at the fireside. Strip your information of technicalities, and put it in such a way that the mothers can understand it." I shall endeavor to follow his advice in this paper, and, if possible, to add something to the general fund of information on the way to keep well.

Those who conduct the domestic affairs of the home, as well as those who make our laws, in both State and nation, have so far failed to take full advantage of the discoveries of modern science in protecting the private and public health, and we are to a large extent deprived of the blessings which ought to flow from them. This state of things is not surprising when we remember how recent are the medical discoveries which have taught us that the most common and fatal diseases are caused by taking into the body, in one way or another, specific poisons in the form of living germs. Fifteen or twenty years covers the period of these scientific revelations, and it is unreasonable to expect that the lay mind could have kept pace with them.

In the old days, when we were in almost total ignorance of the cause and means of preventing such common diseases as tuberculosis of the lungs (consumption), typhoid fever, etc., books and papers were written for the laity telling them how to *cure* these ailments, and nearly every family had its "Domestic Medicine," "Household Doctor," or some such volume of more or less

doubtful value. Now they need literature teaching them how to *prevent* these scourges. The old proverb that "an ounce of prevention is worth a pound of cure," should now read: "An ounce of prevention is worth ten pounds of cure."

There is a striking analogy between what may be called the visible and the invisible world of animal life. When we look around us with the natural or unaided eyes we see a vast number of species of animals, birds, fishes, and reptiles, all included in what is known as the animal kingdom. We are more or less familiar with the life history of each of them. We know their habitat, the conditions under which they can live—in short, all the principal facts connected with their life, death, and reproduction.

Now the modern microscope, which is nothing else but an artificial eye, has increased man's power of vision many thousands of times. It has revealed another and a heretofore invisible world of animal life. Like the visible world, this is composed of many varieties of microscopic creatures. For instance, several hundred different species of microbes may be found in the scrapings from the tongue of a perfectly healthy person.

Only a comparatively few of the forms of life which are found under the microscope are capable of attacking or destroying human life. But among the vast horde of microbes we find one that is the cause of tuberculosis, another that produces typhoid fever, and so forth; and as the field is more fully explored, doubtless many other important discoveries will be made.

Let us imagine an individual coming to this world from another planet without any knowledge of the visible animal world by which he would find himself surrounded. He would probably be very much afraid of a horse or a cow, but would consider a rattlesnake or a tarantula a beautiful plaything. His lack of knowledge would

certainly render him incompetent to guard his health and life against injury. We are very much in the same position as this imaginary visitor with regard to the germ life by which we find ourselves surrounded.

Tuberculosis destroys more lives than any one disease in the world. It kills more than a hundred thousand people each year in the United States. Yet the person who contracts tuberculosis has simply sustained an accident—as much an accident as if he had been bitten by a dog or kicked by a horse. He has been set upon by the microbe known as the tubercle bacillus, which, having effected a lodgment in the lungs, and found congenial surroundings, establishes itself, forms colonies, and gradually destroys the health, and too often the life itself, of its unfortunate victim. Comparatively little can be done to cure the disease, but much can be done to prevent the accident which caused it. If a foreign foe—the Spaniards, for instance—or some other member of the *visible* animal world, were killing a hundred thousand of our inhabitants each year, it would require no argument and no urging to induce the people to drive out such a foe, or render extinct the obnoxious animal which was causing such wholesale slaughter.

It should be noted that we have been speaking only of the deaths from this cause. The suffering of those who are attacked by this microbe and are fortunate enough to recover—in other words, the wounded—must also be considered in summing up its devastation. The fact that the particular form of animal life (the tubercle bacillus) which is actually causing all this suffering and death can be seen only with the microscope is a poor argument to justify our failure to make persistent warfare on it.

The late war with Spain furnishes a striking object lesson. Only 318 of our men were killed or died from wounds as a result of the attacks of the Spanish

soldiers, while 2,485 were killed by the attack of disease germs, mostly in the form of the bacillus of typhoid fever and the plasmodium of malaria. We have made peace with the Spaniards, but no peace has been made with the typhoid bacillus. The ranks of this enemy have been enormously increased. It has been scattered all over this country, and if we are to judge the future by the past, no effective steps will be taken for its extermination.

Millions of dollars are expended annually by the United States to maintain an army and a navy to protect the lives and property of the people against possible enemies in the form of the armies and navies of other nations, while at all times, right in our midst, we have actual enemies in the form of various kinds of disease germs, which not only destroy the health and lives of hundreds of thousands of our people annually, but cause untold financial loss. The government could wage war on these enemies with intelligence and effectiveness almost equal to that displayed in destroying the ships and soldiers of a foreign nation, or in suppressing lawless mobs within our midst.

But, it may be asked, what can we do, as individuals, to protect ourselves and others against these foes? To answer this question fully would lead us far beyond the limits of a magazine article. For as the germs of each disease differ in life history, habitat, and method of attacking the human system, it would be necessary to study each one of the communicable diseases separately, if we should desire to learn how to avoid the poison of all of them. I will give some specific directions how to guard against the two most common and fatal, tuberculosis and typhoid fever.

The tubercle bacilli multiply only in the body of man or some other animal, consequently the germs that cause a fresh infection of a previously healthy person come directly or indirectly from some individual man or animal already

suffering from the disease. When we consider that nearly one seventh of the human race die of consumption of the lungs, and that for weeks, months, and often years, these patients are continually expectorating quantities of the bacilli, we see that this source alone keeps up a large supply of infection. The dangerous sputum dries upon handkerchiefs, carpets, bedding, or in the streets and highways, and floats in the air as dust particles, ready to be breathed into the lungs of the passerby.

In this dry state the bacilli live for a long time. In one instance they were found to retain their virulence after one hundred and eighty six days.

We can all do something to lessen this enormous supply of infection. A five per cent solution of carbolic acid quickly destroys the life of the tubercle bacillus. If every consumptive person in the United States never expectorated except into a vessel containing a small amount of this solution, and these vessels, with their contents, were burned from time to time, the death rate from this source would be enormously decreased. A suitable cup or flask can easily be obtained for use when the patient is obliged to travel from home. The habit of kissing consumptives, or occupying the same bed with them, is also exceedingly dangerous.

The other principal source of infection is from drinking the milk and eating the flesh of tubercular cattle. How frequently man may be infected from this source may be imagined when it is remembered that from twenty to forty per cent of the cattle in the Eastern and Northern States are affected with tuberculosis. Protection from infection from this source is simple and easy. Heat promptly destroys the bacillus. If no beef is eaten which has not been thoroughly cooked, and no milk drunk which has not been thoroughly boiled, the danger of infection from cattle would be almost nil.

Civilized man should look upon milk as unfit to drink until it has been

cooked—that is, boiled. Boiled milk is generally unpalatable at first, but many of those who have become accustomed to drink it feel an aversion to raw milk, and would as soon think of eating raw beef, as of drinking a glass of uncooked milk.

Tuberculosis in children usually manifests itself in disease of the bones and joints (white swelling) and in enlargement and suppuration of the glands of the neck. In nearly all such cases the infection comes from drinking milk from tubercular cows. It is therefore especially important that children should take only milk that has been thoroughly boiled. A thorough inspection of cattle by the Federal government, and the prompt destruction of all found to be tubercular—as is already being done in certain States—would be the ideal means of destroying this source of infection; but we are not likely to have the necessary legislation soon; so it is almost criminal to expose children and young persons to infection by permitting them to use raw milk.

It must not be supposed that every one who takes tubercle bacilli into his system contracts the disease. If this were true, all of us would be likely to die of tuberculosis in some form. Fortunately, most people are immune—that is, the bacillus, when taken into the system, finds itself in uncongenial surroundings, loses its virulence, and dies. But certain individuals, and sometimes whole families, are born without this power of resistance. We have no certain means of knowing beforehand who are and who are not immune; so it behoves every one to avoid the danger of infection.

The bacillus of typhoid fever is generally taken into the system in the water we drink, though any article of food may also be a means of introducing the poison when infected water has come in contact with it before it is eaten. Food may also be infected by flies crawling over it after they have been feeding on material containing the

typhoid germs. Local epidemics of typhoid fever are sometimes caused by milk mixed with water from an infected source. A notable epidemic of this kind occurred in a town in Connecticut, a few years ago. A large number of people contracted the disease within a few days. Investigation proved that they all used milk from one and the same dairy. The dairyman was in the habit, it was found, of washing his milk cans with water from an old well near the barn. Examination of the water from this well showed it to be strongly infected with typhoid bacilli. The milk dealer claimed that he did not water his milk, but even if this were true, there was enough water left on the sides and bottom of the cans, after they were washed, to infect their contents. Such a case is another argument why milk should never be used for food until after it has been thoroughly boiled.

There is another dangerous source of infection by food, which people seem wholly to ignore—eating shell fish raw. The man who ate the first raw oyster is often referred to as a hero. As a matter of fact, any one who eats oysters or clams raw from the shell is running an unnecessary and useless risk of taking typhoid or other germs into his system. In any event, as a rule, he swallows a lot of filthy water, which he would not drink under other circumstances. Oyster beds are often situated in water containing quantities of sewage and other filth, and the so called “juice” which is found in the “half shell,” and which we swallow with such gusto, is composed largely of the water in which the oyster lived. If this liquid happens to be infected with typhoid bacilli, the person who swallows it with his oysters contracts the disease. This is not a theory. A number of epidemics have been caused in this way within the last few years. The remedy is to eat no shell fish raw; have them cooked in some form. A temperature of of 212 Fahrenheit—the boiling point of water—destroys every kind of disease germ.

These bacilli multiply in the intestinal tract of a person suffering from the disease, and they are discharged from the system in large quantities during the time—usually from four to six weeks—that the disease continues. They retain their virulence for a very long time outside the body; and eventually some of them may find their way into the food or drink used by healthy persons, who in turn become victims of the disease. Absolute destruction—preferably by cremation—of all matter containing the bacilli, is the only certain means of preventing the spread of the infection.

If this were carefully done in every case of typhoid, it would be only a question of a few years when the bacillus of typhoid would become as extinct as the dodo, and the disease itself be known only in history.

Boiling water and cooking food that has once become infected destroys the life of the germ, and this should always be done where there is the slightest suspicion of the purity of the water supply. Carelessness in the treatment of typhoid fever patients, which is especially common in the country districts, renders the water in all dug wells, cisterns, and springs more or less liable to become infected by surface drainage and washing rains. Where the water

used is obtained from a large supply—as, for instance, the Croton aqueduct—there is little danger, for if the germs should find their way into it the volume of water is so great, and they would be so widely disseminated, that no one person would be likely to get enough to cause infection.

As we never know the source from which the water furnished on railroads, steamboats, etc., is obtained, it is a good rule when traveling to drink only bottled water, which can always be bought at a trifling expense. The only way to obtain an absolutely safe water supply in the country, where only a small amount is required, is by a deep driven well. When an iron tube is driven seventy five or a hundred feet into the earth, and water is found, that water cannot be infected by the surface drainage. Surface drainage is only dangerous to a depth of twenty five or thirty feet, and as the water from a driven well is inclosed in an iron tube, it is not infected by passing through the upper strata. It comes to the surface pure from nature's laboratory.

It seems probable that no one is immune from the typhoid bacillus. Any one who meets with the accident of taking into his system a sufficient quantity of the germs will suffer the pains and perils of typhoid fever.

A PRAYER.

FOR all the verdant trees, dear Lord,
 Along the dusty highway set;
 For every roadside rivulet,
 And for Thy sun, whose gold is poured
 A largess for the common horde—
 The poor, the low, who crowd and sweat—
 My thanks, dear Lord, are Thine. Oh, let
 No special gifts for me be stored;
 May joys that ragged millions share
 Enrich my life. I do not crave
 Immunity from toil and care.
 Give me, O God, no blessing save
 Companionship with those who fare
 Beside me to the waiting grave.

Ann Devoore.