

SANITARIUM LECTURES. (June 5, 1891.)

J.H. KELLOGG, M. D.

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Good morning, Ladies and Gentlemen : I propose to talk to this morning about

NATURE'S METHOD OF DEFENDING THE BODY AGAINST DISEASE.

When we talk about the causes of disease,--the numerous adulterations of food, and the great number of errors of diet to which people are addicted, and the dangers to life in water and in the air, dangers from germs, and from all the causes of disease which surround us on every hand--doubtless many of you begin to think that it is a very dangerous thing to live, and that there is no safety anywhere, at any time. I believe there is a trite expression, "In the midst of life, we are in death",--or something equivalent to that --and surely this is true. Nevertheless we don't all die. And why don't we die? Why don't we each of us suffer disease and death from the assaults of some of the various kinds of germs which are around us in great numbers? Every breath we draw brings germs, and every swallow of water carries down into the stomach more or less of these enemies to life.. Why is it, then, that we are not more or less affected by these causes of disease?

Let us notice first, what are some of the causes of disease to which we are all exposed, at all times.--For example : there is a common cold, to which we are all liable ; We take cold, in consequence of changes of the weather, more or less. Why don't we

all take cold,--and why don't we always take cold? These changes in the weather might be arranged, categorically, as, ^{first} 1st, changes in temperature; ^{second} 2nd, changes in the moisture in the air; ^{third} 3d, changes in the electrical conditions of the air; ^{fourth} 4th, changes in the amount of sunshine,--and perhaps we ought to add, ^{five} 5th, changes in the air-pressure through the influence of winds--but these are the four principal changes,--temperature, moisture or dryness of the air, electrical conditions, and sunshine,--perhaps adding a fifth condition--air-pressure. Now these conditions are changing all the while:--^{the} temperature is changing every hour, and the electrical conditions of the air are changing every instant. The amount of sunshine varies constantly, from day to day and from hour to hour,--at any rate it is so in this climate--in this country. In some countries they have almost perpetual sunshine, and in other countries, almost continual cloud; but here in Michigan we have a perpetual diversity of sunshine and cloud. Some think we don't have sunshine enough, but I think we have about the right amount. In the winter time, as a rule, we have considerable sunshine; and, at this time of the year, I think we have plenty of it. But why don't these conditions always affect the body?

And so we might add, in reference to errors in diet: why are we not always affected by them? We are constantly eating too little or too much. There is hardly any one who adjusts his diet to his physical conditions as accurately as he should do.

Besides, we are constantly eating things that are more or less harmful. We are constantly exposing ourselves to dangers in our food. We take into our stomachs (ignorantly) decompositions and adulterations, and other dangerous elements contained in our diet. Yet we do not suffer as seriously, as we would think we would be likely to suffer, if we understood this subject as thoroughly as we should.

Then, in other respects we are constantly exposing ourselves to injury,--for example, in matters of dress. We do not adjust our clothing to the weather as we should. We are not as careful to adjust our dress to the requirements of the body, as we should be: We wear our clothing too tight in some parts,--and in some parts we wear too little, and in others, too much. We neglect to take proper care of ourselves in this way, and yet we don't suffer so seriously as we would think we would be likely to, if we should consider the matter carefully. Why is this?

The same thing may be said in reference to exercise: Sometimes we don't take exercise enough,--and sometimes, we take too much. Sometimes we work too hard,--sometimes we don't work hard enough. Sometimes we do not take exercise in a proper manner,--we sometimes exercise violently, so that our hearts palpitate and the blood is forced into the head in great excess. Sometimes we are sluggish and neglect the taking of exercise, and expose ourselves to the consequences of the violation of nature's laws.-- We are constantly violating nature's laws. We become violently excited, perhaps; we expose ourselves to the ^{evil} influence of intense

and violent emotions. When we think of the fragility of the blood-vessels--how very delicate are these structures-- it is a marvel to us that they are not ruptured, when they become greatly distended from these causes. We see the eyes blood-shot, and the veins crowded and distended with blood, and yet the blood-vessels are not ruptured, except upon very rare occasions.

And then, here are these germs to which we are continually exposed,--germs in the air that come into the lungs through the skin, through the nasal passages and through the air passages continually, --and yet we continually escape !

Now let us consider how the body defends itself against these constant threatenings of danger. If the body ^{As it is} ~~was~~ constructed as an ordinary machine is constructed, as a watch, for example-- it would not escape these dangers. Now here is a watch : when we open it and see the wheels going around on the inside--see the movement of the watch, and of these little wheels--delicate little wheels they are, with their delicate little cogs which exactly fit into each other,--the tiny springs and all the delicate mechanism of the watch, we know that a grain of sand or a little accumulation of dust will stop it. And if you should leave the watch lying open a day or two, it would cease to go,-- a very slight derangement will stop it. But it is not so with the body. We may introduce many dangerous things into the body without stopping it . Why ? Because the body has the power of adjusting itself to these things: it is a self regulating

machine; it can constantly adjust itself to changes of temperature, or other climatic changes. These changes require that the body should readjust its activities. Here we have the skin carrying off moisture,--carrying off impurities--and also keeping the body cool. We have a constant fire in the centre of the body which raises the temperature of the body to 100 degrees--blood heat--while the other parts of the body are kept at a lower temperature, and this continues for almost the entire period of life. And that temperature is maintained at a higher degree than that of surrounding bodies,--just as a fire in a stove maintains a higher temperature than the other objects in the room.. The body maintains its temperature at a certain point which is necessary for the carrying out of the vital processes of the system.

How is this accomplished? Why does not the body get too warm? Why doesn't it get too cold? When the outside temperature rises, why does not the temperature of the body rise? When the outside temperature falls, why does not the temperature of the body fall? But these changes in outside temperature do not affect the temperature of the body. This is certainly very remarkable. (Explaining by diagram.) If we had here a vial containing water, with a lamp under it, burning at such a rate that it would keep this water at 100 degrees temperature;--when the air outside was maintained at 70 degrees, if the air outside should fall to 60 degrees, the water in the vial would cool off a little. If the temperature outside should be 100 degrees, the temperature in the vial would rise; and if the temperature of the water in the vial is kept at 70 degrees, it is because there is

just enough heat in the outside temperature to allow it to remain at 70 degrees. So the temperature of the water in the vial is affected by that of the atmosphere. Why is it not so with the body? It is because the body has delicate arrangements of its own, by which it can adjust itself properly. If less heat is required, then less heat is produced by the body. It has an apparatus by which it can cool itself off. It can not only stop heat-production, but it can get rid of unnecessary heat, so that the heat in the body may not accumulate in consequence of the heat from the outside. Even if the temperature of the air outside is as high as that of the body--or even 110 degrees, which is higher than the temperature of the body--then the body may maintain its temperature at less than that. I have been in a Turkish bath, where the temperature was 100 degrees, and yet my own temperature did not rise while in the bath. One man was in a room where the temperature was 200 degrees (~~100~~), but his temperature did not rise. Why? Because the body was able to cool itself off, and keep its temperature below the outside temperature,--even though it might be double that of the body. This is one of the adjustments of nature, -and she is all the time making these adjustments. Nature is able to make these adjustments, and she does make them; and, as a result, we do not suffer, ordinarily from these outside conditions.

If we are suddenly exposed to great cold, nature makes an adjustment of the avenues through which heat might escape,--she closes the blood-vessels on the outside of the body.. That is

what is familiarly called "goose-flesh". The blood-vessels are contracted so closely by the cold,--the skin is drawn up, and puckered up, so that the blood shall not accumulate in the skin--so that the blood shall not be drawn to the surface, but shall be kept within, and by that means, we have the heat of the body saved; and by that means, nature begins the process by which the proper amount of heat is produced, and stimulates the fire in the body so that the temperature is maintained. There is not a day in which these adjustments are not taking place. This is a very interesting and important fact.

Then, as regards the moisture in the air : See what nature is doing here. We require that the air should readily pass into the body, and that the gases of the body should readily pass ^{out} into the air. There should be the necessary amount of moisture in the ~~body~~ ^{air}, or else the lungs would be dried up, and these constant interchanges ~~of~~ could not take place. But we find that nature can adapt herself to changes in the atmosphere in regard to moisture. The amount of work done by the lungs, depends upon the amount of moisture in the air. The same is true of the skin,--the amount of moisture thrown off by the skin depends very largely upon the amount of moisture in the air. When the air is damp, the lungs ~~throw off~~ more moisture, and the skin, not so much; and when the atmosphere is dry, the skin throws more moisture, and the lungs, not so much as usual. ~~If the air is damp, the skin throws off~~ a smaller quantity of moisture than usual, for the reason that moisture is not evaporated so readily in damp weather as in dry.

So you see that when the conditions of the atmosphere are such that the lungs cannot throw off so much, the skin throws off more. This is an important consideration,--that when the air is in such a condition that the lungs cannot do so much, then the skin does more, and when the skin cannot do so much, then the lungs do more. We seem to perspire more readily just before a rain,--and you have no doubt noticed that horses seemed to perspire more just before a rain--although it is no warmer than usual. They will not appear to perspire so much in a dry day, but if it is a warm damp day, they will appear to perspire more freely. ^{than usual} This is because the perspiration does not evaporate so readily from the body in a damp, as in a dry atmosphere, so that there seems to be more perspiration in damp weather, than there really is.

The same principle holds true in regard to electrical changes in the atmosphere, and the electrical relations of the body. The body has an electrical relation to the surrounding air, and there are electrical relations between the different parts of the body. For example: Every heart-beat produces an electrical influence in the body. (Explaining by diagram.) Here is thrown off from the heart a positive current in this direction, and a negative current in the other direction. Here is a line drawn down from below the neck,--right across here: the current of electricity in this part of the body will be positive, while in the rest of the body, ^{the current} it will be negative; and, with every heart-beat, this electrical state will be produced.

You ask why this line does not go through the middle of the body . It is because the heart is a little one side of the chest. If the heart were exactly in the centre of the body, then this division of the body would be along down the median line. But its position being slightly on one side of the chest, produces this electrical division of the body, as shown by a delicate instrument constructed for the purpose of examining these electrical currents. Not only the heart, but the lungs, and the liver, and every muscle, and every cell acting in the body, produces some delicate amount of electricity,--"electrical potentials", as the electricians say.

And then, the different parts of the body undergo electrical changes in a wonderful way,--so that the body is itself an electrical apparatus, and must adjust itself to other states of electricity in the atmosphere. If the electrical conditions of one part of the body are more delicate than those in some other part, then that part must undergo a corresponding adjustment. And one part acts upon another,--to illustrate : While experimenting upon the electrical condition of the air at one time, I noticed that my milliamperemeter indicated the presence of an enormous amount of electricity, when there was no outside current. Upon disconnecting my instrument and looking about me, I found there was another milliamperemeter near by. Upon removing that instrument, the one with which I was experimenting showed the true electrical state of the atmosphere. So there are

wonderful electrical changes in our bodies,--and these changes are taking place continually. And we have in the air, and all about us, electrical changes which must affect this delicate arrangement of "electrical potentials" in the body. I will give you an illustration of that, which I have found, while operating with the telephone : A number of years ago, while listening at the telephone, I heard a great snapping and cracking,--something like rattling the teeth of a comb. I thought some one must be rattling at the other end of the instrument, or that some one was blowing into it; but, on shouting into the telephone, I got no reply. But this rattling sound was continued. Pretty soon, I noticed a light in the distance, and directly afterwards, I heard a distant roll of thunder. So, I knew that a thunderstorm was coming up. The snapping and cracking and rattling in the telephone was continued, until I was glad to hang it up and retire to another part of the room. But I still heard the snapping and cracking in the telephone, until the storm passed over. I listened at the instrument after that, when the storm was so far off that the thunder could not be heard, and still I could hear the indications of the storm in the telephone. The telephone was a more delicate means of detecting the electrical changes that were taking place, than my ears, and it detected the storm thirty miles off. The telephone could easily hear the storm twenty five or thirty miles off, and my ears could not. Now the telephone is a very coarse electrical machine, compared with

the body. These delicate nerve **-filaments** of the body which carry the different impulses of the brain down into the different parts of the body,--these filaments, not more than the twenty thousandth part of an inch in diameter--are much more delicate means of detecting electric changes--much more delicate electric appliances these little jelly like protoplasms are--than iron bars or telephone-wires. There can be no doubt, then, that the body is itself continually affected by these electrical changes which are going on all around us. Why then do we not suffer? Because (as I have said), the body has the ability to adjust itself to these changes.

And so it is, in reference to matters of diet. If a person eats too much, for instance, why doesn't he suffer? Doubtless he does suffer some, but he does not feel much worse,-- unless he eats an extraordinarily large meal. A person may eat twenty five, thirty, or forty percent more than he needs; and if nature should punish us for such violations of her rules as many are guilty of, they would become sick, and would die,--because many make gormands of themselves. Doubtless, as a rule, many people do eat too much,--much more than enough (except some of that class of invalids who can't eat enough) Why don't we suffer immediately, after eating too much? Because nature has given us an excess of vital force in the body, above what is necessary for immediate use. We ordinarily breathe out about 20 cubic inches of air at once, but we have the ability of breathing out

220 cubic inches of air by inspiration. If we should breathe out all we possibly could, we could ordinarily reach 220 cubic inches of air; so that nature gives us ten times as much breathing capacity as we need.

Then, there is the liver,--the liver is capable of doing more work than is required of it in the use of a healthy diet. If it were not so, how would the liver manage to dispose of these "Christmas dinners", "thanksgiving dinners" banquets etc.? It is because the liver is able to do more work than is required of it .

The same is true of the skin. Ordinary evaporation is so slight, that it takes place as soon as the moisture comes to the surface; but the skin is capable of throwing off ten times as much as passes off ordinarily.

The same is true of the kidneys : The ordinary amount of food eliminated by the kidneys, is perhaps two or three pounds every day; while the amount that can be eliminated under some circumstances, is from eight to ten times as great--twenty five or thirty pounds has been known to be eliminated through the kidneys in twenty four hours.

So we have this reserve capacity which nature has given us to defend ourselves against disease, as well as against morbid conditions and sources of disease.

But how are we to defend ourselves against germs which are the most active and deadly foes to human life to which we are ex-

posed? How are we defended against these minute organisms, when we are constantly swallowing them in our food and drink, and inhaling them in the air we breathe, without knowing it? Even if we happen to have a little abrasion of the skin anywhere, they are likely to get in and commence their mischievous work of generating poisons and setting up inflammations,--how are we defended against them? In my next lecture, I will talk to you about the means which the body has of defending itself against germs,--and it has this power,--which is one of the most wonderful physiological facts with which human science is acquainted. I will also show you some blood corpuscles, and ^{explain} the part which they have to perform in this work.

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SANITARIUM LECTURES. (June 19, 1891.)

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Good morning, Ladies and Gentlemen : I believe I promised to talk to you about

HOW NATURE DEFENDS THE BODY AGAINST DISEASE.

This is really a very interesting subject . One is constantly tempted to ask himself the question, How is it possible for us to live among so many causes of disease and death,-- especially when we come to learn about germs, and that every breath we draw, carries more or less microbes into our lungs, and that every swallow of food and water (unless thoroughly distilled and sterilized), carries numbers of microbes into the system,--when one considers all these things, the wonder is, that we live at all . Nevertheless we do live, in spite of all these causes of death and disease. And it is very necessary that we should consider how many provisions nature has made to protect us from these potent causes of disease and death.

First of all, she has enclosed us in an envelope which is impervious to germs,--the skin. If there is no abrasion upon the skin, germs are absolutely powerless to do us any harm. The skin is a horny substance covered with imbricated scales like those of a fish, one overlapping the other, and making a thick protection (like a coat of mail) against the encroachments of microbes which

swarm the air and are found in everything with which we come in contact. In this covering of skin, is contained the mucous membrane. We have a covering of skin, and a lining to the skin. This is the mucous membrane.. The structure of this membrane is similar to that of the skin. It covers the throat and lungs, and all the interior of the stomach is lined with this mucous membrane which is similar to the skin, only it is not quite so thick. It is not the same horny layer, but it is a layer which is in the body, and which is proof against ordinary germs. Nevertheless, if they once get into the interior, they multiply in such numbers that after a while they will break down the wall formed by the mucous membrane, and get into the blood vessels, and get among the nerves and tissues where they can do mischief. As I remarked, so long as the skin is intact, we are safe from germs. But there may be a little opening from some cause (as a pin scratch), where the microbes can get through and commence the most deadly mischiefs. The mere puncture of a needle may open the way for germs, and their work may be sufficient to cause death in a few hours, if they are the right kind of germs. The mucous membrane of the body, so long as it is in a state of health, is able to protect the body from the majority of germs, but there are some germs which are can get through the mucous membrane. The majority of germs doubtless find their way into the body through the mucous membrane of the throat, stomach, or lungs. Suppose, for example, a person takes a cold:

after he has taken the cold, the irritation which is set up, by the "hemming and hawing" in clearing the throat may cause a rawness of the throat (a portion of the mucous membrane being torn off), and then the germs march in. In this way they may get into the tonsils at any time, a little cold attended with coughing, will cause an abrasion through the covering furnished by the mucous membrane, and then the germs will get a foothold there.

Before telling you how germs injure the body, we will consider this subject a little further. (Explaining by diagram).

Germs are found in the water of stagnant pools : If I should gather some grass from the lawn here, and put it in water and let it stand, so as to make a little stagnant pond of an artificial character, ~~put~~ put the water in a basin and let it stand behind the stove, in the window, or in the sun two or three weeks, ~~and~~ the water of that basin would be brought into the same condition as the water in the stagnant pool, and if I should examine it, I would find amoeba, such as is found in the pond. It is flat when it is in motion, but when it is resting, it is not flat, but spherical. It is like a little white spot of transparent jelly. It puts out feet (referring to diagram), here is one putting out a foot. . Now these amoeba are capable of doing a great many curious things. They are capable of eating, -- for example (referring to d.) this one is preparing to eat a morsel of food (I see the artist has neglected to put the food here, but we will supply it). If you will examine amoeba that are living in a pond where there are germs, ~~and~~ you will find in-

side of them great numbers of these various germs. You will find, if you watch them closely, that these amoeba (jelly-like protoplasm, which is the lowest form of life)--living in cells), are very fond of germs, and live upon them, very largely. So, we have, in the pond, a sort of pasture for amoeba. You will see germs in these little living cells,--the germs growing in the pond, are a sort of vegetable growth upon which these amoeba feed, for (as I have said), the pond of stagnant water forms a sort of pasture for them,--they feast upon these microbes. Now, it is a very curious fact, that we find cells of exactly the same character in the human body. This amoeba here (ref. to d.), is from a pond; and this one is from the human body,--these amoeba here, are found in the human body, and this is a picture of what one may see in a single drop of blood. Look at it through a microscope, and you will see a large number of living cells, some of which are like these that you see here, and others are like these. These are the red corpuscles, and these are the white corpuscles. For every four hundred red corpuscles, there is one white corpuscle. These white corpuscles are human amoeba. These amoeba, are as really living, intelligent animals, as fishes are. These little animals are in the blood all the time. There are other similar cells found in the connective tissues. Here (ref. to d.), is a portion of blood having connective tissues: These cells fill up these tissues everywhere in the body. They are found in other parts,--in the mucous membrane which lines the

lungs. Notice how extensive is this mucous membrane : Physiologists have made a careful estimate, and they tell us that if this mucous membrane were spread out, it would cover a surface of 2000 square feet, (about the size of this room) The mucous membrane of a single pair of lungs, when spread out, would carpet this entire room. This mucous membrane is covered with several layers, similar to those cells that grow in a pond and are found in stagnant water.

These cells, wherever they are found in the body,, are capable of consuming germs. Here you see one in the mucous membrane of the lungs. And here are two thousand feet of these cells several layers deep,--an army (as you might call it) in the system, of two thousand square feet of cells, for the protection of the body against germs. When we take into the body a great number of germs, they are captured and consumed by these cells,--for they not only catch them, but they eat them--and digest them, too, so that the microbes disappear. That is one of nature's means of defending us against germs .

We have another very interesting means by which nature protects us against germs in the lungs. (Explaining by diagram.) Here we have the air-passages,--here is the trachea . The whole trachea is lined with little cells which have a very peculiar function. They are ~~detached~~, conical cells--like this (ref. to d.) ,-- Here is the mucous membrane, and they are attached, by the apex of the cone, to the mucous membrane. These cells,

when examined by the microscope, are all found to be covered with hairs. Here are some more of them,--the top of each is covered with hairs. These air passages are all lined with these cells. Now a very curious thing about these little hairs, is, that they are constantly in motion. Imagine the hairs of your head, all standing straight up, and all in motion,--just like the wheat in a field of grain when the wind blows over it. These little ~~little~~ hairs are not only all in motion, but they are all moving in the same direction, --just as the wheat in the field of grain moved when the wind blows it. I have seen these little hairs under a microscope, and they look exactly like the grain in a wheatfield when blown by the wind,--all moving in the same direction. The direction in which these little hairs are thus moving, is always upward. What is the purpose of that? ^{When} these germs are taken in with the breath; they strike upon these little hairs, and these hairs toss them up again. As the hairs toss off the germs, they are caught on the hairs of other cells, and are tossed farther up, and thus they are tossed along up until they get into the throat. Not only that,--there is a slimy mucous secretion which comes into the throat, and is thrown out into the air with the germs, ^{which have been entangled in it} This mucous lies on and among the hairs, and the constant movement of the hairs keeps a current of mucous traveling right up toward the throat, and the germs which are caught ^{by} and carried along with this mucous, are coughed up and thrown out with it. After you have been in a dusty room, the

dust will come up to your throat, and you will cough it up and throw it out. How did that dust get up there? When you were in that dusty room, you inhaled the dust, and it went down into these air-passages and lodged in the mucous and these little hairs (ciliated epithelium), have been tossing the mucous and the dust up-hill, until they have been coughed up and passed out into the air. You can study these cells with a microscope, by catching a live oyster, and scraping off a little of the beard of the oyster, --scraping a little off its gills--for the oyster has gills, and breathes like a fish. If you will scrape off a little of the beard of the oyster, you will find these cells, -or if you will pick off a little bit of the mucous membrane in its throat,, you will find this ciliated epithelium there.

So there are a great many ways of caring for the lungs, and if you could dig down there and examine these operations of nature, you would find that out a million of germs nine hundred and ninety thousand would be taken care of by nature's defenders of the citadel of life. But a few germs do escape and get down into the depths of the lungs, and there they find the mucous membrane, lined by cells. Suppose this represents a group of these cells. (making diagram). There are several layers of these fine cells of the lungs, and (as I have said), they cover about 2000 feet of lung-surface. When these germs come down here, these cells capture them and eat them up.. A few years ago, I made an experiment with a frog and injected a little indigo into the lymph pocket. After a sufficient length of time had

elapsed, I examined the lymph-sack, and the indigo was all gone,-- the cells had captured it, as well as the germs, of which some of them had one, some two, and some had more . This is the way the lining-cells of the mucous membrane capture the germs. If these cells get into the blood, they get among the white blood corpuscles, and these capture the microbes.

Doubtless we are taking into our blood more or less microbes all the while, and the white blood-corpuscles are consuming them. Very probably it is a large part of their work, to capture and consume microbes,--and the way circulation is arranged, gives them a good opportunity for this work. (Explaining by diagram.) Here are the capillary vessels, some of which are larger than others. Through these, the white blood-corpuscles are compelled to travel, and sometimes the channel through which they have to pass is so small, that they are compelled to travel through in single file; in some places they can go through in ranks of two or three, while in the smallest capillaries, there is barely room for a single corpuscle to creep through. So that, in these larger vessels, it might be possible that some of the germs might escape. But when you come to the smaller capillaries, where the whole space is filled up by a corpuscle, if there is a single microbe trying to pass there, the corpuscle is sure to catch it. In such cases, the whole capillary is swept clean, and if there is a speck of indigo, germ, or microbe --or anything else there that should not be there, this little jelly-like corpuscle takes it, and the capillary is swept clean.

Another thing I must tell you about these white blood-corpuscles,--and that is, as they are working their way along through the blood-vessels, you will notice that they are not carried along like some floating body on a stream of water, but are attached to the walls of the capillaries, while the red blood-corpuscles are found traveling along through the middle of the capillaries, like bits of wood floating on a stream. You will see them here (ref. to d.) going through the middle of the capillary,--a stream of them going right through--and that is a very proper thing for them to do, for they are only a sort of load-carriers. They first take a load of oxygen and carry it down into the lungs, and after unloading that, they carry up a load of carbonic acid gas (CO_2), like a mason tender on a building, who carries up a load of mortar onto the building, and carries back a load of rubbish. That is what the red blood corpuscles do. They were once white. After a while, the white blood-corpuscles grow old. If you will look at the capillaries of a frog, you will understand this,--I think I must bring you up a frog, and show you the circulation of the foot. You will see the white blood-corpuscles attached to the walls of the blood-vessels,--they will stop, and then hitch on to another point, and then stop again, and then hitch along a little farther. So you will see them slowly hitching along the walls of the capillaries. I could not understand this at first,--and it used to be supposed by the physiologists, that the principal reason of

these white blood-corpuscles, was, that they were trying to find a place to get out,--because white blood-corpuscles have been found outside of the tissues, and it is supposed (or imagined) that there were small openings along the walls of these capillaries, and that the white corpuscles were hunting for these places, in order to get out,--and you will find, on examination, that one of them, for instance, is putting his foot out on this side, and another is sticking his nose through on the other side, and then it gets larger on the outside here, and larger on the other side, until finally it gets out--like pulling a silk handkerchief through a ring. It is quite possible that that is one of the things which causes the white corpuscles to hitch along the walls of the capillaries in this manner .

Another thing which I must call your attention to, in reference to germs: They are likely to form a colony, and grow more and more numerous . You will sometimes see a sort of mould on the wall. They fix themselves in a sort of patch on the wall, and form a sort of mould, and this increases until there is a large patch of them . So, when microbes attach themselves to the walls of blood-vessels, ^{they} ~~and~~ do the same thing there. Now these white blood corpuscles which lie along the walls of the blood-vessels, pick up these mites as they form, (for they might form an obstruction there). So these corpuscles may be regarded as the scavengers of the blood-vessels,--they pick up the microbes and the subtle particles of matter which might do mischief if left alone. Sometimes we find microbes in the tissues,--and, by

way of experiment, physiologists will inject a few germs under the skin. You examine them a few days afterwards, and you will find that, generally, the germs have disappeared in a short time. Why? Because the white blood-corpuscles worked their way out into the tissues and they found these germs and consumed them,--and that is one way in which we are protected against from the germs which get into the tissues. Suppose germs were injected into the blood: These germs will ultimately disappear in a majority of cases. It is found that if germs are injected into the blood, in a few hours they all disappear. If a large quantity of germs are injected into the blood, they will be found in the blood for a short time, but in the course of a few hours, they all disappear,--not a germ can be found. That is true of germs in malignant carbuncle or anthrax. . . In a few hours they will all disappear, for the reason that the white blood corpuscles captured and eaten them up.

But there is another way by which germs are destroyed. In certain portions of the body, there are ranged certain relays of soldiers (as we might call them),--fortifications garrisoned with white blood-corpuscles. The spleen is one of the ~~spleen~~ is one of those places. It is a great blood-gland. It was not understood, until recently, what the spleen was for; but, after all sorts of experiments had been made, it was found that cats could live without a spleen. All the difference it made with them to be deprived of the spleen, was, that they became fat

and cross,--which is not a very common combination you know, for fat people are generally good-natured--and it is generally understood to be necessary to be good natured in order to get fat. But the cat, when deprived of the spleen, gets fat and cross, and we don't know why that is . . . Physiologists have said they knew nothing about the uses of the spleen, until, at the present time, it is found that the object of the spleen, is to destroy germs. The germs will disappear from the blood in a few hours, but the spleen will be found to be swarming with them,--the whole of the meshes of the spleen, upon examination, seems to be filled with the white blood corpuscles,--that they originate there, and from there are sent out through the whole body. So that the spleen might be considered the headquarters of the scavenger-works of the city of the body, and the dumping-ground of all its impurities. Portions of dead cells are captured and drawn into the spleen, and there they are disposed of,--eaten up, as well as the carcasses of dead corpuscles. When one considers the work that the spleen has to do, they will appreciate its importance. All the corpuscles of the body die in six weeks, and the spleen disposes of them. If these corpuscles were allowed to accumulate in the spleen, it would be like a river after its fish were all dead and left in it to poison its waters. For dead corpuscles are found to be very poisonous. If you take from four to six ounces of live blood and inject it into one of the veins, there is no apparent injury,--in fact, there may be benefit from this. But,

if you take that same quantity of blood, and boil it before it is injected into the veins, the blood is poisoned by the dead corpuscles. So, it is important that all these dead corpuscles should be disposed of. Now the white blood-corpuscles do a very important work for the body in this respect: They capture and destroy these dead corpuscles. They capture them as soon as they are dead--sometimes just a little before, perhaps--and they eat them up and digest them, the same as they do the germs. If you will examine the spleen with the microscope, you will find some of the relatives of these dead corpuscles among the white corpuscles,--their brothers or sisters, uncles, aunts or cousins, by whom they have been captured and destroyed. The white blood-corpuscles have captured these old red blood-corpuscles which have outlived their usefulness, and eaten them up. A white blood-corpuscle will grow old and become a red blood-corpuscle, and one of these white corpuscles catches it and swallows it, and thus helps to build up its own constitution out of that of one of its predecessors. In this way, this work is going on in the spleen,--and we now understand the spleen to be a laboratory in which a wonderful work is being carried on, for the protection of the body.

But it is not only in the spleen that these little animals are taken and destroyed. This work is also going on in the large bones of the body. We have sometimes wondered why these large bones were made hollow. It is because the cylindrical form gives the greatest strength with the least weight of the bones. All

animals do not have hollow bones. Reptiles (such as lizards and alligators) have solid bones,--they must crawl along under bodies of water such as rivers and streams, for their food, hence their bones must be heavy ; while birds, which were intended by nature to fly in the air, should have light bones, hence their bones must be hollow. These bones of man, connect with the lungs, and are therefore sources of storage for the air. Into these hollows, germs also find their way; but they find the bones full of marrow which consists largely of white blood-corpuses , and they capture these germs and dispose of them in the same manner as those which are found in the spleen are disposed of,-- they capture and eat them. So, the marrow of the bones is found to be a great laboratory for the destruction of germs . These great bones of the body are thus utilized by nature as a means of destroying these impurities of the body by means of these scavengers not only of the bones, but of the lungs, spleen and other parts of the body. We see that this is a very interesting subject, and one which we may study to a considerable extent, and with great profit .

Now let us consider for a moment, how it is that germs get possession of the body. When we have so many means of defense , - when the body is so well protected--how is it possible for germs to do us any harm ? When there are two thousand feet of cells ready to capture the germs, and when there are so many millions of these white blood-corpuses ready to capture germs, and with these laboratories in the spleen and in the marrow of the bones,

to watch out for germs, catch and destroy them, what need is there of our ever being sick or injured in any way by means of germs ? Now, it is probable that when the body is in perfect health, it is able to protect itself against germs. Suppose some one should come in here, who was suffering with small-pox and we were all exposed to the disease,--some of us would catch it. But we would not all have it. Some of us who have been vaccinated for small-pox, would not have it,--and some of us who have not been vaccinated, would not have it. Suppose again that we were all exposed to the la grippe,--and I suppose we all have been. Most of us have had it,--but not all. Why don't we all have la grippe ? I have not had it, and I feel very proud of that. Why don't we all have these diseases, when exposed to them ? One reason is, perhaps, because there is a difference in our constitution; but probably the principal reason is, that the body is in a state of sound health, so that the white blood-corpuscles and the cells are able to do their work of destroying red blood-corpuscles and germs. Suppose a person gets pneumonia (which is a contagious disease), and we are exposed to it,--we don't all have pneumonia. It is found that if we examine the sputa of many persons, we find that it contains pneumonia germs, and that these germs are often found in the mouth. If we have these germs, why don't we have the pneumonia ? It is because the cells are vigorous and active and are able to destroy them as rapidly as they come in, so that they do not get a foothold.

hold. But suppose the vitality of such a person is lowered in some way: the consequence is, that the cells are not so active and vigorous as they ought to be, and the germs which have already gained an entrance, get the start of the cells. When a part of the system is paralyzed, the cells are paralyzed and lose their ability to capture germs. The muscles of the cells cannot contract, when they are weak and congested.. So with these white blood-corpuscles: when the body is diseased, they also lose their power, in some degree, to capture germs. This is one way in which the body becomes subject to these microbes.

Now suppose (as I said a little while ago), a person takes a cold and coughs a good deal and in this way he scrapes off a little of the mucous membrane: then his means of protection against germs is gone, and they will be able to get through the mucous membrane into the lungs and get a foothold there, and they will do their mischievous work. How do they do harm, when they get in? Probably by introducing poisons, (the same as they do on the outside of the body,) and these poisons, when absorbed into the blood, produce the most dangerous symptoms, and yet these poisons which have been introduced, are destructive of germs also. So, if there is enough poison introduced, it will kill the germs and bring an end to the disease. This is an important fact for us to understand.

Still another important fact is, that germs require certain peculiar conditions of the body for their development. For ex-

example, germs are developed in a high temperature, like that of typhoid fever, --and that germs produce this high temperature.

It is probable that nature has so arranged it that when the germs have raised the high temperature, the high temperature is a means by which the germs are destroyed. It is probable that the high temperature of consumption is a means by which they are destroyed. In malarial fever, a patient has a chill, and then he has a high temperature, then a sweat, and then the temperature is lower than before. So in consumption, --a high temperature is followed by a lower temperature. It is probable that this lower temperature is the result of the destruction of germs by the high temperature. So that, in cases of typhoid fever, consumption, etc., the high temperature is not the only thing to be combated, --it is one of the means which nature uses for the cure of disease.

Another important fact is, that the white corpuscles and the cells of the body seem to acquire by practice, the ability to capture and consume a great number of germs. It has been found that a person, after being subject to a certain disease for a while, ceases to be subject to it. It has been found that some animals are not subject to diseases to which other animals are subject, -- for example: take animals from a dry into a damp part of the country, and they become subject to malarial fevers, from which animals accustomed to that climate, are free.. It is the same with human beings. The negroes in these low, damp, hot

Southern climates do not suffer so much as the whites do, who are accustomed to cool, dry climates. The whites in Africa do not suffer from these diseases as much as those missionaries who have recently gone there and are not yet accustomed to the climate. It is found in Liberia where the jungle-fever is extremely fatal, that missionaries on first going there, barely escape with their lives, and often die, whereas the natives there, are not at all subject to the disease. Why is this? Both inhale the same germs, and the same number of germs, but the cells of the bodies of the natives of the countries have acquired an ability to consume the germs, and they don't do any harm. It is this fact which is the foundation for the efficiency of vaccination. Vaccination you know prevents a person from having the small-pox for a certain number of years,--during that time, he don't have it again, if he has been vaccinated for small-pox. If it were not for this protection, a person who has had the small-pox might have it again and again. When a boy, and I had the measles, I couldn't see ^{any} chance for my getting well, and I puzzled over it a good while,--in fact, it was some time after I had commenced the study of medicine ^{that I understood} this principle,--indeed it is only within the last two or three years, that doctors have understood this question. It has been a great study in medicine, why it is that a person who has been attacked with any ^{one} of these diseases, don't have it again,--or why he don't keep on having it, when he once gets it. But the white blood corpuscles clear the blood, and gradually get

the mastery of the germs,--they get used to them after a time, and then they are able to cope with them and to destroy them, and the consequence is consequence is that when these germs enter the system in any direction, that the cells and white blood corpuscles are ready for them, and are able to cope with and overcome them. This is similar to the manner in which we are able to manage animals by getting accustomed to them and understanding their traits. Prof. Lancaster has suggested that in the future, we shall be able to vaccinate for all diseases;--in fact this matter of vaccination has been carried to such a degree, that the time may come when we may be vaccinated against hydrophobia, so that if one has been bitten by a mad dog, the virus will not do him any harm. The hog can be vaccinated against hog-cholera, and chickens can be vaccinated against chicken-cholera. As sheep can be vaccinated against anthrax,--in fact this is being done in the South, at the present time, and in various parts of the world, this process of inoculation is being used as a means of protecting animals against disease.

It is suggested, that at some time in the future, it will be possible for us to protect ourselves against all contagious diseases, such as scarlet fever, diphtheria,--or even consumption.

In fact, Dr. Koch has shown that it is possible to protect animals against consumption. A great deal has been done in this direction by Pasteur and others. A doctor in South America has just discovered a means of protecting persons against yellow fe-

ver, and a doctor in Spain has found a means of vaccinating against cholera: but Prof. Lancaster says that at some time in the future, it will be a part of our business to go through a process of vaccination for every disease. No one will then think of going off into a strange climate as a foreign missionary, (or on a foreign mission of any kind,) until he is prepared to encounter every disease by vaccination. This is an interesting theory. We see that considerable conquests have already been achieved, and hardly a year passes, in which there have not been great advances made in this direction. So the time may come, when, by means of vaccination, we may be able to protect ourselves from every form of contagious disease; that in this manner we may educate the white blood-corpuscles and the cells in the human body, so that they will be able to successfully cope with the germs of all these diseases and consume them, and thus protect the system against even the most formidable of maladies.

This is an interesting question, and I have no doubt the next few years will develop some very interesting, and even astonishing matters in this line of medical investigation.

SANITARIUM LECTURES . (July 10, 1891).

Health

J. H. KELLOGG, M. D.

Good morning, Ladies and Gentlemen: A certain philosopher remarked, that if he had had anything to do with making the world and establishing the order of things, he thought he could have made a little improvement upon the existing state of affairs. He said that he would have suggested that health should be made contagious instead of disease. Well that really seems like a bright idea. Why not have health catching instead of sickness?

We all know that we have a great many diseases which we recognize as contagious,--and modern researches show that the contagious element in disease, is due, in a majority of cases, to the development of certain small organisms called germs. There are many diseases, however, which are not ordinarily recognized as contagious, which are more or less catching. For instance: we had a sample of this kind a number of years ago, when a man came in with us, who was suffering with a peculiar form of dyspepsia, accompanied by a variety of peculiar symptoms. He had been here but a very few weeks, when we had ten or fifteen cases of the same kind,--and it was not long before a regular epidemic of such cases broke out. He was a very garrulous man, and he rehearsed his case and his symptoms over and over again, and got the patients to looking into their own stomachs, and then they found that they had the same symptoms, ^{some of which} and they had never thought of it before, but now they were suffering from the same

sort of dyspepsia that this poor man had. I have noticed this a great many times. There are patients who talk a great deal about their symptoms, and thus sow the seeds of disease for others about them, and other people catch the same diseases,--even diseases which are not contagious.

Now this is a kind of contagiousness which a man can protect himself from. If he does not inhale any sly germs which are ready to take advantage of his ignorance and prey upon him at their will, he may protect himself ^{against} disease of this sort,--this is a kind of infection from which he can protect himself. He can, by an effort of will, refuse to think about these unpleasant symptoms which are capable of fastening themselves upon him in this way.. He can establish a quarantine against disorders of that sort.

But the point to which I wish especially to call your attention, is , that in this sense in which disease is contagious,

HEALTH IS CONTAGIOUS .

It is possible for health to be catching, as well as disease . There is no such thing as a germ of health, although (as I remarked the other day), a certain proprietor of a mineral spring in Germany recommends his mineral water because there are certain kinds of germs in it ,which he claims are necessary, for the purpose of aiding digestion. But, as a rule, it is believed that germs are not particularly beneficial to health. There is no germ of health, but it is possible, by an effort of the mind,

for one to develop health. It is possible to cultivate health. It is possible to encourage health-producing agencies of the body.

Now let us consider for a moment, how it is that a person gets sick, and how he gets well. When germs attack the body, it is not really the germs that do the mischief or constitute the disease, but it is the reaction of the body against the germs. A man might swallow an indefinite quantity of poison, and if the system did not react against the poison, it wouldn't do him any harm. A man might swallow tartar emetic, and if the system did not recognize the tartar emetic and react upon it, it wouldn't do him any harm. If a man takes a glass of whiskey, it will very likely make him drunk,--unless he has been accustomed to drinking whiskey; but if that ^{man} has been bitten by a rattle-snake, and then takes a glass of alcohol, it does not make him drunk, because his mind is otherwise occupied. Physicians have noticed that persons suffering from disease seem to be able to take almost unlimited doses of drugs which, under certain conditions are powerful poisons,--for instance; opium can be given in quantities which, under ordinary circumstances will produce sickness, because the condition of the system is such that the mind is occupied with something else, and these doses of opium are not recognized by the system. The same thing is true, in other diseases. Persons do not usually have two diseases at the same time. Ordinarily, if a man gets one disease, he does not have another at the same time, because his attention is not called to it and it is not recogniz-

ed by the system. In the same way, it is possible to cultivate health. If one will fix the attention of his mind, and his will, upon the matter of health, and refuse to recognize disease, then disease may be kept at bay. It is simply astounding, when we realize the influence which the mind has upon the body. We sometimes see a person who is suffering from severe pain : some things will come into his mind, and occupy it, and the pain ceases to be recognized any longer . Sometimes an officer while in a battle goes through a charge, and afterwards finds that he has been wounded,--but he never noticed it, in the excitement of battle . . . I have heard of cases in which a soldier has had an arm, or a finger, or an ear shot off in battle, and did not know anything about it, until shortly afterwards, because his mind was so entirely occupied, that this injury was not recognized. Now this fact did not prevent the arm from being shot off, but this shows that , in certain instances of disease, it is possible for the mind to be so much occupied, and, the whole attention of the system to be so diverted, that the disease is not recognized,--and if the body does not recognize the disease, in many instances we have no disease. There are some things which the body cannot contend against,--for instance, small-pox--we have to be inoculated for that--nevertheless, we might, by an effort of the mind, prevent getting into a fatal condition;--a patient might so antagonize the forces of death by the force of the mind and will, as to save him from a fatal result,--if the disease was likely to prove fatal otherwise.

There is no doubt whatever, but what the mind can have ^{sufficient} control

of the body and of the disease, to decide the issues of life and death in a great number of cases. There is an instance of this kind, in which a man was almost frightened to death and became sick. The man had been put in a bed, at a house where he was stopping, and the next morning he was told that he had been sleeping in a bed that had been previously occupied by a man who had had the cholera, and that he had been sleeping there without the bed having been disinfected since the man who had the cholera had occupied the bed; and the poor fellow thought he was going to die of the cholera,--and he did. A case of this kind is reported of a beggar woman who had a child in her arms while begging, and who asked a wealthy lady who was sitting in her carriage, for alms. The lady refused to give anything, and the beggar woman threw the ragged, dirty little child into the lady's lap, and said, "This child has the small-pox". The lady was terribly frightened and got rid of the child as soon as possible. Then she went home and had the small-pox. Well, upon investigation, it was found that that child did not have the small-pox,--and nothing of the sort--and inquiry developed the fact that the child had not even been exposed to the small-pox. But it is claimed that the lady had the small-pox. Now I don't suppose that she had the genuine small-pox,--but she had an eruption which was something like it. I doubt, however, whether that kind of small-pox would be catching,--except through the mind. I might mention other illustrations,--that of John Hunter for instance, who began

to think about his great toe and look at it,--and he got to thinking he might have the gout in his great toe--and he had it. I am not certain but what he might have had the gout without thinking about it, because he was a high liver and took wine; yet his own testimony was, that he got the gout by looking at his great toe, and thinking about having the gout in it; and that while his mind was fixed upon it, at one time, it began to throb and swell up, and began to be sore and tender, and that he finally had a regular attack of the gout. It has often been reported, that during cholera epidemics, almost as many persons have died of fright, as of disease.. Doubtless a great many people do die of fright in this way. People who are always afraid of being sick, will be sick. People who are always afraid of catching something, will catch something. Doctors who go about their work fearlessly, as a rule, do not take disease. They are familiar with disease, and have not the superstitious fear of it, that some people have. They know that the only proper thing for them to do, is to go bravely about their work, when it is necessary for them to do so, and consequently they steel themselves against the influence of fear. On the other hand, people who have not been properly instructed, become excited and frightened when an epidemic breaks out in their vicinity, and hence they take the disease without very much exposure. I have noted it a number of times, that persons who are afraid of disease will probably catch it, while those who are not afraid of disease,

are not likely to have it . Why ? Because they keep their nervous system on a plane of resistance by an effort of the mind. On the other hand, the person who sits down and says to himself, "Now, I am going to be sick; I feel bad, and I am sure I am going to be sick",--that person will be certain to be sick. But the man who says, when he feels that he is threatened with an attack of some disorder, "I will not allow this disease to come upon me,--I can't afford to be sick, and I won't be sick,"--that man will be likely to escape. In long voyages, in exploring expeditions in the Arctic regions, and in other instances of which we have accounts, it is those persons who have fortitude, determination, and mental and moral resistance against disease and disaster,--these are the persons who escape; while those who yield to the force of unhappy circumstances and impressions which naturally come upon them,--such persons are likely to settle down and die, under these influences..

This force in the body,--this power to resist disease by mental effort--it seems to me, is one which invalids should understand and employ. The man who thinks about sickness and being sick, and keeps his mind upon disease, will be sick, and he will find himself getting sicker and sicker, as his mind habitually dwells upon his trouble,--and the slightest disease will overcome him. Such a person really invites disease. He gets up in the morning feeling bad, and begins to think his case over; he thinks of all the ills, and all the bad symptoms he has,--he takes

a regular inventory of all his symptoms, and is continually dwelling upon them and yielding to them, ~~—~~ that man is certain to be an invalid, and to continue so .

This is one of the ruts which invalids fall into, sometimes. When their disease is going away, they begin to think about it, and they resurrect it again, in their efforts to keep it from losing any of its interest. I remember of a lady about a dozen years ago, who lived in Philadelphia in a house on the third floor. I knew where it was, and I used to go up there to see this patient in her room, -- I can remember perfectly well how everything appeared up there. Every morning when I went up there, she used to serve up for me a fresh nosegay of symptoms. One symptom she always had, -- she "couldn't use her muscles", and she was "satisfied that she had lost the use of her muscles; that she had injured her spinal cord, and this produced a pain between her shoulders; that she had walked too far, some years before, and had destroyed her spine, -- and she never expected to get over it." ~~that~~ she had been under the care of Dr. S. Weir Mitchell of Philadelphia for a number of years, but kept getting worse, until her husband brought her here. Well she got so determined that she "couldn't move her muscles", that she couldn't eat, -- she couldn't even feed herself, -- that is, she thought so, -- and the nurse had to feed her; and it was really painful to see how she swallowed her food without moving her jaws, -- but she could move her tongue (Laughter.) The other muscles of her body became less and less

active, until finally she had to be turned over in bed. She would be turned half way over in the morning, and the rest of the way over at night,--so she allowed her nurse to give her one revolution a day--like the earth,--one revolution every twenty four hours. Finally we succeeded in getting her onto her feet, and wheeled her into making an effort to walk. After a while, she became able to walk, and walked 17 times the whole length of the hall and back, every day. That was a pretty good walk for an invalid. She improved till she was able to walk several miles a day. But she suddenly discovered that her case was losing its interest,--it was less interesting than formerly--and then she went back into the old rut again--and her nurse took her home. About eight years after she left here, I heard from her, and she was still making her diurnal revolution. This was a plain case of cultivating disease. I don't know whether she caught it of any one or not, but it was doubtless a case of self-infliction. She was all the time talking and thinking about "her nerves" and "stomach", and "her poor head",--that was one of her prominent symptoms,--one that she talked about the most--an indescribable sensation in her head. We had a curious case of a man thinking about his stomach. He would imagine, sometime after he had eaten, that he knew where his breakfast was,--and he would put his finger on it, and tell me that his breakfast was "there". An hour later, he would put his finger down in another place on his stomach, and tell me that his breakfast was "over there".; and so he followed it around through the windings

and twistings of the small intestines,--he never let it get out of his sight. I told him that he must get his mind off his breakfast and dinner; that if he didn't stop this kind of thinking, he couldn't get well.. Well, he "couldn't help it,--for he could feel the food rasping down his alimentary canal, and he couldn't help it ." Of course he didn't get well, and I had to send him home .

I remember of another case : A young lady who was confined to sitting in a rocking-chair. It was one of the first cases that I found, when I came into the Institution,--it was some 17 years ago. The young lady had been sitting in that chair (when she wasn't in bed) , for three or four months . It was in one of our cottages up the road here. She had been examined, and the doctor who examined her , was somewhat hard of hearing; and he probably judged by the symptoms, rather than by what he heard in the lungs, as he was too hard of hearing to make a physical diagnosis. The girl looked badly,--she had a racking cough, she was panting for breath, she was wasting away , she was very weak,--wasting away all the while, and her poor mother was fanning her, to keep life in her. I examined her lungs,--she was supposed to have consumption. One lung was almost gone, as her friends supposed; but when I examined her, I found that both of her lungs were perfectly sound, and I assured her that if my lungs were as sound as hers, I should be very happy, and should consider myself as a good subject for the Life Insurance companies.

She was very angry when I told her that. She had been sitting in that chair for so long, panting for breath--sighing now and then--that it became a sort of pleasure, I think, for her to do so,--and it was very pleasant for her to have her mother fanning her, and caring for her, and when I told her that she might just as well get well as not, she was very angry,--she was so angry that she went home and got well. (Laughter.) She told bad stories about her doctors, after she got home: she said the old doctor said there was a large cavity in her lungs, and the young doctor said her lungs were as good as his, and that she could get well just as well as not,--and she didn't like him a bit". So, in that way, I lost her good will.

Another case : This was a case of catching disease,--and it shows how people catch disease sometimes. I examined this man, and I found a large cavity in his lung, and in a few weeks he was dead. He had got into this condition without knowing it. He was a man of great force and energy, and had tuberculosis, but he had been so occupied with business, that he didn't know that he was really upon the brink of the grave . . . I examined him, and found that he had a large cavity in the lungs, which produced hemorrhage, and in a few weeks he was dead. Well, his poor wife watched over him until he died, and of course, felt very lonesome and melancholy after his death. In a few weeks later, she began to cough and lose flesh. She finally wandered away into the com-

etery (she was living in the city at that time) and strewed flowers over her husband's grave. She kept this up from week to week, and from month to month, and she kept coughing more and more. Finally she made her will and prepared to die . One day some of her friends asked me if I couldn't do something for her. So I saw her (I had known her quite well). I examined her lungs and found them quite sound. Well she had a hard cough,--she kept cough, cough, coughing all day long. Her lungs were perfectly sound,--just a little irritation in her throat was all. After I had examined her, and found the true state of things, I said to her, "If I were in your place, I don't believe I would die yet." "What do you mean," said she. "Why, I mean," said I, "that you are going to have such a long and tedious time dying,--your constitution is so strong, and it will take so long and you will have such a hard time of it, in dying now, that if I were you, I wouldn't try it ." "Why, what do you mean, doctor ?" "I mean to say that you are cultivating disease; that you have no trouble with your lungs. You are simply thinking about yourself, imagining that you are going to die, watching your symptoms, and in this way you are cultivating disease, and in ~~this way~~ you will by and by have consumption,--but you haven't it now, and I think it will take a long time for you to die in this way,--and it will be such a tedious process that you will get tired of it before you get through--and if I were you, I wouldn't do it ." "Well, what would you do, if you were in my place ." "Why I would stop vis-

iting the cemetery, and I would make a flower-garden, and I would adopt some roguish little orphan, interest myself in the welfare of others, and have something that would keep me busy and have my time so occupied that I wouldn't have time to think of myself.-- I would keep myself constantly employed." I also suggested a little simple treatment for her. Well, the good woman accepted my advice.--she went to work, took exercise, interested herself in the affairs of others, forgetting herself, and in a few months she was entirely well again. She continued to improve so much in health, and she looked so well, that in a few years she got married again, and has been enjoying good health for a dozen years or more. There are many such cases, where persons are really cultivating disease.--catching disease from others and grafting it on.

I think doctors sometimes cultivate disease in their patients without being aware of it. To illustrate: I once heard of a ^{doctor who had a} young medical student with him, and they had taken a vacation and when they returned, they found they were out of business, because their patients had not well in their absence. "Never mind", said the old doctor, "we'll have some business, pretty soon." So they commenced traveling and inquiring if anybody was sick.-- they inquired at one house if any one was sick in the neighborhood.-- "No", was the reply, "but there soon will be ." Then they stopped at a house where the old doctor was acquainted, and--"Good morning Mrs. Brown!" "Good morning, doctor, walk in." "Well

Mrs. Brown, how are you getting along?" "Very well,--no sickness lately". The doctor had had a patient in the neighborhood sometime before, and he inquired about him then, to see if he had been cured, ^{in his answer} and--"By the way, Mrs. Brown, seems to me you're not looking so well as you used to,--there must be something the matter. Let me look at your tongue". He examined her tongue, and found a little coating there,--most people who do not live ^{on a good diet} ^{on Hygienic} have a coated tongue. "Your tongue is coated,--it looks bad--let me look at your eyes". So he looked at her eyes.--"Your eyes look bad too,--you must have a fever--let me feel your pulse." By this time she has got excited and her pulse beats rapidly,--"Why you have a very rapid pulse--100--why you have a high fever. I will give you some medicine to keep the fever off." So he gives her the medicine, and calls again in the morning.--"Good morning Mrs. Brown!" "Good morning Dr. So and So!" "How do you do this morning, Mrs. Brown?" "Sick enough." Sure enough,--by this time she was sick--had a fever. The doctor left medicine and called again the next day, and found her very sick,--she was "coming to a crisis", he said, and he hoped to ^{carry} "pull her through it". It was a very critical case; she had a severe fit of sickness--a run of fever. The crisis came on, but the doctor by hard work and constant attention managed to carry her through, and she was always very grateful to him. Now that may be an imaginary case,--yet doctors do sometimes cultivate their practice, perhaps ~~say~~, without intending it --and they culti-

vate disease, which is almost equally bad, without thinking of it. The doctor comes into the room, sits down by the patient, looks serious. "Let me feel your pulse". Perhaps the patient has never thought of that, but when the doctor solemnly begins this work, taking out his watch, and silently counts off the beats of the pulse, the patient begins to think it is a serious matter. Then he examines his lungs and his heart--pulls out his stethoscope and applies it to the chest, and the patient is very serious indeed. I remember of a little boy's saying, after the doctor had examined his pulse in this way,--"It made me feel very solemn.". So it makes the patient "feel very solemn", when the doctor gravely feels of his pulse, looks at his eyes, examines his heart and lungs, asks about all his symptoms,--and "How do you feel? How does your food agree with you" --and the patient begins to think about how he feels and how his food agrees with him, and how every different article feels in his stomach. Then the doctor asks him if he has the head-ache at times. "Well--yes. "On which side of your head?" Well, may be it is "On this side",--or "On that side,--or "In the back part". And the doctor calls ^{the} attention of the patient to all the symptoms of his head. He asks him then about his spine, and then about his eyes,--if he has "specks before his eyes", etc. And the doctor puts all the symptoms down on paper, as the patient answers his questions. Now this sets the patient to thinking about his symptoms. I have heard patients say, after the doctor had been asking about symptoms of various sorts, upon mentioning some particular one,--I nev-

er thought of that before, but it seems to me now, that I have felt it a good many times, when I come to think of it ." I dare say he had never felt it before; but the idea of it, and thinking about it , really grafted it onto his mind. The next day, the doctor comes again to see his patient, feels of his pulse, -- goes over all his symptoms again, -- and the patient begins to think that his "symptoms" are very serious matters. So, every day, before the doctor comes, he thinks his symptoms all over, so as to be ready to give them to the doctor, when he comes. When the doctor comes, the patient has thought his symptoms all over -- and perhaps thought of some new ones. So the catalogue of symptoms grows and grows and grows . The patient does not get any better, so he goes to another doctor, and this doctor finds some new symptoms. But the patient does not improve, so he tries another doctor, and he finds some more new symptoms -- or perhaps gives new names to old ones. In this way the symptoms grow and grow and grow, and the case gets longer and longer and longer . . . Some years ago, we had an old lady here, who had thirty or forty doctors attending her at different times, and she had thought of her symptoms and repeated them so many times, and she had learned her lesson so well, that she knew it all by heart. There was no use of asking her any questions, -- she would commence at the beginning, and tell it all at once without my asking any questions, -- I couldn't get a question in edgewise. Just as soon as I commenced to talk about her symptoms, she commenced and gave me all

the symptoms she had ever had, from the time she was a little girl up to the present time, --which was about 60 years. It required about an hour and a half to go over it all. I think, if I had had a shorthand reporter present to take down all her symptoms, it might have made a large volume and worth publishing. There was such a variety of symptoms, and they were so graphically described, that it was exceedingly interesting, --and not to a small degree amusing. Now these symptoms had been gathered up from her different doctors, --she had gotten where she knew them all and thought of them all and she had them all, --they didn't any of them leave her. So doctors in this way unwittingly cultivate disease. They keep their patients sick, by keeping their minds ^{con}trated upon their symptoms. I think that when the science of medicine is perfected, we will in some way find out all about our patients' cases without asking them any questions. That would be a very interesting feature, --and a very useful one, it seems to me. The patient might come in, and perhaps by pricking his finger and drawing a drop of blood and examining it by the microscope, or, by the use of the spectroscope or other means, the time may possibly come when we can extract all the necessary symptoms from the patient without asking a single question. If we can do this, it will be a good thing for the patient; because we will not set ^{him} ~~the patient~~ to looking at himself.

Now this introspection will cultivate disease, --this think-

ing about stomachs, liver, and all the other internal viscera. We have no business to think about them. When a man eats his breakfast and dinner, he has no business to think about them further,--they should be out of his mind, when they are in his body. If he is constantly thinking, for instance about his stomach and what is going on there, the stomach cannot do its work properly. These internal organs are all intended to carry on their work secretly and noiselessly. When a man is well, he don't need to know he has a stomach. I have known people who have made themselves dyspeptics by thinking and worrying about what they were going to eat. I was reading an article from a newspaper some little time ago, written by a physician. In this article, he recommended that people should be very careful about their manner of eating; that eating was a very serious matter; that you should be very careful and eat only what you ought to eat, and that you should eat only what agrees with your stomach, and that you should eat it right (that seems to be right enough); that you should remember and chew each morsel just enough and swallow it just right because our brains and body are made up of what we eat; our minds should ^{not} be diverted from the proper method of eating,--we should not talk or laugh, for we might swallow a mouthful too quickly, or take a mouthful of something that might not agree with us --and we should concentrate all our attention upon the business of eating; it is (as he said), "a very solemn thing to eat," and we shouldn't allow anything to divert our minds from this serious business. In this way a person may become

a dyspeptic surely. This introspection (as I remarked), will certainly develop disease,--even when there was none there before, or, if there is a little spark of disease there, it will, in this manner be fanned into a flame, and becoming a consuming fire after a while.

I have sometimes thought that these secret laboratories of life--these organs of the body where such a wonderful work is done--were like the old alchemists hid away in their caves, secretly hunting for "the elixir of life", or "the philosopher's stone" that was supposed to be capable of turning everything into gold. These men toiled when they were out of the sight of every one. They sometimes produced some wonderful combinations, and thought they had reached the goal for which they had been striving so long, and they didn't want any one else to discover their secret, and so their work was carried on as secretly as possible. So we might compare the work of the internal organs with the work of these ancient alchemists. When we begin to think about these internal viscera and talk about them, it is like getting a bashful boy up before a great audience: his knees tremble, his tongue cleaves to the roof of his mouth and he cannot speak. I remember that I used to be just such a boy. When I got up on a platform before an audience, my knees would shake, and I would forget my piece,--even if I had it learned ever so well. That is the way with the stomach: when we begin to think about it, and turn our attention inward, the effect is, to produce a sort

of stage fright in the stomach,--and so with the other organs -- and they cannot do their work. The nervous reflexes are disturbed in the same way. Many circumstances ^{of this kind} come under our own observation. Sometime ago, one of our outside men worked on a farm, where he ran across something very loathsome: He had returned, and taken breakfast. He happened to think of this loathsome object right away after breakfast, and it turned his stomach, and he began to vomit, and he vomited all day and all night,--he vomited his dinner and his supper, and the next morning he ate his breakfast, and then went out and vomited that,--then he ate his dinner and went out and vomited that. Then he came to me in despair and said, "Doctor what shall I do?--I can't eat,--the moment I eat anything, I think of that horrible thing that I saw out on the farm, and it makes me sick, and I can't keep anything on my stomach, and I'm afraid I am going to starve to death. I have been hanging onto an apple tree for three or four days now, but I can't keep my food down, and I'm afraid I'll die." I said, "You must have something to divert your mind from your trouble." He hadn't swallowed anything wrong,--his breakfast and dinner didn't disagree with him, but that horrible picture before his mind turned his stomach.

There was a case reported in the New York Hospital, where a physician was making an experiment of this kind upon 15 men and 15 women, in which he gave them some sugar-coated pills. In half an hour, he sent some one around to tell them that they had taken a dose of emetic, and they must prepare for the consequences.

The result was, that 5 women and 1 man began to vomit . I am a little suspicious of that story; but the experiment has been tried repeatedly, of giving patients medicine and notifying them of a certain result which the medicines were to have, and the patients experienced the results right along. I had a patient who would wake up every morning at 4 o'clock. She was told of something that would cure her of this , and I sent her some medicine composed of soda, mint tablets and water, and she took it , and slept regularly every morning for several months. I have not tried that experiment very often, for I thought it might spoil my reputation . But it is quite easy to make people have symptoms, if you will only notify them in advance what the symptoms they are expected to have. I have noticed that I get an imaginary disease myself. I can't take hold of a battery sponge without feeling electricity. We used to have a battery that we tested by applying it incases of rheumatism, and I couldn't tell whether it was in operation or not, because I could feel the sparks at any time,--I couldn't go by a coil, without feeling it. It is a delusion that I can't get over. Ever since I was a boy, I have been subject to such delusions,--and I suppose we are all more or less subject to such deceptions . I remember of feeling quite aggravated at a school-mate ... When passing by a stove, I felt a wave of heat. I said to him, "Why in the world do you have such a fire, on such a day as this is,--in Summertime ?" Said he, "We haven't any fire." I held my hand to the stove, and it was warm, and I told him so. He assured me there was no fire

in the stove,--and upon opening the door, I found there was no fire there, and hadn't been for several weeks. So we are all subject to the deceptions of our senses . These influences , then, come through our senses, and, though our senses are deceived, yet if we bring this power to bear while sick, we can get well. .

I think I must tell you another story about how persons get sick by simple imagination . A gentleman with whom I was acquainted, told me the story. He was present, and able to verify the facts. He was sitting at the table with a number of other people; and a person present, said he had just been reading in a newspaper of a very curious circumstance, and that he had made inquiry about the matter, and was satisfied that it was true; he said that the story was, that a lady had just drunk a cup of tea, and she was studying her fortune in the grounds at the bottom of the tea-cup, and she discovered something very queer in her cup. She picked it out and investigated it and she found that it was a certain portion of a Chinaman's anatomy. It seems that Chinamen tramp the tea with their feet, and this fact had come to the lady's knowledge, and she had discovered a portion of a Chinaman's toe-nail in her cup. There was an old lady at the table, and , as this wretched story was finished, the old lady had just swallowed a cup of tea, but she was compelled to go out and un-swallow it. Now there was no toe-nail there,--it was simply the influence of the mind upon the body. I published that

story in "Good Health", and a lady in Minnesota read that story to every family in the neighborhood where she lived, and she said the grocer there said he was going to bring a suit against her, for breaking up his business, for there had been a month or two when he hadn't had any call for tea. So you see the power of the mind over the body. Take another illustration: A man was cured of the cholera in this manner. The cholera had broken out in foreign countries, and it was expected to reach this country very soon. He was going to St. Louis, and expected to reach there in a few days,--and he was sure he was going to have the cholera, so he had a bottle of cholera medicine which he kept right by his bed at night, so that his wife could reach it, when the attack of cholera came,--so that if it came in the night, he would be ready. The medicine was a very powerful mixture, and was to be applied to the stomach,--on the outside. One night, he woke up with pain in his stomach,--which was probably caused by something he had eaten. He waked up, and called out, "I've got it!!" His wife immediately got the bottle of cholera medicine (as she supposed), and applied it, and the man was relieved at once. Next morning, it turned out that his wife had passed him the ink-bottle--(Laughter.) You can readily imagine the condition of the surroundings the next morning, after the application of that ink,--nevertheless it cured his cholera. Now if a simple effort of the mind will give such potency to a bottle of ink

as to cure a man of the cholera in five minutes, or, at any rate, drive away pain as well as a powerful cholera mixture, you can readily see that if we will only apply the force of will to everything we do, in cases of this kind, how great and how beneficial this power will be .

Patients will come in, and say, "I don't see how these simple things are going to cure me. There is something the matter with my liver, and I want something done for it besides these fomentations, massage, etc. I don't see how such little things are good for anything". They want some great things done. In some barbarous countries in ancient times, as it has been reported (I saw it in a French paper), that diseased livers were removed and scraped. But that is not true; because we must reach the liver by other means than from the inside of the body. By application of heat to the outside, we may stimulate the liver in a physiological way. By applications to the inside, we may spur up the liver, as you would a tired horse,--but that is not physiological. Now, by the application of baths, massage, electricity, and other means applied to the outside, we may, by complex influences upon the nervous system, set up reflex influences on the inside of the body, which are curative in character. Now, when we take treatment of any kind, if we will bring the mind to bear upon it, and say, "This looks reasonable,--I believe this will help me,"--put your minds right on it, and say, "I believe this treatment will do me good,--it ought to do me good, and I

believe it will do me good." Think of it,--think of the rationale of it--say, "Now this shaking up, will bring fresh blood all through the system and improve health." . This will stimulate the nervous activities, and so help us in a curative way. Just call to mind, in this way, the usefulness of everything that is done for you. When you receive a treatment, say, "How much good this is going to do me." When you sit down to a bill of fare, ask no questions for conscience' sake,--or for the stomach's sake. Think nothing about it,--eat what is prescribed for you, without any worriment. Don't say, "I wish the doctor would let me have some beef steak, or some stewed oysters,--why can't I go down to the hotel and have a good square meal once in a while--ham and eggs and other things that I used to like so well"? Now if a person keeps his mind in a state of discontent, the stomach will partake of this mental discontent, and these feelings will pervade the whole body. We sometimes hear of persons being "green with envy". They are green.-- Why?? Because such persons get to be jaundiced and green, or yellow, as the result of the morbid condition of the mind. Persons having a violent fit of anger, will become jaundiced in half an hour. Dr. John Hunter, the great physiologist died in a fit of rage. He became very angry in his museum one day, because one of the assistants let fall and smash a very choice specimen that he had taken great pains to prepare, and it was utterly ruined. He broke out in a great torrent of oaths, and in a moment dropped down dead . He should have known

better . This is the explosive influence of a depressing passion which killed him,--why, he died under it as quick as if he had been shot, simply through the influence of the mind upon the nervous system throughout the whole body. It actually destroyed him.

Now if one constantly dwells in a state of despair, despondency and gloom, and habitually keeps saying to himself, "O I don't think I am going to get well,--and I'm not going to get any better", he won't get better. Patients come to my office from day to day complaining in this way. I look at their tongue,--it looks better,--not much coating on it; I look at their eyes,--their eyes are clearer. There is a little natural color coming to their cheeks, and they are evidently getting better; but they will not admit it,--they look on the dark side,--talking and thinking of ^{their} bad symptoms instead of ^{their} good symptoms. "Why, doctor," one man said to me, "I've been here six weeks, and I'm not a bit better than I was when I first came here." Then I ask him "How about your back,--how is your pain there?" "Why, I think that is gone ". So we went on through the symptoms, and there was only one symptom that was no better, and that was "the old pain",--that was no better . I have patients say, "Why don't I get rid of this one symptom,--this one old pain?" But it takes a great while to get that one "old pain" eradicated. When I say to such patients, "Why you have got over this and that trouble,--you will soon get well and be able to go home", they will insist

that they will never get over that trouble. Sometimes we have a chronic invalid who is like a person at the bottom of a deep lake. If he has hold of ^{the} end of a rope and you have hold of the other end, and you are drawing him out, you draw him up a little ways, but he don't feel any better. You draw him farther up, and he feels no better, --but he is better, because he is nearer out of the water. He does ~~not~~ not feel any better until he gets his head clear out of the water. If he is but half an inch under ^{the water} he feels no better, but if he opens his eyes, he will see that it is lighter, --he feels no better, but there is light up there, and by and by, if he is persevering and holds onto the rope that is pulling him up, you will bring him clear out of the water, and his symptoms will all disappear. It is so with chronic invalids. I have known persons from day to day, and from week to week complaining of their old symptoms, but by and by they wake up and all their old symptoms are gone. It is like hammering on a great rock, -a man will pound and pound and pound on the rock for some time without apparent change. But by and by the rock breaks into small fragments. That is the way with chronic diseases, --we have to keep pounding and pounding and pounding away, at all times in the same way, --it won't do to vary the treatment because the patient complains. Patients often want their treatment changed to suit their symptoms. This won't do. It is not ~~so much~~ the symptoms that we are treating, ^{but} as it is the patient,, and we have to keep pounding on the same spot, --and it

must be the right spot,--the headquarters of the disease. We must keep pounding that spot, and by and by something will crack, and you will wake up some fine morning, and every symptom will be gone. As a rule, however, one symptom drops away after another, and they keep dropping away, until the principal symptom disappears,, and then you will be well .

Now, my friends, if you will cultivate health in this way, it will pay you to do so . Cease to talk and think about your symptoms. One gentleman said to me, "People talk about their diseases so much that I can't stay here." "Well now" said I, "I don't think it is as bad as you think it is ." Probably you have been doing the most of the talking yourself". But he thought the Sanitarium was the worst place in the world for sick people, because they were all the while talking about their symptoms . That is not so,--the Sanitarium is not a bad place for sick people--it is the very best place for a sick person . Why ? Because he sees people here worse off than himself, who are getting well. He sees health . He sees a new man come in, who is very sick, and he sees him getting well, so he takes courage, and he proposes to get the start of the other man,--he gets his ambition up, and he says, "Now I am going to beat him. I have seen such a race among invalids,--to see who would get the most strength in a week. That sort of competition is very profitable. This is a proper and a profitable field of competition; it is a sort of competition in which all the competitors get a prize. I would

like to have a rivalry of this kind here. When a patient comes here to the Sanitarium, he will find among the many other patients, those who are as bad off, or worse off than he,--there will always be a time when some one's case is just as bad as his, and when he thinks of this, he takes courage, and then he gets well. This is a sort of antidote which all our patients have. You can't go anywhere in this world where you can't find any one sick. You can't go to church, or out into the streets, without meeting some one who looks feeble and sickly.

Really, I don't think you look very bad,--some of you look healthier than you did a few weeks ago. I don't think our people look much worse than the average run of society. The majority of people are sick. I asked an assembly of a thousand people, a short time ago, how many of them were well, and only five dare raise their hands, in token of being well,--only five out of a thousand! If a person don't want to find any one sick, he must go to some other country. So I say the fact that people are sick, is no disadvantage to the Sanitarium. But when we get an assemblage of people together, we ^{want to} get them to cultivating good health. When one will say in the morning, instead of saying, "How did you sleep last night?--I didn't sleep well at all,--how did you sleep?"--"Very poorly indeed", etc.,--they will say what is the most natural thing to say--persons who have been troubled with sleeplessness begin to complain about it in the morning,--instead of thinking ^{and talking} about this, they should say, "What a bright morning

this is". If there is nothing very bright outside, find something bright and sunny inside. If we have rainy, cloudy days, and don't have much sunshine outside, we can manufacture mental sunshine. Instead of having this a place of sickness and pain, gloom and despondency, we can have here just the happiest place on earth,--and I am sure you are trying to do this very thing. Keep cheerful, yourselves, and try to cheer other people up. The reaction will tend to cheer you up. While you are trying to throw sunshine into others' faces, ~~and~~ the reflex action of the efforts you make, will throw sunshine into your own faces. But I must not keep you too long from the treatment that is going to do you all so much good .