QUESTION BOX LECTURE

At the Sanitarium Parlor, Battle Creek, Mich., Monday, January 15, 1906, at 8:00 P. M.

by

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Question:

I see we have a number of questions in our box tonight. Once a week I have been visiting this questionbox for thirty years, so I think that makes about fifteen hundred times that I have answered questions; and I get somewhere about fifteen to twenty, sometimes thirty or forty questions, I guess an average of about twenty each time. So that makes somewhere about 30,000 questions that I have answered; and sick folks have not got through yet. I always find something new. It is amazing what a variety of things sick folks hunt up to puzzle a doctor on. The first question here is,

Question: What about the use of salt?

Answer: I suppose this means common salt, chloride of sodium. Is it necessary? And if so, how much ought one to eat? That is a practical question. In civilized countries the use of salt is almost universal. Almost everybody eats salt, and I think the average man believes that salt is a really essential article of food. The ordinary works on dietetics usually present chloride of sodium as one of the essential elements of food. But it is getting to be a question amongst scientific men today whether salt is necessary or not. I remember some thirty years ago I was reading in a medical journal a statement by a doctor who was himself subject to rheumatism. He said, "I have been suffering from rheumatism more or less for fifteen or twenty years, and I have noticed that whenever I eat a little extra quantity of salt I am liable to have an attack of rheumatism"; so he said he had evidence of it, and he thought it worth while to make a record of it, and he published it. Something like five or six years ago a French doctor published a very interesting and remarkableobservation. He had a patient suffering from Bright's disease, and in making experiments with this patient, he found that there was a very small excretion of chloride of sodium. Ordinarily there is passed out through the kidneys and through the skinas much chloride of sodium as we take in in our food. The amount take in with the food varies from a quarterof an ounce to an ounce. Some people take as much as an ounce of salt in a day. Some people take a quarter of an ounce, and some take less than that--an eighth of an ounce, or a seventh of an ounce; and the doctor found the amount excreted was very small in this patient with the kidney trouble, and the patient had Bright's disease. His hands were swollen, his whole body was swollen up. He had what is known as edema, the edema which is peculiar to this disease in its advanced stage. It occurred to the doctor that as this patient was eliminating very little salt, it might bepossible the salt was accumulating in his tissues, and that the water was accumulating in the tissues to dissolve the salt. So he said he would stop the salt, he would eliminate all the salt from the patient's diet, suppress every bit of it, and give him a diet with no salt in it except what is naturally grown in it with the development of the plant just as other food elements have been taken in. So the doctor cut off the salt, and gave him what they call in France, a dechlorhydrated diet, a dehydrochlorinated diet; and he found that the dropsy disappeared; in three days it was all gone. Now he thought that might be an accident; so he returned to the use of salt. He replaced the salt in the man's dietary, and in three days the dropsy was all back again. He withdrew it again, and the dropsy disappeared; replaced it again, and the dropsy returned. He repeated it seven times, and each time the dropsy disappeared when the salt was withdrawn, and each time reappeared when the salt was returned to the diet.

This experiment led to some very extensive researches and investigations upon this question. In men, in human beings suffering from Bright's disease, and in animals suffering from kidney disease induced by various means, animals suffering from Bright's disease which has been produced artificially, experiments were made, some with dogs, and with other animals, and the result has been the demonstration beyond any possible question that the dropsy of Bright's disease of the kidneys, and certain forms of heart disease are due to chloride of sodium, to common salt; that the kidney in cases of disease loses its power to eliminate the salt; and when the kidney has lost its power to eliminate salt, it accumulated, the salt accumulates in the tissues, and the man gets into the condition of salt beef, salt pork in a barrel, you know; his tissues are saturated with salt, and the salt soaks up the water from the blood, and the water accumulates in the tissues more and more and more until the dropsy appears. Now this explains how it is that persons suffering from Bright's disease are often so rapidly cured by a milk diet. You have heard that a milk diet is good for Bright's disease. That is because there is little or no salt in the milk, and on this saltless diet the patient very rapidly recovers, the kidneys are relieved of the extra work which has been required of them, and the tissues are rapidly relieved; the salt is rinsed out of the body, and in that way the edema disappears. That is the first explanation that has ever been given of the cause of dropsy in Bright's disease; and so the cure, you see, is exceedingly simple. Now, the question arises, and a great many physiologists are asking the question, and physicians, if chloride of sodium does so much harm in Bright's disease, if chloride of sodium is such a poison to the body that it willproduce dropsy in a case where the kidneys are somewhat crippled, not able to do their usual work, then is it not possible that chloridoof sodium is an unnecessary addition to our dietary, and is doing a lot of mischief all the time in the quantities in which we areusing it? I met a lady not very long ago who had beginning Bright's disease, and I said to her, "You must drop off the use of salt from your dietary." "Drop out salt!" says she; "Why, I use a great deal of salt." May that be that is the causeof the disease; may be that is the reason why the disease is present, and I would not be at all surprised. Don't you know, there is a very curious fact that we are very likely to overlook, and that is that those causes which are most universal in their operation are the very ones that we are the most certain to overlook. You meet a man using tobacco, and he says, "Tobacco does not do me any harm; if I thought it hurt me, I would stop right away." I met a United States senator some time ago, who was well known to the whole country; he is now chairman of one of the most prominent committees in congressat the present time. I met him fifteen years ago, and I noticed this senator was smoking. I said, "Senator, you are such a useful man I wish you would stop smoking. The country needs you, and one of these days you will drop off with something. I would like to see you live a long time, and keep on in your useful work for the country." He is a very excellent man. "O," he said, "Do you think tobacco is harmful?" "Certainly." "Well, it never hurt me a particle. If I thought tobacco was hurting me, I would certainly stop at once." I said, "You certainly ought to stop, then, for it is certainly hurting you." "Well," he said, "I know it is not hurting me. I have made careful observation, and I feel just as well when I smoke as when I do not smoke, and I stop smoking sometimes, do not smoke for some time, and I do not feel any better or any worse, I feel just the same; so I am satisfied tobacco smoking does me no harm." Three months ago that same senator called on me, and he said, "Doctor, I came here on purpose to see you for just one thing." I said, "What is it? I will do anything for you I can, Senator." He said, "Doctor, I came here to get you to say something to me so that I would stop smoking." "O," says I, "that is interesting." It is not very often a senator comes to a preacher and says, "Now then, I am wicked, and I want you to say something to make me good; I am a thief, and I want you to say something to make me stop stealing; I am a robber, and I want you to say something to make me stop robbing people." Sometimes a drunkard does come to be reformed; but this man recognized the fact; he said, "Doctor, I have noticed at last that tobacco is hurting me, and I think I ought to stop, and I came up here to see you, hoping you will say something to me that will make me stop." I believe I said it to him. I am sure I said the hardest things I knew how to say about tobacco. I pitched into him hammer and tongs right straight off. I felt his pulse and found he had arteriosclerosis; I listened to his heart, and found he had tobacco heart. He had those things, and I showed him up in just as bad light as I possibly could; and in less than fifteen minutes he said, "I will smoke no more; I am done with the thing; I am conscious it hurts me, and I believe every word you say." I do not believe he has smoked since.

Why does not the world recognize that tobacco harms men? Why do we see pretty nearly half the whole population of the United States smoking? Everybody smokes, hence nobody knows the damage it does. That is the reason. Now, if everybody got bitten with mosquitoes when they were everywhere, when that was the case, they did not know that mosquitoes were the cause of malaria. There was a time when these malarial mosquitoes were all over the United States, except on the very mountain-tops. Michigan was once full of the Anopheles mosquito, the mosquito that carries malaria, the malaria parasite; they were all over this town, but by degrees they died off, the mosquitoes carrying the malaria poison died off. They all died out in this region. Malaria fever is no more common in this city, or in this vicinity; it is as rare as yellow fever is, almost as rare. It is the very rarest thing that anybody ever has an attack of malaria fever in this place. I have not heard of more than one case in twenty-five years that has occurred in this country, in this vicinity. I think we heard of one or two cases last year, and I imagine somehow or other some of those malarial mosquitoes had perched on somebody's trunk coming up from the south, through Indiana, or came up on some train coming up from Indiana, came on some baggage, or on a mail bag, or something else; some mosquitoes came up from some of those southern states, reached Battle Creek; so a few of them got a foot-hold last year, and there were two or three cases of malarial fever over in the opposite part of town. But it was twenty-four years ago that I knew of the last cases that originated here. Probably next year we won't have any. When I heard of those malarial mosquitoes, I sent a man out,--I tried to get the city interested, but did not succeed, so I sent a man out to buy some kerosene oil, and spread it out on all the marshes all around the town. I did not propose to have thosemosquitoes taking possession of us again. Why did not we find out before that the mosquito bite was the cause of malarial fever? It seems as though we searched for the origin of it everywhere else. I was a member of the state board of health of Michigan for some twelve years, and during that time, I spent quite a lot of time and money and effort in ferretting out the cause of malarial fever, and you know I found the cause of malarial fever was in the wooden pavements. I could prove it; it was rotting wood, ditch water, and various things of that kind; I got facts to prove it, that it was really in the wooden pavement after all, because the wooden pavement held little pools of water around, and the moisture favored the breeding of the mosquito which was the real thing.

I proved that by the fact that in the cities where they had wooden pavements they had more malarial fever than in other places.

The same thing is true of many other causes in universal operation. For instance, a gynecologist some years ago in writing about the reason why women are invalids. He was a great doctor in New York City, and in his book on diseases of women he raised the question, "Why is the American woman an invalid?" and you know his conclusion was that it was the climate of America that made the average woman an invalid. He never thought of the causes at all. The causes did not have anything to do with it; he never thought of the indoor life, the sedentary life of the American woman; it was all the American climate. How absurd, how absurd! Now why was it that the corset, for so many, many centuries, was not recognized as a cause of disease? It was because all women wore it; so you could not ferret it out. Now that is true universally; the causes which are the most common are the most difficult to discover because everybody is subject to them; consequently you do not find them. You overlook them.

Now here is this use of common salt. In all civilized countries it is used. And we are just beginning to find out the vast mischief this thing has been doing. Sylvester Graham, a very sagacious man, one of the brightest men who lived in this country in the last century, sixty years ago started out on a campaign against beefsteak and salt--common salt and beefsteak. And he advocated graham bread. That is where we got that name, graham bread--from Sylvester Graham; it came from this man, a diet reformer who started out in New York, preaching diet reform,--graham bread, no beefsteak, no chloride of sodium, no tea or coffee, but practically the very principles that this institution represents today in diet. This man had observed, and he had studied and made a note of things, and he had learned a great many things, a great many interesting things. He had learned among other things that the Indians, the North America Indians did not eat salt. An old friend of mine who was an Indian trader away out on the frontier of the Indian Territory awayhm back before the War and during the war, he was out in Indian Territory among the wild Indians, and he mentioned to me when we were talking about the diet of the Indian, that when he was going out on an expedition of trading, going off to trade with distant tribes, as he sometimes did, he said, "I always put into my saddle-bag a supply of two things--tomfulla, and common salt." What is tomfulla? Tomfulla is simply corn that has been roasted, parched, then put into a great big wooden mortar, a stump that has been hollowed out by a fire burned in the top of it, put into that and pounded with a pestle in that little hollow place. They parched the corn, then broke it up, ground it up, then he put this parched corn into the bag, a quantity of it, and when he came to a little stream, he mixed it with water, and a little salt, and that is all he wanted to eat during his long trip. He said he would live weeks and weeks on simply tomfulla and salt. He had to take along a little salt. I said, "Why did you take the salt?" He said, "Because I knew I could not get any from the Indians. The Indians took their tomfulla without salt." The Indians of the Western Plains did not eat any more salt thank the cattle of the Western plains. The cattle of the Western plains that are now being raised out there in those countless herds, thousands and thousands in the herds, are never givensalt; they are raised without salt. The idea that cattle require salt is perfectly absurd, entirely without any foundation; it is simply a custom. The cattle have been accustomed to salt, have been educated to use salt. If you come up to my house and look into the little park behind my home you will see a dozendeer, just as fine deer as you ever saw in your life anywhere, I am sure; and those deer have never had a particle of salt in their lives; they never tasted salt. You can not make them eat it. They were raised hygienically, you see, and they won't touch it; they do not want it. Go out there, offer it to them, and they won't take it. Try it sometime if you like. If you can hardly believe that deer won't eat salt, offer them some salt. They won't touch it. When Mr/ Seton-Thompson was here some years ago, I told him I would show him a new variety of deer. "O," he said, "I have seen all the deer of this country, I am sure." I said, "Did you ever see a variety of deer that would not eat salt?" "O, no," he said, "there aren't any such deer; all deer eat salt." "All right," I said, "I have got a variety of deer in my park that won't eat salt." He did his best to get them to eat it, and they would not touch it. This is the way I found out they would not eat it. I supposed they would eat it if they got it, but I was raising them up without it to see what sort of deer they would be. I changed hired men--I keep a man to take care of my horses, deer, etc., and my hired man went off to study medicine; he was an embryonic medical student who came in to work with me to help himself along. I changed men; another man came in and after he had been with me about three weeks, he came to me and said, "Doctor, I am afraid the deer are sick." I said, "Why?" He said, "They won't eat salt." I said, "Have you been giving those deer salt?" I was really alarmed for fear they would get a wicked appetite for salt. I did not want them to backslide in that way after being brought up well. He said, "I have been trying two weeks to get those deer to take salt, and they won't touch it." That is the first I knew that they would not take it, for I never dared tempt them for fear they would eat it, and I wanted to be sure they would not have it. I was emboldened to ~~xxxx~~ offer them salt, and they would not be induced to eat it. That agrees entirely with what an old farmer once said to me. He said, "I have to teach my calves to eat salt. They would not eat it at all, until they are taught to eat it." He said, "I notice the old mother cows sometimes teach the calves to eat salt. I put some salt in the pasture; the cows come along eat it, the calf comes along smells it, would won't eat it; the calf sees the mother eating salt, and just touches the tip end of its tongue to it; the next time it takes a little more, and so gradually becomes accustomed to eat,it, and learns to eat it. A gentleman friend of mine from England who had been visiting over there some time ago, came back, and he said, "Doctor, I used to think you were a crank on the salt question, but I have made up my mind you may be right. A brother of mine living in England is a cattle raiser. On his farm, and in his county there are raised the very finest cattle in England; they take the prizes over all other cattle raised in England,and in that particular county, the farmers have from time immemorial had the custom to raise cattle without salt, and they have the finest cattle raised in Englad." That does not agree at all with the experiments reported by the French physiologist who made some experiments many years ago. He took some calves, gave some of them salt, took salt awayfrom the others, and those that did not have any salt, their hair got veryrough, their fur was rough, their skins were hidebound, they were scrawny, miserable, wretched, and that proves that salt is necessary. But you see those calves had been accustomed to salt, and when it was taken away from them they lost their appetite, their digestion failed, and various other inconveniences arose. I have learned from various works onforeigntravel of the customs which prevail in various lands in relation to diet, and I have learned this among other things, about salt,--that the people of Siberia, that live away up on the plains of northern Siberia do not eat salt. They take their barley gruel and dried reindeer without salt. They never eat salt under any circumstances. The natives of various islands of the sea where they have never been taught to eat

eat salt get along without salt. They never eat it under any circumstances. The people who live in centralAfrica have from the very earliest times, from thousands of years back, lived withot salt, countless multitudes of people are living in central Africa, live all their lives, and for generations,hundreds of years without salt. I myself tried the experiment of living absolutely without salt for three years, and I got along first rate. The only inconvenience I had was that sometimes when I ate food that had salt in it, it was so disagreeable to me that it was a very difficult thing to get along. You had a talk here a few days ago by Prof/ Mendel, of the Sheffield Scientific School, of Yale University. Some of you heard him speak. I was talking with Prof/ Mendel after his talk here, and I said, "Prof. Mendel, what about salt?" He said, "I never put any salt on my food." I said, "Suppose you are eating potatoes, don't you put salt on them?" "No, never." I said, "If you are eating vegetables, don't you ever put on salt?" He said, "If the cook puts a little salt in the food, I take it, but otherwise I never touch salt, don't eat it."

Prof. Bunge, one of the most eminent physiologic chemists in the world, one of the great medical authorities of the world, Prof. Bunge, of Basle, Switzerland, of the great Swiss University at Basle, says the amount of salt required per diem is about a gram and a half to two grams. A gram is fifteen grains, about one-third of a dram, to half a dram. That means somewhere from twenty to thirty grains a day. Now that is not very much. Prof. Bunge at the same time says that the amount of salt eaten by the average man is four or five times that. Some people eat as high as three-quarters of an ounce to an ounce, as I said a little while ago,--as high as three-quarters of an ounce to an ounce. Many people eat as much as a ounce of salt a day. Now if we only need twenty grains, if that is all we require, what becomes of all that extra quantity we take? It must all be carried out through the kidneys, and through the skin; and that extra labor that is required of these excretory organs wears them out; they become worn out prematurely, at too early a day; so we see, my friends, it is getting to be really a very serious question. Are there not thousands of people who are wearing out their kidneys and wearing out their livers, bringing themselves down prematurely to a point where Bright's disease will prey upon them, where the liver will be worn out, where the kidneys will be permanently crippled, where arteriosclerosis, hardening of the arteries will be induced because of the accumulation of tissue poisons within the body,--are there not thousands of people dying of that by the excessive use of salt? For myself, I have no doubt of it at all. I am confident of it. I am satisfied that a very little salt may be used without any special detriment to health, but the large use of salt, the use of salt in large quantities so that it can just be tasted in the food, so that the flavor of it can be tasted determined in the food, is certainly harmful and damaging. So I admonish you, use little salt. Take most of your foods without salt at all. Now there is the potato; you think you cannot eat the potato without salt; but just try it. A nice, baked potato is perfectly palatable and entirely relishable without salt if you have just become a little accustomed to the flavor of it; but it must be a good potato. A parsnip, a turnip, a carrot, spinach or anything else of that sort requires really no salt, for the reason that it already has a larger amount of salts, the so-called salts than any other kind of food. The salts are particularly abundant in these vegetable foods; so they of all foods are those that require the least salt. They do not require a very large amount of chloride of sodium; the beet does not require very much.

The body does not require very much chloride of sodium. There is no chloride of sodium in the bones, and very little in the solid tissues of the body. The chloride of sodium in the body is only in the blood, which shows that it is passing through, passing out; and it is not a very essential element, certainly not in large amount.

Q. Why is tuberculosis called the white plague?

A. I suppose because people who have it are so pale.

Q. What is the cause and cure of nauseous phlegm rising in the throat?

A. It is really a trouble of the larynx, or of the lungs, or may be the back part of the nose--mucus dropping down into the throat. The cause of it is low vital resistance. That is the cause of it, supplemented by infection. A person who has low vital resistance, whose blood has become impaired, resistance has become diminished so that he has lost the power to kill germs that are continually invading the body which is surrounded by germs all the while. They are alighting upon us, coming down upon us, and raiding us and tearing us; they are seeking to get entrance into the body, and they are there to develop poisons, to set up destructive processes to kill us, and there are plenty of germs that will do it. The skin itself is smeared all over with germs, and they finally get inside and set up all kinds of destructive mischief. I got word tonight that a man I am acquainted with is dying of erysipelas. That disease is nothing in the world but skin germs that worked inside that man, worked into his blood, and the expectation is that he will be dead before morning; and nothing can save him, because he is so thoroughly infected that he has not the vital resistance to overcome the germs.

A person who has bronchial catarrh is a person who has low resistance so that the cells of the lungs have lost their power to fight the germs off, so the germs are getting in, getting down into the ~~skin~~ glands that make the mucus, resisting those glands so that they produce an excess of mucus; and that great excess of mucus is an effort at resistance that the body is making. It is only a means by which the body is fighting the germs off, and postponing the day when the germs will go deep down into the body, so deep into it as to destroy the very citadel of life.

The very same thing is true of catarrh of the stomach; the same thing is true of catarrh of the bowels, and catarrh of the liver, catarrh of the nose, catarrh of the ears, catarrh of the eyes, and all other parts of the body. Catarrh of any part of the body is due to lowered vital resistance. The dentist tells you if you do not wash your teeth the teeth will decay; tartar will accumulate if you do not keep them well brushed. How does the dog keep his teeth clean? Do you have to brush your dog's teeth every morning? I never saw a dog or a cat using a tooth-brush yet, and these animals have beautiful teeth. I have seen a dog showing his teeth, and I have said I wish I had as fine teeth as those, many a time. They are just like shining pearls--no tartar, no dirt, no decay. What is the explanation of it? A clean tongue. Did you ever see a dog with a coated tongue? Did you ever notice a cat lapping some milk, and notice what a nice, bright red tongue the cat has? Suppose your cat or dog had such bad breath as you have got, had such a horrid coat on the tongue, and such horrid teeth, you would not have it around the house, but would give it away to the neighbors, to somebody who did not have any cat. One of my little boys came along with a broken boat a little while ago, and he said, "Mama, my boat is broken; I will give it to the poor." I presume he had learned that from Mrs/ Kellogg and me, because he had seen we gave our old clothes to the poor; so when his broken boat was no longer of any use to him, he would give it to the poor. You would dispose of your cat or dog that way that had such a horrible breath; you would not have any use for it. Why is it our teeth are so defective they have to have such nice care? Why do we have to take such great care to keep our teeth from decaying?

It is because the natural preservative of the teeth, the saliva, has lost its power to take care of the teeth. It is the duty of the saliva to take care of the mouth. You do not need any other dentifrice than the saliva if the blood is right. The saliva manufactured from the blood will kill all the germs that get into your mouth. That is the protection. And the mucus formed in the nose will kill germs which enter the nose. So you need not be afraid to eat a few germs. The same is true of your stomach. So long as your stomach is thoroughly healthy, you do not need to be afraid of germs. When Prof/ Koch discovered the cholera bacillus Prof/ Brieger did not take any stock in it at all. In fact, he had another thing he thought was the cause of cholera, so of course he was opposed to Prof/ Koch's discovery, and in order to prove that Prof. Koch's bacillus, the cholera bacillus was a humbug, and was not the real cause of cholera, Prof. Brieger--I am not quite certain that is the name; it was a rival professor at any rate,--he took some cholera bacilli, the cholera bacillus of Prof. Koch, put it into a pint of beeftea, allowed it to grow until that beeftea was just completely filled with cholera germs, cholera germs enough in that pint of beeftea to produce an epidemic of cholera in a great community, to set a whole state on fire, if you please with cholera,--he took that pint of beeftea, swarming with cholera germs, and he drank the whole thing. He said he proved the thing was a humbug. He did not suffer the slightest inconvenience. How do you account for that? He had hyperpepsia; he was a "hyper", as we say for short. He had so much hydrochloric acid in the stomach it killed the whole of them. That is the reason for it. Another man said he would try it, and he got an attack of cholera although he took only a few bacilli. He had a tremendous big cholera, and it nearly carried him off. Now that was a very interesting experiment, and it proved that some people are proof against cholera.

We know perfectly well that when cholera infests a community some people do not get it. We know that when typhoid fever breaks out everybody does not have it. All drink the same water, but all do not have typhoid fever. All are exposed to the same cholera germs, and to the same typhoid fever germs, but the people don't all have it. When pneumonia comes into a community, everybody does not have pneumonia. Some people have it, but all don't get it. Why don't all get it? The man who gets it is the man who has hypopepsia. He has not enough hydrochloric acid in his stomach to kill the pneumonia germs. The man who gets typhoid fever is the man who has a dilated stomach, and has so little hydrochloric acid he can not digest typhoid fever germs. The same is true of chlorea. A man who can digest mushroom, Saratoga Chips, Pate de foie gras, stewed lobsters, lobster salad, chow-chow, and that sort of thing, the man who can digest that sort of rubbish can digest cholera germs easily. Cholera germs, typhoid fever germs, and such things are really, you may say, a delicatassen for that kind of a man, and he can dispose of them without any difficulty at all.

Now you see then the whole thing is a matter of vital resistance. It all depends on vital resistance. A man who has catarrh of the lungs, catarrh of the nose, catarrh of the stomach, and catarrh of any of these important organs which are lined with mucus membrane, that man is simply a person whose vital resistance has been lowered to such a point that he can no longer fight off germs. The important thing then is to keep your blood clean. If the blood is clean it will keep your mouth clean. I am not ashamed to show my teeth, and I want to say I never touch my teeth with dentifrice. I use a brush and a little dip of water after meals, and in the morning when I get up, and at night when I go to bed. I do not take any time to scrub or scour my teeth. I do not do such a things I do not have to. I used to do it, but I used to eat meat, and my mouth was full of grease and fragments of dead animals lying about, and I had to scrub and scrub with soap

We know perfectly well that when cholera infests a community some people do not get it. We know that when typhoid fever breaks out everybody does not have it. All drink the same water, but all do not have typhoid fever. All are exposed to the same cholera germs, and to the same typhoid fever germs, but the people don't all have it. When pneumonia comes into a community, everybody does not have pneumonia. Some people have it, but all don't get it. Why don't all get it? The man who gets it is the man who has hypopepsia. He has not enough hydrochloric acid in his stomach to kill the pneumonia germs. The man who gets typhoid fever is the man who has a dilated stomach, and has so little hydrochloric acid he can not digest typhoid fever germs. The same is true of chlorea. A man who can digest mushroom, Saratoga Chips, Pate de foie gras, stewed lobsters, lobster salad, chow-chow, and that sort of thing, the man who can digest that sort of rubbish can digest cholera germs easily. Cholera germs, typhoid fever germs, and such things are really, you may say, a delicatessen for that kind of a man, and he can dispose of them without any difficulty at all.

Now you see then the whole thing is a matter of vital resistance. It all depends on vital resistance. A man who has catarrh of the lungs, catarrh of the nose, catarrh of the stomach, and catarrh of any of those important organs which are lined with mucus membrane, that man is simply a person whose vital resistance has been lowered to such a point that he can no longer fight off germs. The important thing then is to keep your blood clean. If the blood is clean it will keep your mouth clean. I am not ashamed to show my teeth, and I want to say I never touch my teeth with dentifrice. I use a brush and a little dip of water after meals, and in the morning when I get up, and at night when I go to bed. I do not take any time to scrub or scour my teeth. I do not do such a thing: I do not have to. I used to do it, but I used to eat meat, and my mouth was full of grease and fragments of dead animals lying about, and I had to scrub and scrub with soap and things to get it clean. And that was right. And the same thing was true of the folks at our house when we used to eat such things. When I was a boy they had to use soft-soap in the water to make the dishes clean. But now at our house the only thing necessary to make all the dishes clean is simply to dash them with cold water and wash them off. There is nothing on any dish that won't come off by simply dashing it in cold water. I had a letter from a gentleman in Brooklyn a little while ago, and he said, We have got onto the Sanitarium diet this summer, and we don't have any dish washing to do. There is no grease, nothing at all to contaminate them. And, he said, it has occurred to me that this is why we don't have that bad taste in our mouths any more, because the same thing that keeps dishes clean keeps mouths clean, keeps stomachs clean. It is clean food, you see. Now here is a man who has decayed teeth. What does that mean? It means that man's saliva has ceased to be able to kill germs, so germs get between the teeth and lodge there and grow, so that when there are fragments of food left there, it is all the better for the germs, and the germs have a better chance to grow and to propogate rapidly; and so it is very important that the man should keep his mouth very clean,--wash every fragment of food out of it, because otherwise he is encouraging the growth of these germs which his saliva has failed to kill. If the saliva killed germs it would not matter if there were a thousand fragments of food there; but with the mouth full of germs, and also fragments of food lying about, the germs are encouraged to grow, toxines are formed, exudates are formed, and they decay the teeth--bore holes down through into the teeth, and so the teeth decay. If you find a man who has decayed teeth, that man has deteriorated saliva, and that means deteriorated blood. And if a man has deteriorated blood he is a degenerate man.

I frightened a man the other day. I was looking him over, and I said, My dear sir,--he was a lawyer, too--My dear sir, I see you are a degenerate. He said, What do you mean by that? I said, I see you have degenerated. You used to be a strong man. I see you have broad shoulders and a thick chest, and you must have been at one time a very strong vigorous man; but you are now a wreck. You have almost everything the matter with you. You have a cirrhotic liver, a big liver, diseased kidneys, you have a great many things coming in, and you have broken down. You are right down on the very edge of the precipice, at the ragged edge, and likely to fall over at any time. You have got to turn over a new leaf right away. You must stop smoking, stop eating beefsteak, stop doing everything wrong. You have got to live right close to the line. If you don't, a little wind will blow you over.

This man was raised on a farm, but he was set down in an office to work, and he had been sitting in that office for forty years. Think of it! What would be the condition of a horse shut up in a stable and kept there for forty years? What would be the condition of a man who is arrested, put in prison, and kept there for forty years? This man had been arrested by business--captured. He was shut up in a cell and kept there for forty years. A man may call his cell a counting room, but what is the difference? A cell is not any better because it is called a counting room. Suppose you take one of these fellows, put him in jail, behind the bar, at a table and give him a whole lot of greenbacks to count; give him greenbacks to count day after day. That would be just the situation of these poor fellows who are shut up in these little barred cells in banks in Chicago and in the other large cities, where they are shut up and spend their time counting bills--just simply counting bills. You shut a man up in such a place for twenty, thirty, or forty years, or ten years, and he is bound to become a degenerate. His skin was once pink and clear, but it becomes leathery, hard, dry, inactive. His liver was once a perfect defense against all the poisons which are coming in through the air and with the food, and which are degenerate in his own body, this splendid defender of the body becomes poor, crippled, weak, allows the poisons to filter right through, lets them out into the blood, and lays down its arms, so to speak. It is a crippled defender, like a policeman with one leg broken and the other leg stiff, and he is not able to capture a thief if he sees one. That is just the situation with the liver. So the kidneys are crippled. The liver gets crippled, and the kidneys get crippled, and the whole body goes into decay and degeneracy. This is the situation of the average man. Look at it, my friends. There was Joseph Cook--a wonderful preacher. If he had only known how to live he might have been living and preaching yet. Joseph Cook was a great eater. I used to read his sermons twenty-five or thirty years ago. He went off with apoplexy,.paresis, and just simply driveled away--went out, his light went out in darkness. Why!--simply because he did not know how to eat. That is the reason. He didn't know how to eat. And there was Dwight Moody, one of the most remarkable men that lived in the last generation, a man who had been the means of saving thousands of men, saving thousands of men from ignorance and sin, but he died himself a victim of not knowing how to eat. He was a great teacher; so was Joseph Cook. Another great man has just passed away, and if the truth were known his whole trouble could be traced to that very thing. He didn't know how to eat until it was too late.

This wrong eating, my friends, is a universal thing almost, and is ~~running~~ ruining more thousands of men than drink. Alcohol in its mischief does not compare with the mischief which is done at the average dinner table, where men, women and children participate in that sort of intemperance that is more deadly than alcohol intemperance, because it is more universal. There is no question about that at all, my friends. Wrong eating is responsible for more harm and mischief than tobacco and whiskey put together.

One of the causes of all this evil is the excessive use of proteid. Cut your proteids down, don't eat too much Protose or proteids of any sort. Cut beefsteak out entirely, for you can scarcely eat meat of any kind without eating too much proteid. When you eat bread you are getting all the proteid you need. In potato you have nearly enough proteid. The amount of proteid should only be one-tenth of the total number of calories. One professor said we ought to eat only one-fourth of that. One-tenth the number of calories is about one-eighth by weight. Just about one half the regular rate is the proper portion.

What is the mischief which comes from that excessive use of proteid? There is deadly mischief that comes from it of ~~all~~ the worst sort. Bright's disease, liver disease, autointoxication in general are born of excessive proteid, for it is converted into poisons that are vastly more deadly than alcohol. The extra amount of proteid which you take in the form of beefsteak, lean meat, or eggs, or albuminous foods, all decays, is converted iinto poisons, and these poisons contaminate the tissues, and produce sallow skin, a dingy sclerotic, and a bad taste in the mouth. And the horrid loathsome alimentary residue, the fecal accumulations of the bowels, and the horrid poisons formed in the colon, which are absorbed into the blood, come from these proteids, this excess of proteids which are not well digested and perfectly absorbed and utilized.

Q. Nearly all split hoof beasts I have observed eat of the earth, and this earth contains alkali and other salty substances. Why do they eat the earth if not for salt?

A. Alkali is not a salty substance. It is not a substitute at all for chlorid of sodium. You might take your cow who likes salt and give her some carbonate of soda and see if she will take that as a substitute. It is no substitute at all. We need salts, but there are abundant salts in our food. We need chlorid of sodium, but there is enough in our food. That is the truth about it. And if an animal eats grass without eating earth, he gets all the chlorid of sodium he needs in the grass. That fact is proven. As I said before, you can see my deer out here in my park. There is no alkali earth there. All the antelope that roam the forests of Central Africa and South America have absolutely no salt, for there is no salt there at all. The natives get an appetite for it, they like it, and form the salt eating habit, as it is easily acquired, just the same as tobacco smoking habit or the whiskey habit. When Park was exploring Africa he declared that one pound of salt would buy a man. Salt was such a precious thing you could buy a man for a pound of it. Think of that. That was the custom there for many years; perhaps for half a century a man could be bought for a pound of salt; salt was such an uncommon thing in Central Africa. You will readily see that salt is such a precious thing the animals can not find salt there. There is no salt for the animals. There are no salt lakes. They have watering places, but no salt. It is said by some that the cattle on the Western plains go out to the salt lakes to get salt. It seems never to occut to most people that these cattle don't go down every motning before breakfast to get salt. They could not do that, you see. It would wear them out. But there is once or twice a year that these animals used to have a great migration, particularly the wild animals. It is like the folks in the cities who run off every year to the mineral springs. You will find multitudes of people swarming off to all kinds of mineral springsin the summer, and think they feel better afterwards. Animals sometimes get into the way of going to mineral springs like folks do. Some sagacious animal away back somewhere found out that salt was good for worms, and that animal communicated the fact to other creatures, so once a year the wild animals will go to the salt lakes to get rid of their intestinal parasites, and they are perhaps benefited by the protectative influence of the saline water; but it is only once or twice a year that they do this.

Q. Of what diseases did Mr. Horace Fletcher cure himself by chewing?

A. I think he has told me, if I remember rightly, that he had heart trouble, and it was suspected he might have incipient Bright's disease,- there were some symptoms of it. He had symptoms of a complete breakdown, so he was absolutely inunsurable. He could not get any Life Insurance. No Company would insure him. I had a letter from Mr. Fletcher a day or two ago. He was then in Detroit, and he said he was going to give us a call in a few days. He had just been down to New Orleans, and says he finds Fletcherizing is extending rapidly in New Orleans. The people are getting interested in it, and taking great pains to chew.

Q. Are raisins bad for a weak digestion is the seeds and skins are discarded?

A. No. They are excellent for certain kinds of weak digestion. For persons suffering from slow digestion and hyperchlohydria, raisins are very excellent, because they are rich in sugar, and the sugar of raisins stimulates the flow of gastric juice--the pulp of raisins. Malt Honey and other saccharine foods have the same influence.

Q. What is the meaning of low specific gravity in the urinary secretion?

A. The indication is that the patient is losing flesh. The tissues are rapidly breaking down.

Q. Can low specific gravity and two much solids be brought to normal?

A. Yes: by simply correcting metabolism. That patient should rest a little perhaps, and should have a little more tissue and a little more food.

Q. What is normal specific gravity?

A. That depends entirely upon the quantity of water. It varies from 110 to 115 or 120, and depends upon the amount of water you drink.

Q. What is normal total solids?

A. That should be about 1 2/3 times the urea. It varies with the weight of the person and the amount of work done.

Q. Does fruit juice reduce acidity?

A. Yes. Fruit juice, no matter how acid, reduced acidity, so you need not be afraid to take acid fruits because you have acidity, or because you have a tendency to rheumatism. Acid fruits are a very peculiar substance. A fruit acid is a pure acid, but it is an acid combined with alkali. When it is taken into the body the acid is burned up and leaves the alkali all alone, and the alkali then helps alkalinize the blood and the tissues, you see. When you take chlorid of sodium, that is another thing. Chlorid of sodium reduces the alkalinity of the blood, because the acid of chlorid of sodium is chlorin. Hydrochloric acid is not diminished by it, but these vegetable acids are all burned up and used just as sugar is burned up and used. They are utilized and passed off as carbonic acid gas we breathe, leaving behind the alkali which alkalinizes the blood.

Q. What is normal blood pressure?

A. Eleven and four-tenths. My blood pressure is 10 1/2. I would rather have that than more, because if your blood pressure is low, and you are perfectly well, that means your heart does not have so much work to do. The heart has to work against the pressure all the time. The higher the pressure is the harder the heart has to work. There is a closed tank made of steel, if you please. Here is a pipe which runs out down here to the pump. Here is the pump. We will suppose here is a pump, and here is a piston that works back and forth in the pump. When that piston runs down this way it pushes the water up into this cylinder. Now the cylinder is not absolutely closed. There are a great number of little tubes leading out of it, and these tubes connect with a large tube which brings water back here to the pump. The water gets back to the pump in that way. The water is pumped up into the tank, then forced out of the tank through very little holes and small tubes, and the water is collected into this large pipe, carried back to the pump, and so the circulation goes on. Now you can see the smaller the holes in these little tubes the more pressure it would take to put the water through. Suppose for instance is has sixty pounds of pressure. Now if we should cut out some of these pipes, so there would be only half as many pipes, how much pressure would it take now to get the same amount through? We will guess at it, and say it takes twice as much. So it takes twice as much pressure when we have only half the number of holes. Now we suppose we had twice as many holes as there were originally, then it would only take half the pressure. There would be thirty pounds of pressure instead of sixty. You see the amount of pressure required to force water through the pump here, through these openings, would depend upon the size of the openings and the number of them. These little pipes, and this large tank represent, if you please, the arteries of the body. The arteries of the body stir up blood under pressure. Now these small tubes represent the small arteries, the little arterioles which connect the arteries with the veins. The large tubes represent the veins. There is no pressure in these. That is the reason why, when you cut a vein, the blood simply runs out and does not spurt. When you cut an artery the blood spurts out, because in the artery the blood is under pressure. But in the veins there is no pressure to amount to anything. The blood is simply forced through these little openings, goes to the veins, comes back to the heart, and is by the pump forced back into the arteries again. The arteries represent the steel tank you see.

Now the pressure is ordinarily from 11 to 14, but we will say from 10 to 14. I think about 12 is really approximately the normal blood pressure. Now today I examined a lady who had a blood pressure of 24. Now what is the matter with that lady? She has Bright's disease. What does Bright's disease mean? It means that a whole lot of these tubs are cut out and the blood has to be forced ~~thru~~ through about half the proper number of tubes, so it has to get it very hard to get it through. That means her heart has had twice the amount of work it ought to have had; and that means that the heart is going to be worn out easily, and by and by when it gets worn out, gets dilated out, its walls will begin to stretch and stretch and stretch, and by and by they will stretch so much the valves can not close the opening, then we will see the blood rushing back, and then dropsy will come on, and that patient will rapidly go down to death. How did these arteries get

get closed up in that way ? The arteries of the whole body are contrasting. When you find the arteries of the wrist getting hard--arteriosclerosis, that means a withering, and shrinking and shriveling up of the arteries all over the body, and the kidneys have to eliminate the poisons which produce disease. The arteries of the kidneys have to carry that poison away, and they are exposed to the poison more than any other part of the body. Poisons are concentrated in the kidneys, so the kidney arteries suffer more quickly and extensively than any others, and it is beginning Bright's disease. Whenever we find Bright's disease we find high pressure. No, not always, because I saw also today a patient with Bright's disease who had a pressure of 9 instead of 24. Or rather the patient had a pressure of 90 instead of 240. Two patients I have seen today with Bright's disease, one with a blood pressure of 240, and the other with a pressure of 90. Which one is better off? The one with the pressure of 240 is better off. Why?--Because that means that the patient has got a good strong heart yet, and the heart is able to pump the blood through. In the other case, the pressure of 90 means that the patient's heart is worn out; is getting weaker and weaker and weaker; the pressure is falling, and the heart is not able with that amount of pressure to get the blood through the shriveled arteries, so the whole body is rapidly falling into decay. Now what is going to be done? We must take off some of the work. How are we going to do it ? Open up these small vessels. How shall we do that? It is the easiest thing in the world--a warm bath will do it. A warm bath dilates the arteries, takes the load off the heart right away. So how wonderful hydrotherapy is in these cases, you see. There is nothing else in the world that will do it like a warm bath. A warm bath right away will take the pressure off, open up the tubes and make them larger. Then we will put an ice bag over the heart. What will that do? It will strengthen the heart. Give the heart more power and energy. Then there are other things to do. Simple exercise. Whenever you contract a muscle you reflexly dilate the arteries of the muscle, so that helps to take the pressure off.

Q. Will fresh air cure a coated tongue?

A. It is a capital good thing, because it makes the blood clean, and clean blood will make the tongue clean. That reminds me to put in another word for the fresh air tubes. We have had calls today for fifteen fresh air tubes. We hope to dispose of fifteen or twenty, or thirty or forty more tomorrow, and we have got our folks all ready to go right at it to make a lot more for you when you take these off our hands. We want to get them all out before the warm season comes. We are very anxious to close this stock out, and we will sell them at a very low price, in fact I think the price for a short time is nothing. I think they are furnished free for a short time only. I hope you will call for them fast enough to keep our folks busy putting them up. Keep your blood clean, and clean blood will keep your tongue clean; and it will keep your head clear, and keep your conscience clean to a considerable extent, if you do everything else as well.

Q. What will increase the motility of the stomach?

A. One thing that will increase it is chewing. Chewing will help your motility because chewing will lessen the work of the stomach. Applications of the ice bag over the stomach, exercise, sinusoidal electric current, applications of cold water of all sorts--these all aid motility. But one of the very best things is deep breathing. Stand up against the wall, stand up straight with your chest out, with the abdominal muscles well contracted, pull them in well, take a very deep breath. That helps the motility of the stomach better than any other one thing. Every time the diaphram comes down it gives the stomach a healthy squeeze--a little gentle jog. Cachinnation is a splendid thing for such cases. Perhaps some of you don't know what that is. That is the thing you do when you laugh. Cachinnation is simply the medical term for laughing, and laughing is simply a sort of jolting of the stomach, because when you laugh the diaphram is jolted up and down in the stomach. It helps to empty the stomach. The stomach lies right under the diaphram. The diaphram is a curved muscle that comes up here. Here is the diaphram, here is the stomach, the esophagus comes right down here, so the stomach lies right up under the diaphram. The diaphram contracts when you breathe. It jogs the stomach, as I was saying, and every time the stomach is contracted upon in that way the food contained will move along. The action of the diaphram in breathing is one of the most important aids to digestion. This is why we exercise in the gymnasium after breakfast, after dinner, and after supper in the evening; it is to aid digestion by aiding the stomach.

Q. Where do pine nuts grow?

A. Pine nuts grow on pine trees, on nut pine. It is a tree that has large cones, and in the cones are found a great number of these little kernels. When the cones get ripe they open up and the little kernels readily come out. They grow in the State of California and in Western Arizona, but those we have in this country I think come mostly from Spain and Northern Italy.

Q. Is it necessary to roast them?

A. No, it is not absolutely necessary to roast them. But you get them in the market sometimes shelled, sometimes not shelled. If they are not shelled they will look a little grimy, so they have to be very thoroughly washed, and after washing they have to be dried, and it does not do them any harm to heat them just a little, so as to thoroughly sterilize them. They do not require cooking. They are like all other true nuts, perfectly wholesome without cooking. Nuts and fruits are foods which can be eaten raw. They are our natural diet, and hence they are all ready for us just as they are served up from Nature's hand. Fruits and nuts are cooked in the sun as they say down in Mexico--Cacida in el sol. Down in Mexico if you call for some fruit they will ask you if you will have "dueros"--hard, green, fruit, or "cacida in el sol," fruit which has been cooked in the sun. These fruits cooked in the sun are simply ripened in the sun, and they are really cooked.

Q. If the daily cold bath makes a person nervous, does it not indicate that the person should stop the cold baths?

A. Yes. Take a nice neutral bath at 92 or 94° just before going to bed in the morning, and take a cold air bath in place of the cold bath. Expose the body to contact with cold air and vigorous friction instead of to cold water.

Q. Are figs and dates preserved in molasses? If so, are they suitable food for a weak digestion?

A. The dark colored date is soaked in molasses. These dates are put into a large heap, put into a press and pressed until all the molasses that can be washed out is forced out. The white date is treated in the same way with cheap brown sugar, and is thus much sweeter than dates ordinarily are. The cheap date as seen in its native state is very disappointing indeed. I remember how disappointed I was the first time I got hold of some dates in Cairo. I thought that in getting the date right in its native home I should have something particularly nice and delicate, very luxurious, but instead of that I found a poor little tastless thing, which had not very much more flavor than the so-called St. Johns bread you find at the Italian fruit stands in the cities. They taste so dry, so nearly tasteless that the native Egyptians do not think of eating them at all without cooking them. Dates have to be put in to soak, put up in a syrup, to be cooked, stewed for a while, in order to make them at all palatable. The dates we have here, as I stated before, are soaked in molasses, and in that way are made sweeter and more palatable. But there is a date which is a very different article, and it is the Tunis date. The date from Tunis is a very sweet lucious fruit, but it costs about 30 cents a pound in this country. They can be bought in Cairo for seven or eight cents a pound. They have to be brought a long distance on the back of camels, and that makes them rather expensive; but they can be bought in Cairo, as I said, for seven or eight cents. The ordinary date is not very suitable for the person with poor digestion because of the amount of sugar it contains. Patients with Bright's disease, cirrhotic liver, sour stomach, subject to catarrh and hyperacidity, such stomachs must discard cane sugar entirely. Stomaches with fermentation must avoid cane sugar.

Q. Why would not the bedroom window open say eighteen inches at the bottom and six inches at the top, be as healthful as the cold air tube? It would interfere so much less with the sleeper.

A. Well, now, my experience was this. I used to sleep with my windows open. I pulled my bed right up next to the window, and I woke up in the morning often to find a snow bank on my bed. Sometimes it blew on my face. Sometimes it would blow in upon the floor, melt, run down through the floor through the carpet to the cieling below, and do considerable damage and cause us inconveniencee when the window was open. Then I observed another inconveniencee, which was really the most serious inconveniencee, that is in the night the temperature would go down to 10° below zero sometimes, and the bed became so cold, the mattress became so cold, so thoroughly chilled, that it was about an hour after I went to bed before I could get the bed warm enough so I could sleep comfortably. Even if I introduced hot water bags and things of that sort I would not be comfortable. These things did not seem to answer the purpose, for the hot water bag warmed up only the portion of the mattress where it lay, and it was really uncomfortable. So I hit upon this scheme of introducing the cold air, and I found it a very great convenience. I tried it, liked it, and the advantages I found were these: The only thing you want is good cold air to breathe. You want the cold air for your mouth, your nose, your nostrils. You do not care for it for your feet and hands, because it is important to keep the feet warm while you are sleeping. You want to keep the blood out of the head when you sleep. When we retire we want lymph in the head. It flows in from the spinal cord, fills the ventricles, bathes the cells; but we do not want blood in the head when we sleep. Why? why, because blood in the brain excites it. The more blood you have in the brain the less soundly you will sleep. When something happens toyou that drives the blood away from your head suddenly you faint away, lose consciousness at once, become unconscious. So in sleep you are unconscious. The brain becomes pale. That fact has been observed in people who have lost a portion of the skull. I performed an operation on a skull last week in which there was a considerable portion of the skull lacking. I could see the brain. The patient was put under an anesthetic, and I had to scrape away a portion of the brain in order to relieve this patient from the spasmotic trouble from which he suffered. That was the only method of effecting a cure for the patient. In such cases where large parts of the brain has been removed, it has been observed that when the patient has been given a pack, a wet sheet pack for instance, the blood is drawn into the skin. The brain becomes pale and the patient goes to sleep. When the blood runs to the brain the patient wakes up. You want blood in the rest of the body, but not in the brain during sleep. That is the reason we can not sleep with cold feet. But we want the cold air to breathe, and the cold air coming down into the lungs promotes sound sleep, healthy sleep, purifies the blood, and burns up the foreign products in the body and in the blood rapidly, so that the irritating substances which keep one awake are removed through the blood, and the blood is purified, and all the vital processes are encouraged. Then we want just simply cold air enough to breathe. All we want is enough to breathe. We take down a pint at each breath, and at the rate of sixteen breaths a minute we breathe in just two gallons of air a minute. That is all we need. We need a barrel full every fifteen minutes, four barrels an hour. When you have the window wide open--eighteen inches at the bottom and eight inches at the top, there is a barrel full of air coming into the room every minute, and you have coming into the room, instead of four barrels an hour, sixty barrels an hour--fifteen or twenty times as much cold air as you need, and you have got to burn fifteen or twenty times as much coal in your furnace to keep your house from freezing, or else have the whole house cold. The body will lose more heat in trying to keep its cold feet warm--all the heat that is dissipated from the body necessarily is lost, so the energy is thrown away, and you have got to do so much more to supply it, don't you see. So if you are thin, and want to get fat, all your loss of heat simply entails an extra burden upon you. It is so much fat taken right out of your body. If you throw off 250 calories of heat, that means just about one-fourth of a pound of flesh that has been carried away. So what you want is just simply enough cold air to breathe, then with the fresh air tube we have a little stream of cold air passing by the nose. It is always there when you take a breath, so you get a good pure breath. The next time you take a breath you breathe pure air just the same. The stream is flowing all the while. Perhaps one-tenth as much air comes in through th^e fresh air tube as would come in through the windows, but you get all you can possibly want, and you do not waste any fuel in a body heat, you do not waste any food, you do not waste any tissue, but you get all you could possibly get if you were right out doors, you see, because you are breathing cold air all the time.

Now the trouble is people make hard work of it. They think they must fix themselves all up with a hood around their head, and have got to lie perfectly still all night long. That is a great mistake. Simply allow the fresh air tube to come down over your head, about twl feet above your head. Take off the hood, lie down in bed, and go to sleep. The cold air comes down upon your head, spreads around, you lie in it, and get the cold air on your face. That is the way I do. I can just almost see the pure cold air coming down. I can feel it anyhow. I have a little woolen hood which I put on, which comes down over my face and protects my face as well as my ears. On these warm nights I do not wear it, but I have it ready to pull down over my head in case we should have a sudden change of weather. I am looking out for emergencies nowadays, as I pretty nearly frosted my nose last winter.

When you use the fresh air tube you wake up in the morning and instead of having that feeling as though you had not rested enough, feel so miserable and wretched, as neurasthenic people do--feel as though you have got to have something done to you before you can raise your head, perhaps go into the bath room and have a cold bath in order to feel better; instead of that you feel all right the minute you wake up. You feel full of vigor, enjoy life, and you feel ready for anything that comes along. You don't need a cold bath. You have been sleigh-riding all night long. You can almost hear the bells jingle in your dreams. I am not overdrawing this picture of the fresh air tube. It is worth everything to you. I can do twice as much work with the fresh air tube as I can do without it.

My little boy, Robert, whom you see here occasionally, he said to me yesterday, "Papa, do you think it would be possible for me to have a fresh air tube?" I said, "Certainly." He said "O good! O good!", and away he went; and tonight when I went home to dinner he was on hand and he said "Papa, come and see my fresh air tube." He had it fixed in his window, and slept under it. All the rest of my boys are going in for fresh air tubes, all except one of them, and he sleeps out doors, so he does not need a fresh air tube. One of my boys has been sleeping out doors ever since last June. I have been teasing him to come in, and he has half promised me he will come in, but I am not quite certain whether he will or not. He has been sleeping in a tent, and I asked him the other day--"Don't you get cold?" "Of course not," he said, "I keep warm." He is going to be as hearty as a young bear. He is a boy fourteen years old. He took the notion into his own head to do it, so I am glad to see him try it.

This fresh air cure is worth everything else combined. If you could not do but just one thing here in this institution, if you should say, What is the thing I can do to help me more than anything else? I should say, Keep your head out of doors all the time. That is, keep it out of doors in the day time by walking, riding, and exercising about in the open air, and in the night time through the fresh air tube. You see you don't have to have your head out of doors, but you bring the out doors to your face. That is what the fresh air tube is for. Last winter, before we had a name for this tube, a lady wanted one, and she came along in and said "I want one of those head-out-of-the-window things." She had heard so much about it she wanted to try it, and she got it.

Q. What is the cause and the cure for chilblains?

A. Chilblains are probably a uric acid disorder. The body is full of uric acid. Get the tissues a little bit chilled, and the consew uence is uric acid isprecipitated through all the tissues, and the poisons of the tissues are gathered there, so irritation or inflammation is set up. The best cure for it is hot and cold--half a minute hot, half a minute cold. A hot and cold foor bath effects a cure in a wonderful way. I never knew why until I found out the real cause of it. It is not inflammation, but simply irritation set up by uric acid precipitated in the tissues. Hot and cold applications brings the leucocites there, the white blood cells. They come there and pick up the little particles of uric acid and carry them off. This is the way the trouble is cured.

Q. What is the fresh air tube?

A. You just call at the desk and say you want one put in. I appointed a committee yesterday to wait on each one of you and report to you. I had an interview with the leader of our gymnastics in the gymnasium, I asked him to speak to you about it every day until he got you started. We are getting our wood-chopping department going. You will find a pile of wood, some axes and saws, and it is capital good exercise, and every stick of wood that is prepared out there is distributed to the poor. It is not utilized by the Sanitarium. If you catch any of our folks using that for the

Sanitarium I hope you will have them arrested, because that wood belongs to the poor of this town. Logs are hauled in here, some of them being given to us, and they are for the poor, and when they are cut up the wood is dristributed to poor widows of the town who don't have anybody to cut wood for them. Now you know what is being done with it.

Q. I have had a badly coated tongue for many years. Could you kindly advise any kind of treatment that would help to clear it up?

A. Get your blood clean, and your blood will clean up your tongue. Calomel, or any other thing of that sort you can get hold of will do no good at all, because the coat on your tongue will come back in a few days, just as sure as it was there before. Make your blood clean, and your tongue will be all right. A professor came to me once, and said "I have had a coated tongue for ten years. What shall I do?" I said, you must work: You must saw wood: you must split wood. But he came back every few months, showed me his tongue, told me how awful it was, and what a nasty taste he had. I said, "All right; follow my prescription and you will get well." By and by he lost his job where he was and had to go onto a farm for a while. It wasnot his fault that he lost his job, it was the fault of the other folks. They made a great mistake when they let him go. He went onto a farm for a year, went to work, milked cows, ploughed land, sawed wood, mowed grass, cur corn and husked it,--did that sort of thing on a farm . He called here to see me a few months ago, after he had been doing this sort of thing for a year. He said "Look at my tongue," and put it out, and it was as clean as a cat's.

v--m 1/21 '06

Following Pages Are Best Copies Available

THE LIVER

A Stereopticon Lecture at the Sanitarium Parlor, Battle Creek, Mich., Thursday, January 18, 1906, at 8:00 P. M. By

J. H. Kellogg, M. D.

I promised to talk to you a little while tonight about the liver. We had a little talk about that a week or two ago. Before I say anything on that subject, I want to make an announcement. Professor Fisher will give a lecture here on Saturday evening at 5:30 on balancing the day's ration. Professor Fisher has given a great deal of attention to the question of the daily ration and balancing the bill of fare, and has devised a most ingenious method of doing it mechanically. He will also tell you how to do it geometrically and arithmetically. That is one of the most important questions that can be considered in relation to nutrition,--the proper balancing of the bill of fare,--the right proportion of fats, the right proportion of proteins, and the right proportion of carbohydrates; and to do it correctly requires quite a little trouble, by referring to the tables of percentages we have in our books on dietetics; but with the Sanitarium diet list that we have, and with the bills of fare arranged as they have been, it is not so difficult a thing to do; but Professor Fisher has arranged a method which is a little easier still. Instead of having to add up the long rows of figures, you simply count up the portions of foods that are to be served. Portions of food will be served in quantities which provide 100 calories each of actual food substance. And every portion of food as it comes to the table, and every dish of peas and beans, or every piece of bread--everything you get will have just 100 calories. If the doctor says you must have 1600 calories, then you will have sixteen portions, you see. The sixteen portions you will divide between breakfast and dinner and supper, as you like. If you have 2100 calories, that will be twenty-one portions. Some of the food will be served in half portions, and some in quarter portions. When you get lettuce and celery, I hardly know what the proportion is, but I imagine it will not be more than one tenth of one portion. But these various portions portions are simply to be added up, and you know at once how much you have eaten. The Professor has a little balance arranged by which he can put your dinner on the card, so to speak, and put little pegs which represent each one portion, upon cards, and the cards put on scales, balanced, and it tells you just exactly how much fat, how much protein, and how much carbohydrate there is. It is an exceedingly interesting thing. The Professor will explain it to you on Saturday evening at 5:30. I hope you will all come and bring all your friends who are interested in nutrition. We have two or three extra people in the kitchen during meal-time whose duty it is to weigh out every dish of food accurately, so you know exactly what you are doing, and how much. It is just as important, more important to know what you are putting into your stomach than it is to know how much fuel you are putting into your furnace. Food ~~coming~~ going into our stomachs is fuel just as much as coal going into the stove. If you put too much fuel into the stove, you have too hot a fire. Some complain that they can not do this, or do that, or do the other thing that they used to do, and they wonder why. It is because their bodies are crippled, and it is because of these little explosions, or conflagrations from over-eating, as the result of too much eating, too much feeding.

Now, we are going to talk to you tonight a little while about the liver. We told you something of the story of the liver the other night--the wonderful things it does; and tonight we will speak of a few more things in this very interesting story.

The liver is a laboratory--the most interesting of all the numerous laboratories of the body. Every gland is a laboratory. The gastric gland is a laboratory in which the acid gastric juice is made. The salivary glands constitute a laboratory in which the alkaline saliva is made. The pancreas is another laboratory in which work is done. Now, the liver is a laboratory in which the blood-making process is concerned. The liver has more to do with the blood than almost any other gland in the body. It purifies the blood, takes waste matters out of it, and doubtless to some degree helps to destroy the worn-out, red corpuscles which are found circulating in the blood. Here are some of the red cells right here. When they get infirm, worn out, no longer of any use, they have to be consumed. They are all shriveled up like shriveled up old men, decrepit, infirm, no longer of any use, and they come along to the liver, and the liver seizes them and eats them up, destroys them, sifts out the coloring matter and uses it to tint the hair and the eyes and the skin. If you have freckles, it is because the liver furnishes the coloring matter to make those freckles with. The coloring matter is borrowed from these red cells.

The potash in these red cells is made into bile, and the bile makes soap in the intestine; so it is all utilized. Here are various kinds of cells. Besides these red cells, there are white ones. These large white cells are wonderfully useful in the body. Suppose you fall and sprain your ankle, the ankle swells up, becomes enlarged and hard with exudate around it. How are you ever going to get that ankle to working again when it has got so stiff? There is a glugy substance poured in all around the edges of the bones and ligaments so it is tied up, and how in the world are you ever going to get the use of that ankle again? By massage, hot and cold baths, moist compresses at night, and keeping it warm, after while it will become smaller again, and its flexibility will return. What has happened? The thing that has happened is that by the rubbing and applications of water, the hot and cold, the blood has been brought to the part in larger quantity than usual; and as the blood comes pouring through the vessels, surrounding the joint, these large white cells come along with the rest, and these particular cells you see here have been swarming out into the tissues, and been gnawing away at these masses of gluey substance, eating it away bit by bit, carrying it off just as you see an ant ~~a hand~~ carrying something. When I was down in Mexico some little time ago, I saw some big ants going along carrying all sorts of things, some carrying straws, and some insects, lifted high up above their heads; some were carrying little bits of feathers and other things they had picked up, and some little fragments of wood; and I followed them along for many rods alongside the road, then across a fence and a hedge, and over into a field. Those ants were traveling there day after day, day after day; they were working, each one carrying away a little particle, traveling in a procession just like soldiers. Now, after while, these little fellows had carried off a great mass of material. The ants carried away a man's house once, and he didn't know it until one morning all of a sudden it went to pieces. The ants came up into the pillars of the house from the ground, through a hole in the floor, got into the leg of a chair and carried off the whole inside of that chair, so the chair was nothing but a shell, and when some one came to sit down in the chair, it crumbled into a heap of dust. It had all been carried away.

In the same way these curious creatures, the macrophags, swarm out into the tissues, hunt up fragments of things that don't belong there, and carry them away. Here is a lady, for instance, who has not got the right shape of nose. She is a public woman, an actress or something, and her nose does not suit her. She wants a classical nose. She singsk classical muxxi music, so she wants her nose to accord with the music; and she goes to the doctor, and the doctor says, "Very well." She gives him a picture of the nose she wants, and he proceeds to make the nose that shape. So the doctor molds some paraffin that has just the right teperature and injects it under the skin, and before it gets cold and hard he takes his fingers and molds that nose in just the shape she wants it; and it cools off and there it is. But it would not do for the paraffin to remain there. Little by little the paraffin is carried off by these macrophags. They leave something else in its place. They manufacture fibrous tissue, or change that paraffin into fibrous tissue. In operating upon a man the other day, I found one of the bones of his ankle, the bone upon which the leg bone operates, really the hinge bone of the ankle over which the leg bone works, the astragalus, as it is called,--I found this bone tubercular, the whole inside of it tubercular, full of germs, and the bone was all softened down; the shin bone was in just the condition I was talking about a little while ago, the condition of the chair; the whole inside was destroyed by germs, while the outside was intact. So I carefully scraped out the inside of the bone, swabbed it out with pure carbolic acid, then with alcohol, and filled that full of a solution of spermaceti, iodoform and sesame oil of such a composition that it would melt with warm water and I could pour it in, fill it up, and it would become solid at the temperature of the body. In a few moments that was solid, so that man had an astragalus the outside of which was natural bone, and the inside of which was wax, spermaceti, and iodoform. Now, then, what will happen? In the course of a few months these macrophags will swarm in there and they will carry off that wax, and they will put bone in place of it, and manufacture bone right there upon the spot; bone will shoot out from the sides of this little shell on the outside, and by and by the wax will all be gone, and it will all be transformed into bone, and it will be a brand new astragalus again. So you see how wonderfully useful these macrophags are.

Here are some other little cells, these cells here. These are smaller cells than those and they have a different function in the body. These are to capture germs, and these are microphags. The microphags capture microbes. When you go outdoors somewhere, go visiting somewhere, go to the theater--I would not go to the theater,--when you go to the concert, go to the prayer meeting, go to church, go anywhere, you meet other people, you will encounter somewhere somebody who has had pneumonia, or that has some pneumonia germs on the clothes, and you will get some pneumonia germs into your lungs, into your throat and your lungs, yet you do not get pneumonia, unless you have just been eating a Christmas dinner, or a turkey dinner of some kind, been gormandizing and your body is all full of impurities. Then you may get pneumonia. You do not get pneumonia from pneumonia germs alone, for if you have been living an upright life, you can ~~xxx~~ take pneumonia germs and swallow them, or breathe them into your lungs, and they won't do any harm at all, because those microphags are on the watch always on the qui vive; and the moment a pneumonia germ comes in, those microphags capture it, seize it, eat it up, carry it away. Here is a cell, you see, with something inside of it. Here is a cell with some little granules inside of it. That is the way one of these germs looks inside of one of these cells. It takes it in and eats it up, so the germ is killed.

Now, the same thing is true of la grippe. Everybody doesn't get la grippe, typhoid fever, and many other maladies--almost all infectious malaadies, in fact. Germs upon the skin are assailing us continually, yet ordinarily we are able to resist them. Why? Because, as fast as the germs get down beneath the skin they are caught by these little microphags, the white cells which capture and destroy them; so we are saved.

Here are some cells of another kind,--the esinophiles, as they are called; and these esinophiles gradually disappear when a person has pneumonia. They grow less and less and less until they are almost entirely disappeared from the blood, and that means the patient is getting worse and worse and worse; and the more these cells are destroyed, the worse the patient is. But by and by, of course as the patient begins to improve, to get better, these esinophiles come back again, and the number of esinophiles is something of an index to the prospect for the patient's recovery. That is, when they begin to gain, and the number increases from day to day, we know a favorable process is going on, and the patient is going to get well.n So it is very important to know about this. I operated upon a number of patients yesterday, as I do on every Wednesday up in our operating room on the top story. I had to do some very serious things for the people up there. Yesterday morning I had a little drop of blood taken out of the finger, had the blood carefully examined, had the number of these cells found in the blood counted up so as to know kxx just how many there are in a certain number, what percentage there are in a given quantity of blood. Now, this morning I had another test made, and I watched very carefully to see what that report is. If I found for instance 7000 white cells,-- 7,000 of these cells in the blood count, that is, in a cubic millimeter, with 5,000,000 red cells, I know that is the normal state. But now suppose in that report this morning I had found instead of seven thousand, fourteen thousand, or twenty thousand, I want to say to you I would have been right after that patient quick. I should have gone to the telephone the minute that report got to me,--I would have seized the telephone, telephoned the surgical ward to give me a report this minute of such and such a patient. When I got that report from the patient, if I found some other symptoms were present, I would have been right down here early, pell mell to look after that patient; we would have got out the fire department, so to speak, to pitch right into that case hammer and tongs, so to speak; and what for? To fight off germs that are attacking that patient, because the blood-test tells us the situation before any other symptoms appear. We know from this change in the blood that the body is beginning this battle, that the war is on, so to speak. We know that war has been declared, that the body is being assailed, and is fighting, getting ready to fight, to rally its soldiers; for these little cells really are soldiers with which the body fights against germs. It is of infinite value--the knowledge that has within recent years been gained in relation to the blood, and how the blood battles to protect the body.

These are only two or three of the red cells here in this slide; but if you look at a specimen of blood, you will see it is nearly all made up of these red cells. There are only a few of these other sorts of cells in proportion, only seven thousand in a quantity of blood which contains five millions of these others,--only about one to five hundred or six hundred. An interesting question which puzzled physiologists for a long time, more perhaps than almost any other question in physiology is, whence comes the blood? What organ in the body makes the blood. Now, the blood is not made in the stomach. The stomach digests food. Food is absorbed into the blood-vessels, but it is not blood. Where does food become blood, and how? And it is a most surprising discovery that was made a few years ago, that the blood is made in the bones. That is the last place you would think of looking for it, isn't it?--the bones, those ugly looking bones, the framework that constitutes the skeleton of the body is the laboratoryin which the blood--that most wonderful of all the body fluids or the body tissues,--the place where the blood is made, the laboratory in which it is formed.

Now, this is a ~~sixti~~ picture of the head of a bone, the joint; this is the joint where two large bones join together; here is the head of one bone and there is the head of the other bones, and you see here a great many little spaces. Here are some little open spaces. This bone is filled up with what is called the red marrow, the large ends of the bones; and the flat bones of the body also contains what is known as red marrow. The hollow bones contain the ordinary marrow of the bones, but the red marrow is another thing; it is in the red marrow of the bones, the large ends of bones, and the flat bones, the calcareous tissue--this is where the blood is made.

The liver is the organ that purifies the blood. Suppose a man, having crippled his liver, is not able to purify the blood; the man takes alcohol, for example, or tea, coffee, or pepper.. Pepper has six times the power of alcohol to produce a cirrhotic, diseased liver. Suppose a man eats pepper, mustard, peppersauce, ginger, spices, condiments, cloves, cinnamon--all these other objectionable things, and smokes tobacco, perhaps takes impure water that comes through lead pipes so the water becomes saturated with led; or a man in the habit of taking iron tonics, great quantities of blue pill, or blue mass every time he feels a little bilious, constantly has to be taking after-dinner laxative pills of some sort, or drinking mineral waters every day of his life perhaps, as well as some kind of seltzer aperient, or some other thing of that kind,--some sort of poison taken in every day in the food, or with his medicine, or incidentally through water, or in some other way,--all of that poison goes to the liver; the liver must act upon it, and the consequence is the liver ~~axx~~ by and by gets worn out. The liver first of all takes these poisonous substances, soaks them up into itself so that it becomes saturated with poisons, and it then gradually destroys them, drives them out again. But when these substances come in in such overwhelming quantities, the liver can not destroy them all, it gradually gives up its work, becomes incapable of doing it, and they pass on into the body; the liver by and by becomes deteriorated so that it loses its power to destroy poisons. Sometimes it acquires power to deal with poisons. A dog, for instance, can take meat that is rancid; a turkey buzzard can eat carrion; a hyena or a hog can eat decomposing, rotten flesh, and it apparently does no harm, because it has such marvelous liver power. The oyster, the scavenger of the sea, can eat the slimiest thing, the most decomposing, putrescent things with absolute impunity because it is a scavenger, and the reason why it can do that with impunity is because it has an enormous liver. You know that great big fat red end of the oyster,--that is its liver and kidneys. The oyster is mostly liver. It is mouth and liver. One end is mouth, and the other end is liver. The oyster takes in everything that comes along. Watch an oyster at work, and you will see he is licking the slime off the bottom of the sea, cleaning off the slime off from the stones. You can see his great, big, thick lips licking off the slime on the stems of the seaweed, and the slimy ooze that had settled down in the bottom of the sea. Examine a drop of oyster juice, put it under the microscope, and you will find it is like a silver mine in Colorado--there are millions in it, millions of wriggling, writhing, scrabbling germs. Now, the oyster has this tremendous great liver, as all other scavengers do, so as to be able to eat these horrible poisonous things with impunity, because the liver destroys the germs. The liver destroys the germs, and it destroys the poisons produced by the germs.

Now, man has the poorest liver of any animal for destroying or dealing with poisons. , Man, of all animals, is the least prepared to deal with these poisonous things. A dog's liver, as proved by actual experiments, has four times the power to destroy uric acid that man's liver has. That is, the ordinary dog can live on meat better than man can, but the dog gets sick if you feed him exclusively on meat. He gets rheumatic, for even the dog can not thrive on a purely carnivorous diet. So the man who tries to live on the dog's diet has only one fourth the chance to make a success of it that the dog has, because his liver has only one fourth the power to destroy poisons, to destroy uric acid, you see. That is the reason why human beings are suffering so much from uric acid diseases,--rheumatism, gout, and various other maladies of that sort that are getting to be so rife in these modern days,--is because when you sit down at the ordinary hotel, it is the dog's diet that is placed before you. I am not overdrawing this thing, my friends, at all. You know what your daily experience is when you go to a hotel and sit down. What is it? It is meats, meats, meats,--every sort of flesh meats,--several kinds of beef, mutton of various kinds, and different sorts of fish. You very seldom find a hotel bill of fare that doesn't have calves' brains on it. That seems tobe very necessary for the average hotel table nowadays. I suppose there is some reason for that. A Chicago doctor said the other day that the thing that troubled most men in Chicago was they didn't have brains enough to run their businesses and their stomachs too. I suppose that is getting to be the trouble almost everywhere. Brain fag is a great complaint nowadays. Business men are living such an unnatural life their brain energy, nervous energy is reduced to such a point they have not got brains enough left to run their business and their stomachs too. They are doing business enough to occupy their brains altogether, but they are overloading their stomachs with indigestible comestibles, that require brain power and energy as well as physical. They have not got enough to do both things. Either one or the other fails; either the stomach or the business fails first, and it very often happens that both go bankrupt. Just look over the bill of fare at the ordinary hotel. There it is, all meats, meats,--meat of all animals,--four-footed animals of various sorts, birds of various kinds, fish of various kinds, fruits, vegetables and nuts of various sorts. There is the diet of almost all creation there. You know, a whale is adapted to a fish diet. The whale has seven stomachs to digest fish; so it takes seven stomachs to digest fish. The whale has from seven to eleven stomachs. Some varieties of whales have eleven stomachs. The whale that has the least stomachs has seven. There is the cow that digests vegetables of various kinds,--herbs, leaves, roots of various sorts, and the cow has four stomachs, and the goat has four stomachs. Then there is the dog which has one stomach to digest meat; and there is the monkey that has one stomach to digest fruits and nuts. Now, let us see how many stomachs it takes, then, to digest that kind of a bill of fare,--the fruits, the firsh, and the flesh, and the vegetables, and the nuts,--how many stomachs does it take to digest the universal bill of fare? There are seven whale stomachs, for fish; four goat stomachs for the herbage, roots; another stomach, the dog's stomach for flesh, and the monkey stomach for nuts and fruits. That makes thirteen stomachs in all. But you see man sit down at a hotel table, looks over the bill of fare, and there is the food of all creation there; there is food for seven whale stomachs, food for four goat stomachs, food for the dog's stomach, and food for the monkey's stomach. And you know, that man has the audacity to put into his one little stomach, intended for fruits and nuts only, the food of all creation, and then he wonders why he can not digest it. There is only one creature in the world that can digest that kind of dinner, and that is the woodchuck. The woodchuck has fourteen stomachs.

Well, now the same thing is true of the liver. Man has not enough stomach-power to digest the things he is trying to digest in the popular dietary of the day. He only has one stomach where he ought to have fourteen to do all the work that is required of him. The very same thing is true of the liver. He has but one liver, a liver of definite capacity, but it ought to be four times its actual capacity to be able to deal with all the things put into it in the shape of food. And worse than that, add to that the medicines and drugs of various sorts, all of which must be dealt with by the liver, --liver tonics which are all liver poisons, every one of them--simply liver poisons that do the liver no good at all; and the various sorts of mindral drugs--arsenic, mercury, various sorts of things,--most mineral substances, even including iron, zinc and various other things taken in,--all these metal drugs must be acted upon by the liver, and the liver must take them out; and it stores them up in itself until it is crippled,--all of these things over-work the liver, until the liver of the average civilized man has to do twenty times as much work as ought to be required of it. That is the reason why we find the liver breaking down at an early day. First, the liver fails to do its work. So long as it can do its work well, then the other excretory organs of the body do their work well. The kidneys do their work well because they are simply the open door through which poisons go out after they have been worked upon in the liver.

Morphia is a very poisonous drug. But take this morphia, put it into a stove and burn it, and the ashes of morphia would not be very poisonous. St Strychnia is a very poisonous drug, but take the strychnia and put it into a candle flame and burn it, and the smoke and the ashes of strychnia are not poisonous. The poisons are destroyed when they are burned. The liver is a place where wet combustion is taking place, and the poisons which have passed through the liver are in the conditions of drugs which have gone through the furnace. Tobacco is poisonous, but after it has been smoked, the ashes of tobacco are not poison. It is by smoking that the poison is set free. So the liver deals with these poisons, reduces them to a harmless form, in which form they are carried off through the kidneys, and cause the kidneys very little work, does them little or no harm to dispose of the poisons in this form; but when the liver fails, ceases to do its legitimate work, then these poisons pass straight on into the blood, pass on into the kidneys and not only injure the kidneys but injure every other organ, every other tissue with which they come in contact; and that is why it is very important to have a good liver, and have your liver intact. That is the reason why you feel so bad when you get into a bilious state. What is the matter? There is no trouble with your liver except that it is overwhelmed with poisons coming in that from that dinner that is rotting in your stomach or colon, so that it can not deal with all the poisons, and some of them pass over into the blood, then you get headache, have a sick headache.

Now, consider for a moment when you had sick headache last time, when you were bilious; remember how sick you felt, and by and by you vomited, and how much better you felt within fifteen minutes after you got your stomach empty. Why, consider what it was that came out of your stomach. Those poisons that came from your stomach, were being absorbed into your blood, and all those horrid poisons were being taken into your blood, circulating through your brain, in contact with your brain-cells, coming into your liver and kidneys and destroying them, and then passed on into your brain and nerves, and you are simply intoxicated, under the influence of a drug. And within a few minutes after you got rid of the supply and the stomach had been empty a few minutes, the kidneys cleared out the poisons, and the liver stopped the poisons from coming in, and the liver and kidneys purified the blood to such a degree began to feel better right away. That is the philosophy of it. You get into a miserable state, your bowels loaded up with several days' accumulations of food residues; they are there lying in the colon, rotting, decomposing, poisons being absorbed into the blood, then your head aches, and is it any wonder it aches? You are just as intoxicated as though you had been to a drug store and got a drug and swallowed poison of some kind. Your colon is emptied, and instant relief comes to you; you feel as if a load has been taken off your head. And there has--a load of poisons which has been circulating in your blood. Just as quick as the source of poison is removed, the kidneys and liver very quickly purify the blood to that degree that you feel relieved. So you see what a wonderfully important position the liver occupies in the economy of the body--what a wonderfully important organ it is, and what care we ought to take of it. If we exercise the care we should in caring for our livers, if we will only take that food which is best for our livers, and drink only such liquids as are best for our livers, we will do that.

Some years ago a patient came here, and we found he had tumor of the kidney, x xxxxxx xxx xxxxxxx that was thought to be a cancerous tumor, a deadly tumor. He was very much emaciated; and although not strictly a cancerous tumor, it still was a deadly disease; he was emaciated, exhausted, unable to do any business, and was reduced down to a very low point. I had to take him up to the operating room and remove the kidney that was diseased. Fortunately the disease was confined to that kidney. This was about ten years ago. The disease fortunately had not extended beyond the kidney, so when I removed the kidney, the patient very soon recovered, gained in flesh, and he has enjoyed splendid health from that time until now. I saw him not many weeks ago. He was stopping with us a little while, and he has been enjoying excellent health now for ten years. He said to me when he got out of the operating room, "Now, Doctor, I have only one kidney left; tell me how to take care of it. I realize I can not have this operation done again; that I can go through this experience only once. I belong to the one-kidney aristocracy", and he mentioned to me several other congressmen, judges and others he knew of, eminent men, who had had one kidney removed, and he said, "I belong now to this one kidney club, aristocracy, and I want to keep on earth just as long as I can; so I have got to take good care of that kidney, and now won't you tell me what to eat and what to drink, how to behave myself?" I marked out a course of life for him, and he said, "I will stick to it religiously." The result of it was he had ten years the very best of his life, and of splendid, vigorous activity, with one kidney, simply by taking care of it.

That is the situation of the man who is a chronic invalid. Now, no man can become a chronic invalid unless his liver first collapses,--so that these tissue poisons that are circulating in the blood can no longer be destroyed; so the blood can no longer be kept clean and pure. Just as long as the blood is right, so long the body will be taken care of, and you can not get any form of chronic disease so long as your blood is right; because the blood is the life. There is healing power in the blood, that heals everything with which it comes in contact, just as there is a creative power in the blood that creates wherever creation is necessary, so far as possible, within the body. This creating, healing power, when it is intact, endowed with its natural efficiency, takes care of the body in every particular, but when the liver becomes crippled by being over-worked, this healing power has lost its white cells I was telling you about a few moments ago--those great, big cells that invade the exudates, go around the sprained ankle and carry off all that gluey mass that makes it stiff; limbers it up, restores it to health,--when these cells lose their power to work, and these microphags lose their power to fight germs, you get some pneumonia germs into your lungs and you have got pneumonia; or you get exposed to typhoid fever germs, and you have typhoid fever, because your cells have lost their power to destroy typhoid fever germs; so you are exposed; the citadel of life is optn to attack; the gates have been left open, the sentries are asleep, the guards are intoxicated, drunk, veritably drunk, so the body is not able to defend itself.

So you see then, what a bearing flesh food has. It overworks your liver; and condiments,--mustard, pepper, peppersauce, ginger and those things, you see what they do. Prof. Voix of Paris, showed that pepper has six times the power alcohol has to render the liver inactive, to destroy its efficiency; so you see the great importance of taking splendid care of your liver.

Now, we have three or four more pictures here I will show you so you can see the reason for the Sanitarium bill of fare, why we leave out every article of food that could furnish extra, unnecessary work for the liver. Here is a picture of the liver turned up so you can see the other side of it. Here is the gall-bladder. I met a patient this evening that gives evidence of gall-bladder disease, and next week I expect to have to remove that gall-bladder because it has become so diseased and has been diseased for so many years it is a hopeless case; it has become simply a useless appendage. The liver lies right over the transverse colon. All of these organs are associated. So this great mass of colon in which there is an accumulation of fecal matters decomposing alimentary residues of various kinds; then there are fragments of flesh found there which decay in just the same way that they decay outside the body, become putrescent; and these putrescent poisons penetrate the blood and intoxicate the body.

Here you see what happens when the clothing is not right. Here is the liver in its normal position; and here it is squeezed down below the ribs, pressed down out of shape so it can not possibly do its work. That doubtless is the reason why it happens that four women have gallstones where one man has gallstones. Observations which have been made show that to be true. This is the way the liver looks through the microscope. These are minute cells of the liver as they appear when examined through the microscope. Here you see where the blood comes in--these little places, and the blood runs out through these little cells; the blood penetrates through those little passages and is thoroughly inspected and examined for these wonderful creatures. These liver cells are inspectors; the blood comes up through this opening, spreads out here, it is carried away, purified; and that is the way the liver filters the blood. And it is carefully inspected, the poisons all taken out of it, so the liver must be kept intact.

This shows a normal liver in its normal shape. This is a piece of liver which has become diseased through disease of the heart, and the blood being crowded back upon the liver, its structure has changed; it has lost its natural characteristics; and it is a so-called nutmeg liver. Here is the liver which comes from eating pepper, mustard, peppersauce, ginger, spice, cinnamon, and other kind of things,--that sort of liver has become cirrhotic, all shriveled up to that shape. Here is a portion of inflamed liver; here is a part of a fatty liver--a liver which has been changed to fat; and there is a cancerous liver with masses of cancer ~~xxx~~ in it. I did an operation last week, or last Sunday, in fact, I performed an operation on just such a liver as that. Here were these masses projecting out above the edge of the liver. It is a hopeless case, of course; we can do nothing for it. Here is the so-called hobnailed liver. ~~Hxxx~~ These are all diseased conditions of the liver brought about by dietetic abuses, by over-working the liver. Here is another view of the liver in a different direction.

Here are some pictures of uric acid. We hear a great deal about uric acid, and these are crystals of uric acid. When the liver is inactive so that it can not properly do its work, uric acid accumulates in the blood, until the blood is saturated. Uric acid dissolves with great difficulty. It takes thirty thousand times its own weight of cold water to dissolve it. It only dissolves one part in thirty thousand times, it is so insoluble. It dissolves much better than that in warm water or hot water; but in cold water it dissolves very slowly. Now, then, see what the meaning of that is. Here you have got some blood that is saturated with uric acid. You ate a big beefsteak, and that beefsteak has fourteen grains of uric acid in every pound of it. Or you ate a morsel of sweetbreads. Sweetbreads has seventy grains to the pound of uric acid in it. You know how they shrivel up when they are cooked. I have heard they did. I never tasted any or saw any cooked, but when I asked a gentleman about it, he said, "Oh, yes, a pound of sweetbreads doesn't amount to anything when it is cooked; it is all shriveled up." He had eaten a pound of sweetbreads many a time, and it was a very common thing for him to eat a half a pound. But there are seventy grains of uric acid in a pound of sweetbreads. Now, the kidneys eliminate only six grains in twenty-four hours--six grains a day is all the kidneys eliminate. Think of it--when you have eaten a pound of beefsteak, there are two days' work for the kidneys to get rid of that one beefsteak. And if you have eaten a pound of sweetbreads, it is two weeks' work to get rid of that uric acid, that is, by the ordinary, natural every-day work of the kidneys,--it would take two weeks nearly to carry off the uric acid from one pound of sweetbread; so you see it is rather a serious matter to take these foods, to swallow these foods which are loaded with these tissue poisons. Now, your blood is completely saturated with uric acid, all it can

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carry; and if you go out in the cold, or the wind blows on the back of your neck somewhere, you feel pain after it. Now, is there any mystery about that? The cold chilled the skin; the blood was cooled, the uric acid was precipitated, don't you see? It is just the same thing as if you had some hot water full of sugar, and let the water cool and the sugar crystalizes out of the hot water, you see. Or if you have some hot water saturated with salt, when the salt water gets cold, the salt crystallizes out of it in just the same way. If you get your hands or fingers cold, or get a little draft on the back of your neck in some way, you get some of this uric acid deposited in the tissues; and that is the way you get it in the joints, and get chillblains. The joints got very cold, and the uric acid is deposited in the skin, and so much uric acid is deposited there that you have inflammation, and that is chillblains. So, in various ways, this uric acid comes to be deposited in various places in the body through its insolubility; and that sets up local disease, sets up sciatica, produces stone in the kidney, or stone in the bladder, and various other troubles of the nerves, muscles, brain and various other parts of the body, and particularly of the blood-vessels. This is because they are constantly exposed to this poisonous liquid circulating in them, and constantly exposed to contact with this uric acid; and the result is arteriosclerosis or hardening of the arteries, which is the disease of high livers. It is the disease of high life; it is the disease of sedentary people, of literary people.

Look at the trichinae in the pork, and see the measles or tapeworms in the beef. You get tapeworm in beefsteak ten times where you get it once in pork. You get trichina almost always in pork,--a live, wriggling worm swallowed into the stomach is set free. Here is some meat of the natural color, and here is some anemic meat. Here is the meat from an animal that had fever when it died; here is jaundiced meat. When you see meat that is deep red, that is because the animal was exhausted, or had fever when it died. If you see anemic meat, that is because the animal was xaxkx pale, had tuberculosis perhaps when it died. The ox feels just as bad when it has jaundice as you do. Did you ever think how the ox himself must feel when he is bilious? The ox that is bilious must have headache the same as people do.

This simply illustrates the importance of right breathing. When the abdomen is confined, it can not be used in this way. Look at the difference in natural breathing and unnatural breathing when the waist is constricted. These various organs have fallen out of place. I had a case just the other day of that sort. The colon was away down here. I met a case within a week, a case I had to operate upon to attach the intestine to the stomach because the stomach had fallen away down so far that obstruction had occurred to this end of it. There xaaxxa is another way to attach the intestine to the stomach--to make a new outlet for it.

This is a prolapsed stomach; these are the result of wrong sitting positions, sitting cramped over with the chest fallen down and various other ways. This shows the normal skeleton. This is the ordinary position which you find. Most civilized women have the front of the body broken down, the muscles all broken down, weak, the organs we have just been seeing sagging down out of place, and the result is general chronic disease as the result of it.

Here is the natural pose and the conventional feminine figure. This is the natural figure as God made it. You see there is quite a contrast between the two. This is the same thing. Here is the figure of a poor school girl as she was when she arrived at the Sanitarium; and that is the same figure after development in the gymnasium.

Before letting you go, I want to make just one more appeal for fresh air for you. I want to say to you, my friends, as I have said so often before, that pure, cold fresh air has more healing power in it than anything else we have in the house. There is nothing that we can do for you in this house that will compensate you for the loss of fresh air. We ought to have a breathing tube put up in every room, and if you are willing to use it, we will have it put up. Don't forget to protect your heads. I met a lady today who took cold because she did not protect her head when using the breathing tube. If you let the cold air pour upon your head, you probably have got so much uric acid in your blood that some of it will precipitate and you will get a cold; so it is best for you to have plenty of protection for the head, and let the cold, pure air come in. Let the air drop down a couple of feet above your face, let the pure air blow down upon your face all night, and the result will be your liver will be provided with such a large amount of pure oxygen that it will be able to burn up the waste products and make your blood pure, and more than double the rate of your recovery, my friends,--the power of it will be more than doubled by an increased supply of oxygen.

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B L O O D   P R E S S U R E

A Lecture to the Junior Class of the American Medical Missionary College, Battle Creek, Mich., Thursday, January 18, 1906,

by

J. H. Kellogg, M.D.

In the first place, what is blood-pressure? We must have a correct idea of what blood-pressure is before we can understand the relation of hydrotherapy to blood-pressure, and of what hydrotherapy can do in the regulation of blood-pressure.

What we call blood-pressure is the tension that is required in the arteries in order to force the blood over into the veins and thus supply the tissues with the nutrient material; and the determination of the blood-pressure is the measure of that energy.

Now, in order to understand the various elements that enter into this problem, we must have a correct idea of the mechanism of the circulation. We will start with the heart. Suppose the heart is a pump. Here is a pump; here is the piston in the pump; here is a reservoir. The pump forces fluid into this reservoir. Every time the pump makes a stroke forward it drives fluid into this large reservoir while the pump continues to work; but of course when the pressure gets up to a certain point where the pressure in the reservoir is equivalent to the force of the pump, then the pump will cease to work.

Byt the contents of our reservoir are continually leaking out into other reservoirs. Here is a reservoir that has a capacity equivalent to that of the main reservoir, and the blood is leaking out into this reservoir through small tubes. We call these tubes the arterioles and the capillaries. Here is another reservoir that has a capacity equal to two-thirds the capacity of the main reservoir, and the contents of the main reservoir is continually leaking out into this.

Here is another reservoir that has half the capacity and will hold half the contents of the main reservoir, and its contents are continually leaking out into that through these small tubes; and all these reservoirs are connected.

There is another set of tubes leading from the last reservoir

We have a diagram here which we will allow to represent the general circulation. Here is the pump, which represents the heart. This large reservoir is the arteries. Here are these other reservoirs which represent the great venous systems. This smaller reservoir which holds half the contents of the large reservoir represents the venous system of the muscles. The muscles hold half of all the blood in the body; thatis, they are capable of holding half of all the blood in the body. The larger reservoir has two-thirds the capacity of the large reservoir, and it represents, if you please, the skin, the subcutaneous tissue. A still larger reservoir, which has a capacity equal to that of the large reservoir, is the aorta and the portal circulation.

From the portal circulation the blood leaks out through another set of tubesxxx, the capillaries of the liver into this large vein, into this hepatic vein; and this enters the general venous system. This line here represents the diaphragm. Here we have another pump connection which we have not before indicated, which comes into the lungs, to assist in drawing the blood back to the main pump, the heart. The lungs assist the diaphragm to make a suction to draw the blood through the main pump, the heart.

Now the purpose of the heart pump is to maintain pressure in the large reservoir. That is one of its purposes. But there are other things that come into this question of blood-pressure. The reservoir itself is elastic, so that when the heart is forced up, the blood is forced up into the reservoir, and has filled it full, the elastic walls contract upon themselves, upon their contents, and serve as a storage for latent energy which forces the blood onward after the heart ceases to do it.

Suppose we have an elastic bag here and pump water or air into this bag. When we cease pumping it in, the elasticity of the bag will force the air or water out. That is what this reservoir is. When the blood is pumped into it, it becomes distended, contracts, keeps forcing the blood on.

But there is something more than that. The arteries have contractile walls, especially the small arteries. As these walls contract, rythmically and independent of the heart, they have a sort of milking action. The small arteries force the blood on out of this main reservoir. The small arteries become a part of the main reservoir in the storage of the blood, and they keep forcing the blood on.

Now thereis still another element in the blood-pressure, and ~~tat~~ that is the tissues themselves; for the blood-vessels are surrounded by tissues, and the elasticity of these tissues compressing the blood-vessels help also to force the blood on into the arteries. So they become a source of energy, and the blood is stored up.

What are the various sources of energy which move the blood on, which maintain the pressure of the blood in the arterial reservoir? These sources are, first, the heart; second, the elasticity of the walls of the arteries; third, the contractility of the arterial walls, of the muscles in the arterial walls.

The circulation consists of a pump and reservoirs in which the blood is stored. Now there are two reservoirs, the arterial reservoir, and the venous reservoirs. There is one arterial reservoir, and there are several little venous reservoirs. This idea of venous reservoirs is ~~xxxxxxxxxx~~ old. The world has understood about that, the medical profession have understood about that a long time; but the idea of an arterial reservoir is new. It is not original with me. A New York doctor suggested the idea, and it helps out very greatly this conception of the circulation.

Here is the arterial pump which pumps blood into one of these reservoirs in which the pressure is high. In one of these reservoirs there is high pressure maintained all the time, and in other reservoirs it is low, almost nothing at all, because they are simply receiving reservoirs. One of the great reservoirs is a distributing reservoir in which material is stored for distribution. This is quite necessary, because the blood is a viscous fluid, a fluid that is hard to distribute; it is thick, and it flows slowly, with difficulty. It is like muddy water in some respects. It is very different from water. It is viscous, and it is difficult to get it through the small openings wh through which it has to go, so there has to be a power behind it.

The blood does not move by capillary action. Water will go by capillary action, soak through; but blood does not move easily by capillary action; it is viscous; it is sticky, adhesive; it clings to the surface where it is, and when it gets into the small tubes, the natural tendency is for it to stagnate there. The natural tendency of blood is to stagnate, to adhere to the surface it is in contact with; so, in order to move it on, there has to be a power behind it to push it on. You know that lessening the viscosity of the blood will influence the circulation. You have heard that iodide of potash is a good drug in high pressure. Why? It diminishes the viscosity of the blood; that is all. It diminishes the viscosity of the blood ten per cent, so it has the effect to lessen the amount of work that has to be done to the extent of ten per cent. That is why iodide of potash is helpful, or seems to be helpful in some cases,--because it diminishes the work of the heart by diminishing the viscosity of the blood.

Here, then, is the reservoir in which pressure is to be maintained. What is the normal pressure of the blood? 110 to 112 mm. 25 mm. make an inch, and we use from four to six inches of mercury, so it would be 100 to 130 or 140, or 150 in early adult life. How much would that be in pounds? You know the barometer colum is about 760 mm. or about 30 in. high. Mercury weighs about two pounds to the inch, or half an inch of mercury is a pound; so four to six inches would mean eight to twelve pounds. So that is the pressure the heart has to exert upon the blood-circulation in general, the arterial system--is eight to twelve pounds.

So what are the forces that maintain the pressure in this reservoir? They are, first, the heart, exerting a force of eight to twelve pounds. That is quite a pull, but it is not so great as you might think. You can make that amount of pressure with your breath, or pretty nearly so. To what height can you blow a column of water? Two and one-half feet of water make a pound of pressure. You can raise a column of water to five or six feet easily, and perhaps even more than that by strong pressure with the lungs. With a little hand bulb you can raise a column of water a good deal higher than that. With a little atomizer bulb you can throw a small column of water sixty feet high. So the heart is able to maintain this amount of pressure continually in the arterial system.

But there are other forces which enter into it, because while the heart furnishes the power to begin with, the arterial walls being elastic, store up some of this energy, and so help to make the pressure continuous. Then there is the pressure of the tissues outside the vessels. The tissues are compressed by the arteries as the arteries are dilated; and as the arterial reservoir swells it compresses these tissues, and they contract again after the heart ceased to beat, and return this energy which has been used in compressing the tissues, return it to the heart, provided the tissues are elastic; but suppose they are not elastic; suppose they are edematous, full of water, hard from exudate, inelastic. Then you do not have that force helping the circulation. It depends, then, upon the condition of the tissues. Suppose the tissues are relaxed, lose their elasticity, then they do not have that force; but if they are firm, strong, then you have a force which helps the circulation all the time.

The elasticity of the vessel walls, the elasticity of the tissues is a subject which has been entirely overlooked until a few years ago when tissue tonous was shown by landaur; it has been entirely overlooked until quite recently.

There is one other thing--muscular contraction; contractility of the small arteries, the peripheral heart.

So there are four causes in operation:--

1. The heart contracting naturally, filling the reservoir.

2. The arterioles, represented by these little tubes, contracting contracting at the other end of the reservoir.

3. Elasticity of the vessel walls, and

4. Elasticity of the tissues outside of the vessels, serving as a source of latent energy, helping to propel the blood current.

Air pressure is in the heart as well as outside the heart. It is the medium in which we live, so that does not have any bearing except during changes of air pressure, when it might be influenced.

We have the arterial system, the reservoir in which the blood is under pressure.

The venous system consists of reservoirs in which the blood is not under pressure.

Here is the muscular system, and the tonous system--the skin with its vessels. Then we have the portal system, which is a very interesting thing. There is a venous reservoir which has muscular walls, and in it the force of the blood-pressure is reinforced. The portal veins ~~al~~ contain a store of blood which must all be forced through the liver, and in passing through the capillaries of the liver, represented by these arterioles here, it has to have a system; so this portal system of vessels that have muscular walls which are naturally controlled by the splanchnic nerve, forces the blood onward to the hepatic vein, and the hepatic vein enters with the rest of the venous blood just below the diaphragm that comes in below; ~~then~~ thus the movement of the diaphragm downward, rarefying the air in the chest cavity, lessing the pressure upon the veins, moves the blood back toward the heart.

In this way, it is very easy to understand the mechanism of the circulation, the therapeutics of blood-pressure; but it is very, very necessary to have this conception of the circulation. I was never able to understand it well until I got this thing into my mind.

The arterial circulation--a reservoir in which blood is under pressure in order to be forced through the small arteries into the tissues where it is needed. Then after it is through with the work of the tissues, passing on to a venous reservoir, carried up into the large vessels of the vena cava, and carried to the heart.

So now we have the force of the circulation, and the source of it, and the mechanism of the circulation; and now we have ~~not~~ another thing--the regulation of the blood-supply. We will take that up tomorrow, when we will talk also about the therapeutics of the blood-circulation. When we get through with this question so that we thoroughly understand this mechanism, we will see that hydrotherapy is the most beautiful thing in relation to the b lood-pressure; it is one of the most beautiful chapters i n the whole subject of hydrotherapy, as it is also one of the most important.

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BLOOD - PRESSURE.

A Lecture to the Junior Class of the American Medical Missionary College, Battle Creek, Mich., Friday, January 19, 1906,

by

J. H. Kellogg, M. D.

We will review briefly the mechanism of the circulation. We have first the pump, then the arterial reservoir. The pump is the heart, the heart-pump,--the arterial reservoir. The venous reservoirs, divided into three sections, ~~three connected~~ which communicate more or less closely,--the muscles, the skin, and the portal circulation.

These reservoirs are connected by small contractile tubes, the arterioles and capillaries.

Then we have the double pump, the right heart and the left heart. The venous reservoirs, connected by the right heart which pumps the blood from the lungs where we have the same sort of distribution again, an arterial reservoir containing intravenous blood. The small tubes connected with the venous reservoirs contain, in this case, arterial blood, by which the blood is fed back to the left side of the heart.

Now, we have another thing, a little side show, we might call it, the portal circulation here. The portal circulation is connected with the liver by a series of tubes which connect the portal reservoir with the secondary venous reservoir. Here are two venous reservoirs connected.

The first portion of the venous system is connected with the second venous reservoir by a set of small tubes.

We have in connection with the portal reservoir muscular walls. The portal veins have muscular walls, and the special nerve which controls its circulation, the splanchnic nerve, which forces blood through the small tubes into the second venous reservoir, the liver. Part of the blood from the portal circulation finds its way through this second set of tubes into the liver; thence throughthe hepatic vein into the general venous system; but a small part of it passes through in the usual way into the general venous system along with the blood from the skin, from the muscles, and from other parts--a small portion because the portal circulation is connected with the systemic circulation at several points.

This diagram makes the thing reasonably clear. I have given quite a lot of thought to the working out of him this diagram so as to make it show all the different things, and it shows them pretty well.

There is one point more: that is that the pump is within an inclosed cavity which is subjected to fluctuating pressures. The pump and part of the venous reservoir are in a closed cavity, the chest, and this is fluctuated by the change in the size of the chest contantly, so that the pressure to which the blood is subjected in the pump, the outside pressure, is continually varying; which is an exceedingly important fact, for when the pressure is diminished in this closed cavity, it exercises a very great and important influence over the whole venous reservoir, over all of them, but most particularly over the portal reservoir. The portal reservoir has the most work to do to get its blood back to the heart again. The portal blood has to go through this set of arterial tubes, and then through another set of tubes to the liver before it gets into the general circulation. So it is reinforced at both ends. The splanchnic nerve and the muscular walls of the portal veins combine to help the blood through; then besides there is the suction of th chest in front/

I had a letter yesterday from a man that I saw in Chicago a few years ago. Some one had been using the X-ray on him for lukemia. He had an enormously enlarged spleen. Senn had been applying the X-ray over the sternum and the ends of the large bones with the idea that it might help it in some way. But the man was getting worse all the while. He told me he paid Senn one hundred dollars to look at him, and was paying twenty dollars a week for his treatment at the Presbyterian hospital. He wanted to know what might be done. I was interested in this man because I first saw him down at Customhouse Place twelve years ago. He was a drunkard, in the gutter; but he got out, became a good man, is a good man today, living a straight, upright life. Of course, it was intemperance that brought this thing upon him. He wrote me an interesting story about two weeks ago, saying that after I saw him in Chicago he went back to Iowa for several months, and seemed to be getting worse. He had given up all hope, thought he was going to die, but a doctor down there somewhere in Iowa took it into his head that he might remove his spleen. He did so, the man recovered, and is now in splendid health, and has been in excellent health for two years. That is a very interesting case. He has been in good health for two years after he had been given up by everybody; but he has a discharging fistula in his side which he is anxious to get rid of. It was Mr. Haines.

In this diagram the venous reservoir for the other organs like the brain and the kidneys is represented along with the skin and the muscles. They are comparatively small. They take but little space, and they are thrown in. They are included in the large vena cava. We might put on another reservoir if we wanted to make our diagram complete in that way, but these three are the ones we make use of.

Now, in order that the blood should circulate, it is necessary that pressure should be maintained in the arterial reservoir. The conception of the circulation is a reservoir in which the blood is under pressure; the arterial blood forced through a series of small tubes into the reservoirs in which there is practically no pressure. Under normal conditions there is no pressure in the venous reservoir.

Now, what are the forces which maintain pressure in the arterial reservoir? They are:--

1. Heart Energy.
2. Vessel Tonus.
3. Vessel Elasticity.
4. Tissue Elasticity.

Vessel tonus relates to the muscular walls of allthese small vessels, the arterioles, and the capillaries. They are under the influence of the vasomotor nerves, and the sympathetic nerves.

There are two sources of nerve supply of the arterial walls,--vasomotor, and sympathetic. They are two separate, distinct things, under separate, distinct control. So, if the vasomotors is disturbed, the sympathetic will take up its work after while. Cut the splanchnic nerves, and the pressure in the portal vein will fall speedily, because it is dilated; but after two or three days that pressure will return through the influence of the sympathetic.

Vessel tonus means the contractility of the small arteries, because of their muscular walls. Vessel tonus exists always during life; it is never absent. This is true also of the capillaries. The capillaries have a certain tension, or tone. How?--By the nuclei of the cells which compose their walls. The nuclei can contract, and that contracts the capillaries, so that must be remembered. That may be or may not be--I think it is not particularly--under the influence of the nervous system; but it is a thing that exists at any rate.

Tissue elasticity. Is there anything else?

Blood volume is the other important thing that has an influence upon blood-pressure. Heart energy is the prime source of blood-pressure.

Now another thing that is essential to blood-pressure is vessel tonus. Here is the heart pumping blood into this large reservoir. Suppose the reservoir was open at the far end so that the blood would run out as fast as it was pumped in, would there be any pressure in it? If the blood ran out as fast as it was pumped in, there would be no pressure at all. There must be a constricted outlet. A constricted outlet is just as important, really, as pressure. Tonus is destroyed entirely by cutting the cervical cord; the blood-vessels relax immediately, and the blood-pressure falls to practically nothing. That is the condition in which we find a patient in the operating room who is suffering from shock. Inhibition was so great, pressure fell to nothing. It was so low we could not measure it with the sphygmomanometer, but I do not suppose it was absolutely nothing.

Vessel tonus and heart energy together maintain pressure.

Vessel elasticity is the elastic tension that is maintained by the vessel walls.

The carotid artery of a dog was found to have sufficient elasticity so that a pressure twenty times the normal could be brought to bear upon it without bursting it. The human carotid has been found to resist eight times the normal pressure; so this elasticity of the vessels is very great.

Tissue elasticity is the elasticity of the tissues outside of the vessels. In these tissues, for instance, there is no elasticity in the bone. It does not yield; it does not stretch, so it does not help the circulation through the bones at all; but in the muscles it has some influence. In the liver, the kidneys, and in all organs that have muscular capsule, it has some influence. Are there any muscular fibers in the capsule of Glisson?

The skin is the most important of al, because there is a large amount of muscular structure, and the arterioles of the skin have verythin muscular walls. The muscular structure of the arterial walls of the skin is deficient. But there are muscular fibers all about the arterioles, and by the contraction of these muscular fibers the vessels are compressed; so, though the vessels of the skin are rather deficient in muscular fibers, the skin itself being so full of muscular fibers--that is what makes the gooseflesh appearance/ Do you ever notice any difference in the feeling of the skin after a hot bath and after a cold bath? After a cold bath, the skin is smooth, hard, and firm because of the effect of cold upon the muscles.

The actual volume of blood is much smaller than the capacity of the vessels to hold. The capacity of the vessels is very much greater thanthe volume of blood. There is a surprising discrepancy. So if the vasomotor tonus is entirely destroyed by division of the cervical cord, all the blood leaves the arterial system in a very short time.

What happens after death with reference to arterial tonus, vasomotor tonus? It disappears entirely. Just before death, at the very end, the blood-pressure falls, the heart gets weaker and weaker and weaker, and the same power that weakens the hand weakens the heart, and weakens the tonus, you see. So the arterioles open up; and as the arterioles open up the large arteries contract, and after death all the blood moves on into the veins so that after death the arteries are found empty. The elasticity of the arteries contracts upon the contents, and the arterioles open, and the blood moves on until the arteries are absolutely empty.

Now this blood volume my fall as much as one-fifth; a man may lose one-fifth of all his blood without his pressure falling very much. The blood may be increased one-fifth of its volume, or more, may be even doubled without increasing the blood-pressure to a dangerous degree. It is important to remember that thing--if a person has a great fall of blood-pressure from hemorrhage, in a very short time the blood-pressure rises again. It falls at once, but quickly rises again, and it can be at once restored by introducing liquid. The amount of liquid that can be introduced is very great. There are a great number of interesting questions with reference to blood-pressure that come up.

What is high pressure? Normal pressure is from nine to twelve or fourteen. It varies with age, of course. Below nine or ten, or 90 or 100, much below that is hypotension. Above twelve or thirteen, much above that is hypertension. I have known tension as high as twenty-four--240. A tension has been recorded as high as 400; but the record was made with a narrow band of five centimeters instead of twelve. The armlet should always be twelve centimeters, and that makes a difference of thirty or forty millimeters. That is because when it is narrow it takes harder compression than it does when it is wide. Suppose you have a rubber tube with water in it, if you just put a knife blade on it, you have to press much harder than if you put the back of the knife on it, because in the latter case you press on a longer area. The pressure we are considering is hydrostatic. It does not make any difference what the temperature is. It is the hydrostatic principle in physics, you remember. It will help you immensely in your mind to get these few things figured out.

Capillary suction has scarcely anything to do with it because of the viscosity of the blood. In taking blood-pressure the armlet must be twelve in order to give you the best results. The blood-pressure will seem to be much lower with a twelve-centimeter armlet than with a five-centimeter armlet. Just within a year or two that has been discovered. They have to correct all the old records by that fact. For instance, two hundred and forty with the narrow armlet is reduced to two hundred with the wide armlet.

I want to get some of you to volunteer to work awhile in doing a lot of new work on this question that has not yet been worked out. Nobody has the opportunity that we have here to work this thing out. A number of years ago I did a lot of work with blood-pressure, but I have been so busy lately building sanitariums and getting into trouble in various ways, I have not had time. I might have been taking blood-pressure instead. But we are going at it again now; we want to learn some scientific facts. Truth is the thing that is of greatest value to the world. Now, truth is worth a whole sanitarium and a lot of other things.

A pressure was recorded as high as 400, but when that was corrected for the armlet it was only 300. Pressures of 300 have been observed for a year or two at a time. The highest pressure I have observed for any length of time was 240. We have a lady at the Sanitarium now with a pressure of 240--a case of Bright's disease. This pressure might rise very much higher than that before there is any danger. As I said before, the carotid will resist eight times the normal pressure. The arteries of the brain, the smaller arteries are exposed to the same pressure, but they won't resist so much. However, you can believe that the blood-pressure of the arteries,--that the arteries will resist any pressure that can ever be brought to bear upon them under ordinary conditions. They are not likely to rupture/ They have astonishing power of resistance.

The sphygmomanometer is a measure of blood-pressure throughout the entire arterial sytem. Why?--Because the thing that makes the blood-pressure is the resistance at the end. Now, if the blood-pressure was at the heart alone it would get less and less and less and less the further you get away from the heart. Suppose you have a long tube, and we are pumping water into the end of the tube, and it is open at the other end, where will the pressure be the greatest? It might be tendpounds, or four, according to the length of the tube. The pressure is used up in friction. It might be so much here, and ten at that end. Suppose we close this tubeup so that there is just a little orifice here, would there be very great difference betweenthis end and that? It would be the same, you see. Pressure in the blood-vessels is due to closure of the distal end of the vessels. That is where the resistance is/ It is the resistance, the tonus of the vessels that raises the pressure. The heart furnishes the energy, but the regulation of the vessel tonus is the thing that maintains the pressure in the vessels; so it is practically the same throughout the whole arterial system. It is due to closure of the distal end of the tube. It is uniform you see. If we find, then, the pressure in the brachial artery, that will indicate what is the pressure everywhere else.

Suppose we have a patient lying down, and have his hand up this way and get the pressure at the end of his finger, would the pressure be the same as it would be at the finger of the other hand held down? No. It would be the difference in the weight of that column of blood. So, for convenience, blood-pressure is always taken with the limb at the level of the heart. That makes the records uniform. The blood-pressure is different when you are standing from what it is when you are sitting down, or lying down; but theblood-pressure in the carotids, whether you are sitting up or lying down, or standing, will be essentially the same, because the blood-vessels of the legs, the regulation will control the tonus.

Now, it is important to be able to control circulation in various pathological conditions, to control theblood-pressure; for there are morbid conditions in which pressure is too high, and conditions in which it is too low. When the pressure is too high, how may we bring it down? When the pressure is too low, how may we bring it up? There are a great many ways in whichthis canbe done? It can be done with drugs, with a great variety of mechanical measures, movements, exercises of various sorts, various kinds of irritants, and it can be done with water.

The most important of all the things which control the circulation is the splanchnic nerve. That is the nerve which controls the circulation of the portal system. Here is the nervecenter; here is the nerve which controls the portal circulation. This great reservoir is capable of holding the entire volume of blood. How do we know that? If the hepatic vein here is tied, the animal will bleed to death. An animal bleeds to death by simple ligature of the hepatic vein; all the blood simply runs into the portal circulation, and the animal is bled to death. It has been proven by various experiments that it is capable of holding the entire volume of blood.

Now, the peripheral circulation is maintained bymeans of the splanchnic nerve. The splanchnic nerve causes contraction of the portal vessels to such a degree as to force the contraction of the vessels of the periphery. The tonus of the peripheral vessels would have the effect, if there was not some other resistance to it, to drive all theblood into the portal circulation. If the peripheral vessels only were contracted, the tendency would be to drive the blood internally. But this splanchnic controlling these great portal vessels maintains a tone there by means of which the tonus of the peripheral vessels is balanced off.

We may say that the whole vasomotor system is under the influence of the sensory nerves to a large extent. Every sensory nerve has a direct relation with the vasomotor system. Every time a sensory nerve is stimulated, it produces a vasomotor reflex somewhere. The sensory nerves which are all-important in this [illegible] work are the nerves of pain, especially important are the nerves of pain, and the temperature nerves,--the heat nerves, and the cold nerves, and the pain nerves. In fact, all the sensory nerves; but these nerves in particular are in direct relation with the vasomotor system in such a way that there is a reflex response whenever a sensory nerve is stimulated. Do not forget that. That is the reason why operations which may give great pain may cause the patient to die of shock. Why? Because there is such a powerful influence upon the vasomotor system. For instance, if the sciatic nerve is pulled, or pinched, or other great sensory nerves are injured to a very great degree, the result may be a complete inhibition of the vasomotor nerves to such a degree that the patient dies, and the blood all runs into the venous reservoir, so the patient dies from bleeding into his own veins. That is what shock is. That is why a person faints away when he is scared. Psychic influences have the same effect. A person suddenly turns pale. You see a little shade of pallor on the face. Then usually he gradually recovers.

Some time ago a lady received a letter from home while she was eating dinner. The letter contained some bad news. She turned suddenly, stepped from the dining-room, vomited the moment she got out. That whole thing was purely reflex, and it is due to the influences upon the sympathetic, vasomotor system. So that is a very important thing to remember.

Applications to the skin of an irritant character, anything that stimulates the pain nerves, or the cold nerves, or the heat nerves, the thermic nerves, anything which does that makes a most powerful impression upon the vasomotor system. It stimulates to a moderate degree. Too strong an application inhibits. We find that with massage. Light massage should stimulate, cause contraction of the vasomotor; but strong massage will inhibit.

A light pressure will lessen the flow of blood; light stroking will lessen the flow of blood in the skin, but hard rubbing will cause redness of the skin. Hard rubbing causes redness while light rubbing has the very opposite effect. So if a person has too much blood in his head he may relieve it by gentle stroking; but if a person has not enough blood in his head, is anemic, you can improve the condition by hard massage. So we have this point again: that one way in which the vasomotor system can be brought under control is by stimulation of the sensory nerves. That is the all-important thing to regulate the tonus and the heart action.

Another fact of great importance is that the splanchnic nerve is, of all the vasomotor nerves, the most sensitive to sensory impressions. That is a fact that has been worked out by investigators along this line--that the splanchnic nerve is more sensitive than any other nerve to sensory impressions, and the splanchnic nerve is more important than any other nerve in the regulation of the blood supply. The blood supply of the brain depends more upon the splanchnic nerve than upon any other nerve of the body. The Chinese have the idea that the man's soul is in that part of the body. Some people's souls seem to be pretty near that region from our standpoint; but the Chinese believe that a man thinks with his stomach. When a man gets very bad news of some sort, it seems to strike to his stomach; he feels it in his stomach. Strong emotions of various sorts are felt in the stomach, and the reason why is because the psychic effect operating upon the splanchnic nerve, affects the circulation of the stomach. That is the reason. These emotions which are sensory affect the sensory system; our emotions are sensory and they affect the sympathetic cells, and there make an impression. So much for the mechanism and the general facts.

Now, how can we influence blood-pressure as we may want to do therapeutically? As I said, there are various drugs which will contract the vessels. For instance, here is alcohol; it will dilate the vessels. When a man takes alcohol, his face is flushed; you feel his pulse, and it is a full, bounding pulse. Alcohol lessens tone; it dilates the vessels which lead out of the high pressure reservoir into the low pressure reservoirs, and opens up the arterioles. While it opens up the arterioles, it also lessens the power of the heart, the actual working power of the heart; lessens the force of the pump. It lessens the resistance and lessens the force behind. Now, it is the resistance that causes the rise of pressure to start with. It is the resistance in front that makes it possible to have a rise of pressure. Then it is the power behind that makes the pressure rise. Resistance in front makes pressure possible, and the resistance behind causes a rise of pressure.

Alcohol lessens the power in front of the blood-stream, and also lessens the power behind the blood-stream. That makes lower blood-pressure, and that is what it always does. But if a person faints away, and you give him some alcohol, or brandy, it revives him. Put a little brandy in the mouth and the patient revives, but he feels faint. It is a fact that it does. But why does it? It is simply the irritating effect in the mouth. Put some brandy into the mouth, and it smarts; it makes the stomach smart; but shortly after the alcohol gets into the blood and reaches the nerve-centers, then the actual constitutional effect appears; but the first effect is simply an irritant effect; the irritation of the thermic nerves.

Years ago I had to settle that question--whether I would use alcohol in surgical shock or not, or inanesthesia collapse, and I decided I would not do it. I said a hot bag to the back or a hot iron would do just as well as alcohol/ That is nothing in the world but sensory stimulation; it is simply the first effect, but afterwards the effect would be detrimental. If the patient were not going to faint again, it might do; but there is something better. You cangive the patient a good spanking. Just peruse them on the face as hard as you can, box their ears--anything that will smart will do the same thing. Then they will not have the bad after effect.

The doctors have beenrecommending for a long time that the old man should take wine to keep his arterioles dilated; but there is an objection to that. Alcohol in the blood accelerates the arteriosclerosis, you see, and so keeps on hardening the arteries; so there is no defense for alcohol; it falls down at both ends.

Digitalis is another drug/ How about digitalis. Digitalis is a cardiac excitant, and it increases the power of the heart, but it increases the work of the heart. What does it do to the arterioles? It contracts the arterioles, so increases resistance, raises blood-pressure. If that is the only thing you want to do, it might be all right, but tellme, does digitalis cause the heart to do more work? Does it actually give the heart any more energy with which to work? It is a poison; so the ultimate effect of digitalis must be damaging. It is just like a whip to a tired horse. The whip makes the horse dance around a little while, he will act as though he is rested, fresh, and young, but the more you whip him, the less strength he has got. Whipping does not put any strength into him. Does it lessen the work of the Horse?

Now, as a matter of fact, the conditions which demand increased pressure are not common. There is little danger from low pressure. The great danger is in high pressure. The low pressure that we have danger from is the secondary low pressure that we will talk about prettyquick.

How about strychnia? It is another drug which excites the heart, and also increases the tension. Digitalis contracts the openings leading out of the reservoir. The principal effect is supposed to be on the heart, but, as a matter of fact, it does increase the amount of work the heart has to do. The question of strychnia, of course, is settled experimentally in the laboratory. It is generally conceded that digitalis contracts the vessels and the heart both.

Strychnia stimulates the nerve-centers, raises the tone, increases the irritability of the nerve-centers, and it increases muscular tension everywhere in the body. I examined a man here some time ago, and I found his muscles shaking. Everytime I touched him, his muscles would twitch. I found that man was several times a day subject to little fits of twitchings, convulsions. It is the universal effect, becauseof its influence on the nerve-centers. I said to this man, "What is the matter with you?" "I don't know." "Have you been taking medicine?" "Yes." "What have you been takingg?" "Strychnia." I at first thought it might be tetany, but doubtless it was strychnia poisoning.

There are various other kinds of drugs which will raise blood-pressure, and have a certain influence upon the heart and upon the blood-vessels, which operate by contracting the small vessels and stimulating the heart, or by stimulating the heart along without contracting the small vessels. Generally the drug that stimulates the heart stimulates also the small vessels; and the reason why is this: The vessel tonus and the heart action are bothmaintained by the same sort of nerves, by the same set of nerves. What is the nerve of the heart that excites the heart? The sympathetic nerve is the exciter of the heart. It is a non-medullated nerve. The constrictor nerves of the arteries are non-medullated. The dilator nerves are medullated. We do not know so much about thedilator nerves, but they are believed to be medullated nerves. The inhibitory nerve of the heart is medullated also. The compressor nerve of the heart and the compressor nerves of the vessels are medullated nerves, and the constrictor nerves of the vessels, and the accelerator nerves of the heart are non-medullated. They are both the same kind, so it is reasonable to suppose that what affects one would affect the other. When you go far enough back in history, the heart is simply a little dilatation of the aorta. The vessels are a part of the heart and an extension of the heart. The blood-vessels are simply an extension of the heart. When you think of the heart, think of the vessels of the circulatory system, the heart, the arteries, think simply of the heart as an organ which ramifies throughout the whole body. The brain is an organ which reaches out its long fingers into all parts of it. The heart does just the same thing. The heart and the arteries are one organ, so their different functions correspond. The contractive power of the heart, and the contractive power of the vessels are all under control of the same kind of nerves, come from the same group of centers; so the medicine that affects one ought to affect the other, affect them all; and the influence of any sort that affects the heart ought to affect also the constrictors of the vessels. You will find that rule holds true. If there is an exception in digitalis or strychnia, it seems to me it is not an exception that will hold. Further investigation will show that it is not true, because it must be an anomalous thing if it is true.

Now, by what means can blood-pressure be increased therapeutically? Suppose we want to increase the blood-pressure. If we should increase the heart energy that would increase the blood-pressure, would it not? It would pump more blood into the reservoir. The volume of blood put into the reservoir will determine the blood-pressure to some degree; so the more rapidly the heart beats, provided the heart empties itself at each beat, the higher will be the pressure. The more completely the heart empties itself, other things being equal, supposing the rate does not change, the more completely it empties itself, the larger the larger the amount of blood which will empty the arterial reservoir, hence the pressure will rise.

Then, if we can increase the rate of the heart without lessening its efficiency, or if we can increase its efficiency without increasing its rate, we shall in every case raise the blood-pressure provided the tonus remains the same. Suppose the heart is emptying its ventricals; the ventrical is three-quarters empty; each time it beats it forces out of itself three-fourths of its contents. Increasing the rate tenper cent, we would increase the pressure proportionately. If we do not increase the rate at all, but cause the heart to contract with greater vigor and firmness so that it will completely empty itself, we would see that by the fuller pulse. The volume of blood sent out to the heart would be larger, and a fuller, stronger pulse even though it were no more rapid than before would indicate a rise of pressure. Can we do either one of those two things? Can we increase the efficiency of the heart in this way? Can we increase the rate of the heart? If we can do either one of those things, we can increase blood-pressure.

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THE NATURAL DIET OF MAN

A Stereopticon Lecture at the Sanitarium Parlor, Battle Creek, Mich., Thursday, February 8, 1906, at 8:00 P. M.

by

J. H. Kellogg, M. D.

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The natural diet is our subject tonight, and it is one of the most important questions we can consider. The three essential things for a locomotive are air, water, and fuel. Without either one of these three things, the locomotive must soon cease to move. Air is of most importance, of first importance. Shut off the draft of the locomotive, and the fire very soon goes out. Shut off the water, and it is likely to blow up, at any rate to go to pieces and stop. Shut off the fuel and it likewise ceases. The body is like a locomotive. It is a locomotive; it is a machine, and it requires for its operation the same things which are required for the railroad locomotive--air, water, and fuel. Air is first of all important. Without air we die in three or four minutes. Water is next in importance. Without water, we live only a few days. Food is third in importance. If the food supply is cut off, a man may live a month or even six weeks. Cases are on record in which persons have lived two months and even more. A famous faster in London fasted sixty-three days--that is more than two full months,--without a morsel of food, but he had plenty of air and water. So this question of diet is one of tremendous importance.

We are made of what we eat. There is an old proverb, "As a man thinketh so is he." And there is another old proverb, a German proverb not so ancient, "as a man eateth, so is he." One is certainly just as true as the other." I am not a philosopher, but I have undertaken to make a proverb by applying that axiom of mathematics, two things equal to the same thing are equal to each other. "As a man eateth so is he;" "asa a man thinketh so is he"; as a man eateth so he thinketh. Our very thoughts are born of what we eat. A manufacturer knows that the product of his engines depends primarily almost upon the sort of fuel that is put into his furnace; so he carefully measures the coal, carefully tests the coal, and takes pains to get coal of the very best quality for the money. He weighs the amount of water which goes into his boilers, and the amount of fuel which goes into the furnace, so he finds just how many pounds of water can be evaporated by a pound of coal. If it is only five pounds, it is very poor coal. If it is seven or eight pounds, it is fairly good coal. If it is ten or twelve pounds, it is splendid coal, and that is the coal to buy provided it is not too high priced.

The very same thing is true with reference to our bodies. Our bodies are machines, and we maintain the heat of our bodies, the energy of our bodies by the food which we eat. If this food is cheap food, food which is compared at least with the coal which will evaporate five pounds of water to the pound, then we will get a poor output of energy. It will be poor thinking, and poor working, and an inferior grade of vital activity, because the body's supplies of energy come from the fuel. Food is to supply energy to the body as fuel dows to the locomotive. Water is necessary to the body as it is for the locomotive. What for? As a vehicle for the energy. The heat in the coal is conveyed from the furnace into the boiler, and from the boiler it is carried by the steam into the cylinders and transmitted to the pistons which drive the shafts which turn the wheels which run the locomotive so pulling the train.

Those great working arms are operated by the steam, and the steam gets its energy from the coal. The coal burned in the furnace puts energy into the water so the water becomes steam; the steam carries it to the piston chamber and forces the piston back and forth, and in that way the train is pulled.

Now, it is just the same thing in the body. Energy is taken into the stomach in the food that is eaten; then this is dissolved by the process of digestion, taken up by thousands of little mouths which suck it up from the climentary canal and carry it into the blood, and the water dissolves it and carries this energy off to various parts of the body, to the nerve-centers where it is deposited as nervous energy; to the muscles where it is deposited in the form of glycogen to be used as muscular energy; so the entire body is constructed, stored with energy, the tissues are built up, with filled with energy. The water conveys the food in and carries the ashes out.

The air is necessary to furnish draft to keep the fires burning in the locomotive, to make the heat, develop the energy. It is only by the aid of oxygen combined with the coal that the energy is set free. It is exactly so with the body. The air we breathe in combines with the food to store up energy by which our muscles are made to move, by which we are made to sweat. So this question of food is a primary question in physiology; it is a primary question in our practical, every-day life. The business man can not afford to ignore this question of food. He can not afford to ignore the question of fuel. No better can he afford to ignore the questionof food in relation to himself. His business is what he makes it. What he is himself, his business will be. If he is an invalid to such a degree that his brain power is weakened, that his vital energy is diminished, his business will suffer to just that degree. How many a man, just as he reaches a point where his business is in a critical position, where he is just ready to achieve great success, the success for which he has striven for years and years and years and has just come to his great profit, can not avail himself of it. Why? Because he has not got the energy. He sits down at his desk. Here are tremendous questions coming up to be decided, but his brain is so stupid he can not make up his mind whether he wants to do it or does not want to do it. When a business proposition comes before a man in the full possession of his powers, he will be able to settle it in a second; but this man can not see just what he ought to do. Why? He is perplexed, troubled. He can not bring before his mind, can not set in order, in array, the various points which pertain to that xxx question. He can see only one point at a time, and it is indistinct, hazy. His brain is clouded, and when he has an appaintment to talk over a business proposition, he has not got the energy sufficient to make a brilliant picture of all the points involved in that question before his mind so he can see them all at once, and settle the question, balance it up. If he had a machine like this of Prof. Fisher's on which he could put all of his ideas, balance them and bring down the little pointer here and settle the question,--if he could do it that way it would be a beautiful thing. But we haven't got any mechanical instrument here as yet for balancing ideas. This comes the nearest to it of anything I ever saw; so the business man must depend upon his brain, upon his brain power and brain capacity for settling the questions that come before him; and his brain capacity depends upon what goes into his stomach. What goes into his stomach is converted into brain.

Now, the question as to what is proper food for the horse is one which has been studied a great deal. In this country there has been an immense deal of experimenting to find out what is the best food for the horses. The United States government has expended an immense amount of money through the agricultural department to determine what the best food for horses is. The farmer knows when it ought to have corn, when the horse ought to have oats, and when it ought to have hay; he knows the value of all the different kinds of hay; knows the real value of clover hay and of timothy hay, and marsh hay, and all the different sorts of hay,--he knows their value--of corn stalks too; he kn knows the value of corn stalks. All these things are thoroughly understood by the average farmer. At the farmers' institutes they are told all about these things. The farmers are carefully instructed as to what is the best food for horses, for speed horses and for work horses.

The United States government has spent an immense deal of money in settlement of the question, what is the best food for hogs? The hog is better fed today than his owner is. He is better fed than his owner. See what the farmer does. He raises wheat upon his farm, splendid wheat. That wheat takes out of the soil the things necessary to make bones, the things necessary to make sinews, the things necessary to make brains, the things necessary to make nerves, all the things necessary to make splendid bodies. He takes that wheat, and instead of eating it as it comes from the hand of the Creator, prepared expressly for making splendid bodies, a splendid animal,--furnished with all the elements necessary for making everything that the body requires,--instead of eating it in that form, he takes it down to the mill and pays the miller a good round sum to take that wheat and take out of it the best saxt parts; to sort out of it the best part which he calls the bran, and he sorts the middlings out in one place, then puts the poorest part, the worst of it, the cheapest of it, the central portion which is merely starch and has very little strength and vigor and vitality in it,--puts that in another place to make flour of it; that portion he puts into the oven. But it is the shorts, the middlings, and the brain which contain all the energy, and the salts,--the material which furnishes the bones, which makes splendid muscles, and nerves, and brain; he takes them home and feeds them to his pigs; and he takes home the other bag that contains the starch, the inferios material, takes that home and feeds that to his wife and children and eats that himself. That is the reason why he has such splendid, fat pigs, and such a lean wife and children.

Now, you see, there is no sense in that; there is no reasonin it. That has laid the foundation for this evil practice, this destructive, deadly practice, which has pretty nearly destroyed the teeth of the American people. The dentists are getting rich. Somebody has said that the gold mines of the future will be found in the cemeteries. That is, what the dentists have not got in their pockets will be found in the cemeteries, for such enormous quantities of gold are now going into people's mouths to replace the teeth which they have worn out. Now, if I should ask the question, how many people here tonight have thirty-two sound teeth in their mouths, I don't believe there would be twenty people raise their hands. Is there anybody here who hs thirty-two sound teeth? Such a person would really be so much of a curiosity that he ought to stand up so we could look at him. There is not a person here I am sure who has reached middle age, that hs thirty-two absolutely sound teeth. How many people are there here who never were in a dentist's chair, never had their teeth examined by a dentist? Scarcely anybody here. The dentists are getting to be just as necessary as the shoemakers. We have to have people to repair our teeth just as we have to have people to make shoes, to repair our shoes. We have to be supplied with teeth, just as with boots, with shoes and stockings and other goods. Our teeth begin to wear out while the rest of our bodies are in comparatively good order.

But now, this decay of the teeth, the hardest part of the body, one of the most indestructible parts of the body, is an evidence of constitutional decay. It is an evidene of constitutional decay. You only recognize that if you stop to think what your judgment would be if you were called to eamine a lot of horses, for example. Suppose you are buying horses, and a farmer brings you a lot of horses, say a dozen horses and you are buying horses for the government. The very first thing the horseman does is to look at the horses' teeth. Suppose a dozen horses have been brought to you, and you find that every horse there has badly decayed teeth, or practically no teeth at all. What would you say? Oh, you would say it was a measly lot. You would say, "We don't want anything to do with thesehorses." You would not buy a horse that had only half his teeth. Suppose a man should bring you a horse and you examine it and find it has store teeth in its mouth, false, store teeth, actually. He looks all right, but when you look into his mouth at his teeth, he has not got a single sound tooth in his head; has lost them all. You would say you didn't want that horse, for he is a plug. But it is just as good for a horse to have store teeth or false teeth, as it is for a man or a woman, just exactly; and a horse has just asgood a right to lose his teeth as you have or I. The horse has just as good a right; for the same things that would cause a horse to lose his teeth, those same things have made you lose your teeth; the things which cause decay of the teeth of a horse, will cause decay of the teeth of a man. It is constitutional decay. It is not because you have accidentally forgotten to wash your teeth, not because you do not use a toothbrush every morning and every night, or three times a day. That is not the reason why you had decayed teeth. If it was, horses, dogs, or goats, would never xxx xx have good teeth, for they do not use the toothbursh; they don't have to, for their teeth take care of themselves.

It is because your body has lost its power to protect itself that we have to take this extraordinary care of the teeth in order to have any teeth at all. Why is this? It is because we have been compelling our bodies to make blood, to make bone, to make nerves, to make tissues, brains and muscles out of material which never was intendes for that purpose, which never was intended for the formation of the human structure. The Israelites complained because they were compelled to make brick without straw; but their task was easy compared with that of making brains out of oysters, making brains and nerves out of Pate de foie gras, old cheese, stewed lobsters, pickles, horse radish,--the thousand and one things which are consumed upon the ordinary table are absolutely unfit for making brains and bones, and nerves, as clay, almost, or pebbles, or wood, sawdust or something else of a similar character.

There is a natural diet for every animal. Every ~~animal~~ farmer knows what a horse ought to eat; what will make the best pigs, what will enable cows to give the most milk--exactly what is the very best thing for his animals to eat. Every hunter knows the very best thing to feed his dogs. A very funny thing about that is that the experienced hunted won't feed his dogs meat; he feeds them something besides meat. I asked a hunter once what he fed his dogs, and he said cornmeal mush. I asked a Scotch hunter up in the highlands of Scotland, asked him what he fed his dogs, and he said, the same as he ate himself. I said, "What do you eat?" He said, "Bannocks and brose." Brose is oatmeal stirred up with hot water, and bannocks are oatcakes. I asked him if he gave his dogs meat. "No." "Why not?" He said because they could not run; did not have so good wind. So I asked a hunter away off in Portland, Oregon, who had hunted in the Rocky mountains many years, what he fed his dogs. He gave them bread. "Don't you give them meat?" "No." "Why?" "Because they don't have any wind or any scent when they eat meat. I asked a hunter in Indiana what he fed his dogs. He said, "I give them cornmeal, oatmeal much and bread." "Don't you give them any meat?" "Never." "Why not?" He said, "Because they can't smell a bird within four feet of it." He said, "I had a bird dog that co could smell a bird 300 feet away, but that dog will go right straight up to a bird, and within three feet of it after he has had meat to eat, and not smell it. And besides, he hasn't any wind." So you see the hunter knows what is best for dogs, and the farmer knows what is best for horses and pigs.

How many of you know what is best for you to eat? How are you going to find out what is best for the hog? Suppose you have got an animal that you never saw. Suppose somebody shouldbring you a bird and you didn't know what it ought to eat,--a bird that came from far off, and you don't know what it should eat. The very first thing you inquire about is, what does that bird eat in its natural state, when it is at home? Where is the bird found, in the woods? What did the bird eat in the woods? Now, ask that question of man. What did does man eat when he is away out in the woods all by himself, when no one ever taught him any bad habits. What did he eat in his original, native state? You say, "Oh, he ate anything he could find." But that is not the original man; that is not the man that was planted here on th this earth in all his pristine beauty and vigor, and vitality and naturalness. That is not the situation as it was then. Go back and ask the ancients what was their belief about that. They will all tell you--the ancient Greeks and the ancient Romans, and the ancient Syrians, the ancient Hebrews--they will all tell you the same thing. They will all tell you that the first man lived upon fruits and the products of the earth. You read it in the very first chapter of Genesis, you find it in the traditions of all people, and you find it here in the Bible. The Bible gives us the earliest records we have of mankind. Suppose you say it is not history; suppose you say it is not inspired; suppose you say it is just simply the ideas that people held formerly, it is the ideas which people held away back before modern history, almost in pre-historic times, the earliest history, the most authentic history is the history we have in the Bible. The wonderful revelations that have been made in the eastern excavations and explorations within the last ten or twelve years have marvelously supported the Biblical history and shown it to be reliable, to be true. Think of that Biblical history; take the account of the earliest man, and you find it agrees entirely with the very earliest accounts that have been given to us along these lines by foreign nations. It is that men first lived entirely upon the fruits of the earth. The statement is made in the very first chapter of Genesis and the 29th verse, that when God made Adam, he told him what to eat. It is a very interesting thing--the first instruction given to man about his conduct was with reference to what he should eat. There is but one drink, so you don't have to be instructed about that, and Adam didn't either. There is no other drink but waterThe only power there is to allay thirst is in water, and there is no other substance in all the universe that can allay thirst but water. A man may have some things mixed with it, but it is the water that allays the thirst. But there are a good many different foods substances, so it is necessary that man should be told what he should eat. There is only one drink for all the animal creation--birds, fishes, mammals--all kinds of animals and man,--they all depend upon the same drink, and that is water. But there were different kinds of food for different classes of animals. So man was told what he should eat, and he was told what the cows should eat, the lower animals. The lower animals must subsist upon herbs of the field. Man must subsist upon the herb yielding seed, and the fruit of the tree yielding fruit in which was the seed thereof. That was to be his diet; that was to be his food--it was to be fruits and seeds. Fruits include not only the juicy, watery fruits, but also those fruits which we commonly call nuts. Fruit is the seed-bearing body of plants. Herbs bearing seeds, and seeds, and fruits,--that was to be the diet of man, as given to Adam.

Now, the lower animals were to subsist upon grass. That is what the Bible says about it. Some of you believe the Bible; some of you believe in verbal inspiration, and some of you don't believe in verbal inspiration. Some of you believe it as history. But believe the Bible any way you please, there is the very earliest record in relation to man,--the very earliest record of the Greeks, and the earliest records of the Romans,--all the historians of the earliest times~~xxx~~, the record of the old Egyptians,--they all say exactly that same thing, they all agree in that--that the diet of the first man was fruits and ~~grains.~~ nuts. That was the first diet.

Now, suppose you take man and examine him from another standpoint. Suppose you examine his organs of digestion. Here are the salivary glands,--these large glands that make the saliva. By the way, a man came to me the other day and thought there was something terrible the matter with him. He happened to turn up the tip of his tongue, and saw a little lump sticking up in the floor of his mouth, and he thought he had something growing there that ought not to be there, and he was scared because that little sublingual gland was sticking up from the floor of his mouth. It happened to be projecting on each side. I had quite an argument with him to convince him that he was fortunate that he had two salivary glands, one on each side; and here are some more--the sub-maxillary; and here are more,--the carotid--six in all. The dog has salivary glands but they differ from these. The dog can not make so much saliva as man can. He does not need so much. But man has not as big salivary glands as a cow has, be

bwcause the cow needs a great deal more saliva. The horse eating dry hay, corn, a d grains of various sorts, needs a large amount of saliva, but man does not need so much. The monkey has got salivary glands just like the man. It has the same number of salivary glands, and the same sort, that make the same kind of saliva. Suppose here is one of the higher type of monkeys. Let us compare his teeth with those of man. Here are thirty-two sound teeth, sixteen in each jaw, but very few of you have them all. You have a few of them Here is the gorilla mouth. Here are the four front incisors, then here come the cusped teeth, and two small molars, and here are three large molars. Look at this gorilla. You see he has his four incisors--one, two, three, four; and here are the two cusped; here are the two small molars; there are the three large molars. You see the gorilla has just the same number of teeth man has and the same kind exactly.

Now, let us look at the teeth of the dog. Here are his incisors in front like that, six of them; here are the cusped teeth; here are the small molars, and here are the large molars. But these teeth are different; they are sharp, have cutting surfaces; they are saw like and fit in like the teeth of a saw. This tooth fits right into that little space above, and this one into that little space up there. So these cusps hang over so, and when the dog eats he chops; his teeth have a chopping motion. Here are the teeth of the horse up here. You see here a long row of molars back there, and there is a wide xpxxxx space here, and there is a cusped tooth; sure enough, there is a cusped tooth. Here are some incisor teeth in front, and these incisor teeth cut off food, and it is thrown back here to be ground.

When we notice man's jaws, we see there is something interesting and pe peculiar there. When the horse or the cow grinds its food,--you see the cow grind its food, the jaw moves back and forth and it also moves laterally. There is a sort of grinding motion like the work of a mill wheel one upon another, and you can hear the mill as the cow grinds. You hear a dog eating his dinner, eating a bit of beef, for example, you would know very soon it was a dog. If there were a dog eating a piece of beef in one place, and a cat eating a piece of meat in another place, you would know by the sound of the movements made by the jaws which was the dog and which the cat. You would not have to look around to see. The dog eats with a chopping motion. It is simply an up and down motion of its jaw, a vertical motion, because the dog can not move his jaw sideways. The dog's jaws are fixed to move just like a door swinging on hinges, in the same way. They can not move in any other way. Why? Because these sawlike teeth just fit in, dovetail in together in this way, and there is no chance for lateral motion, you see; no change for that sort of movement at all, while the molars of the cow have rough surfaces which grind one upon the other and there is room for them to move about.

How is it with man? How is it with the monkey? The man and the monkey have the movements together, Now, how about those canine teeth? Which are the canine teeth? You have to count them to find out. Begin down at the back end here, three molars, two small molars; then that next one must be cusped. It looks just like all the rest, because the cusped teeth are not longer than the other teeth. They can not be longer because they have to meet upon the upper teeth. In the case of the dog there is a space there. Here is a space for these to lap by. This tooth comes in here to this space, and this one goes up there in that space, so there is room for them to lap by. But here is this monkey, gorilla, rather, with its cusped teeth actually longer than the other teeth, but there is a little space there where they can lap by. This canine tooth means the animal is a flesh eater, doesn't it?

That the animal is adapted to the use of flesh; it is a dog tooth, a carnivorous toothisn't it? Then the gorilla must be a very carnivorous animal? Not at all. The gorilla never would touch flesh; you could not induce it to touch flesh. It will kill a man or an elephant, but it will eat neither one; after it has killed him it will go off and leave him. When the elephant invades the home of the gorilla, he will seize a club, climb up on a tree and drop down on the elephant's back, and he will pound him to death. He will just get up upon his neck, and hang on there and hammer that elephant until he has malled him to death. He will stand up on his hind legs and fence like a boxing master with a hunter, and he will get the best of him. He will seize his rifle and snap it in two, bend the barrel and break it in two. He is one of the monarchs of the forest, really the king of the forest, for he can kill every beast that lives in the forest. Yet, this gorilla is a vegetarian. He never will touch flesh unless driven to it by absolute hunger, and I don't know but he would die without eating it even then.

Then here is this horse up here that actually has got canine teeth. What has the horse got canine teeth for? To eat corn with. If the canine teeth show that the animal is a carnivorous animal, then the horse must be a carnivorous animal and the gorilla must be carnivorous. Here is a man who has cusped teeth, but certainly not canine teeth, for they are not at all like the cusped teeth of the dog. Then there is the stag that has canine teeth; and the camel has four great canine teeth. So we see the fact that an animal has these so-called canine teeth is no evidence at all that that animal is carnivorous. They are not indicative of the carnivorous diet at all; they simply mark the transition stage between the cutting and the tearing process in front, and the grinding process behind. The mouth is a mill which is arranged on the gradual reduction plan, in other words. So if we want to find out what any animal eats, we can not tell it by looking at its teeth alone; we must follow that animal to its native haunts and see what he eats when he is at home. If we want to know what the squirrel eats, we must follow him to the woods and see what he has stored away in his storehouse. If we watch him closely, we will see that he eats nuts if he can get them. He will rob birds' nests if he can not get nuts if he gets a chance, and he will catch a small bird and eat that if he has a famine of nuts so that he can not get ~~what~~ the nuts he ought to eat. That is the way the dog became a flesh eater. The squirrel would become a flesh eater and eat flesh all the time, as certain birds in Australia have become flesh eaters while they were once graminivorous birds; but their natural food became scarce and they took to eating sheep, and those birds are now carnivorous birds but once were graminivorous birds.

That is the way man has become carnivorous, while his teeth in their natural structure indicate that he is a fruit and nut eating creature, a seed eating creature; but he has degenerated in certain parts of the world until he has become a carnivorous creature. In Egypt you will find men and women,--human beings, I might say, rather, who live upon fish almost exclusively upon fish, and raw fish too. Some of these folks were taken up to London some time ago, and they had to be fed on raw fish; could not relish anything else; they had such an appetite for raw fish they had to be fed raw fish in the midst of all the advantages of civilization and the most luxurious diet in the hotel, they chose raw fish. These creatures do not represent the very highest type of human beings by any means; and the same might be said of the flesh eating class of people generally. People who live almost entirely upon fish, you find they are not the most intellectual, as you would suppose they ought to be, for some years ago I think Prof. Agassiz suggested that fish ought to be conducive to the development of brain structure, because fish contain so much phosphorus. The brain has a great deal of phosphorus in it sowe ought to find fish the very best food for brains. A young fellow out west wrote to Mark Twain and asked him how much fish a young man of twenty-one going to school ought to eat per day in order to support his brain. Mark Twain wrote him back that he thought a small whale would be about suited to his necessities. That is about right. A person going to undertake to nourish his brain by fish,--there is no such thing as special brain food, and certain people who eat fish are not particularly brainy. Persons who subsist upon fish altogether are not particularly intellectual, and have not made any progress that has gotten them ahead of the rest of the world; but it is the grain eaters who have made progress in the world;--those who have come the nearist to the natural dietary. But you say the English people eat so much meat. Yes, but they didn't always do it. They did not live upon meat 2500 years ago when they were clothed chiefly in war paint and a few feathers and subsisted upon their enemies very largely,--in other words, when our Anglo-Saxon fore-fathers were cannibals and had not yet made very much progress in civilization; but when the Romans taught them to raise wheat and eat wheat,--for the Romans were wheat eaters; the Roman soldier carriedboiled wheat for his ration; that was the one thing which he ate. The soldiers complained once that their general compelled them to eat meat for wheat had become scarce, and they considered it a very inferior diet; so they made complaint to headquarters about it. So, as I said, it is because the Roman conquerors taught us to eat wheat that we have made progress in the development of our civilization.

In India where we have one of the oldest, perhaps the oldest of all modern civilizations, is to be found, in India, in the Orient, the people of that country, the countryof this old civilization, are not meat eaters. They eat at the most, just a very little fish. The people of Japan, who are an off-shoot of this old civilization, eat but very little meat of any sort. They are the intellectualpeople from whom we have derived many things; a great many treasures of knowledge which we possess today have come from the far East, from people who have always been grain eaters, who have always lived upon the fruits and the other products of the earth from the very earliest times,, who never have been meat eaters. If the Anglo-Saxon race is ahead of the other people of the world at the present time, it is in spite of the fact that we have become such great meat eaters, and not because we have always been meat eaters, for we haven't.

One hundred years ago the English peasant ate but very little meat. Even at the present time, you find the English peasant eats very littlemeat. When traveling in England some years ago, I visited what they call the black country, and I found people there very thrifty, hardy, tough, vigorous, hard-working people living almost absolutely without meat--a soup bone on Sunday, and a little meat on holidays was all the meat they ever tasted in their lives. And I found the English farmer eats very, very little meat.

Go to a cheap restaurant where things are served up--not the things you need or ought to have, but the things you like. Maybe you find such a place is over a stable where the horses are fed. When the farmer goes down to market, he puts his horse into a stable, where the horse is fed what is good for the horse. The question is not asked, What does this horse like best? although that would be a very safe question; but the questionis, "What is good for this horse?" If they should give that horse the thing he liked best, very likely it might be green cabbage, and he might eat enough to kill him.

I have known horses to get into a neighbor's garden and eat a lot of greenstuff d and died because they have over-eaten of it; but that is not the question at all with the horse; the question is, what is good for him? The farmer puts his horse into a place where he gets something really good for him; then he goes up to a restaurant to get his dinner, and picks up the bill of fare of one of these restaurants--let us see what it is. Chicken; ham and eggs; hamburger steak; pigs' feet, spare ribs,--that is pigs' ribs too, you know; cheese; pork chops; b boiled ham; fried eggs; fried fish; corned beef; redhots; sardines; Bologna sausage; and an abundance of horse radish, mustard, pepper, and other hot sauces There is not a thing on there, not a single thing that is natural for a man to eat. There is not a single thing that belongs in the human bill of fare, not one thing there. Every single thing on the whole bill of fare is something foreign to the natural dietary of man.

Now, suppose you give that dinner to the horse, let the horse have that dinner. What would happen to him? The farmer would never get home with him in the world. How does it happen the man is satisfied to swallow such a dinner? Sometimes the horse has hard work to get the man home. I saw such a case not long ago. A man ate that sort of dinner at a restaurant, and he had to go straight to a saloon to kill the fires that had been created down there under his jacket; and he had takenin so much of that sort of cooling off stuff that he lay flat in the bottom of the wagon, and the horses were taking their own way home as fast as they could without his driving.

Man can cultivate an appetite for a good many things that are not good for him. If he has got an appetite for horseradish, or for hamburger steak, limbergur cheese and that sort of thing, of course, if he tries real hard, he can cultivate an appetite for other things.

All of these things were removed from the stomach of a man by a docter in a hospital in St. Louis on April 7. That is the miscellaneous assortment of hardware taken out of this man's stomach. He swallowed those things in a dime museum. I saw a man eating glass--took a lamp chimney, and swallowed it all, ate the whole thing and said it gave him an appetite. That man managed to get along and he enjoyed his bill of fare perhaps in the same way that other people enjoy eating this kind of thing.

Here is a picture of trichinae. I met a man who declared he believed he liked trichinae. He said he thought it added a kind of pleasant flavor to his pork when it had plenty of trichinae in it. He said he wasn't going to be scared.

Man has no natural capacity for eating chicakens. Here is an animal that is provided with a means for catching the chicken, crushing it, and swallowing it whole and digesting the whole chicken. Man can not deal with the chicken in that way. It is only by the aid of the cook and by various artifices that man can prepare that chicken by artificial means that are not at all natural.

There is another one of the consequences of flesh-eating--uric acid crystals, you see here. These are formed in the joints in various parts of the body as a result of flesh eating. Why? Because uric acid is found in flesh. In every pound of flesh meat there ase fourteen grains of uric acid. You don't find any uric acid in pineapples, grapes, bananas, or any of these beautiful fruits. They are the natural diet of man, and they are tempting to us; they appeal to us and we can indulge in them freely without any great damage. A boy climbs up a cherry tree, fills his stomach brimful of cherries which give him a stomachache; but the next morning he can climb another cherry tree and get another stomachache. No terrible thing happens to him if he doesn't swallow too many pits. But suppose he eats too much roast turkey, or too much meat of some other kind--too much roast beef,--he has something worse than stomachache; he has a bilious attack, he has fever, perhaps comes down with an attack of la grippe, or pneumonia; and the result is he does not get over it for a week or two, andperhaps does not get over it at all. A great feast of that sort will often give a person an attack of rheumatism that by and by leads to Bright's disease.

Now, just look at some of these fruits, and see what they have in them,--things that are natural for us to eat. Let us see what they are. They are all very much alike. With the exception of dates, and prunes, and raisins and figs--with those exceptions, they contain a large amount of water. There is somewhere from 85% to 90% of water in nearly all. The persimmon and the muskmelon contain a little more flesh; they are almost the only ones that do not have from 75% to 90% of water. Now dates, you see, contain almost no protein; they average about one half of one per cent of protein. Another thing is they contain no fats, practically no fats at all. Musk melon has got a little fat, and the dates have a very little fat, and raisins have a small amount of fat, but they contain, you see, quite a large proportion of carbohydrates, from 60% to 75%. The dried fruits, figs, prunes and raisins, contain you see, a large per cent of carbohydrates, xxx sugar, you see, in the raisins, 76%, and 73% in the prunes, 78% in the dates, 72% in the figs; so that in dried fruits there is practically 75% of carbohydrates, while in the rest it is 10% to 20% of carbohydrates. Here are grapes that have 19%, and that means sugar, practically all sugar, for the starch is predigested. So fruits consist almost exclusively of two things--sugar and water with various flavoring matters. The sugar is all digested and ready to be immediately absorbed. The water requires no digestion. Here is the banana. You see this contains pxtxxkxxx7%x 27.7% of carbohydrates; and it contains just a very little mineral matter, nine tenths of one per cent, cellulose two tenths of one per cent, and one half of one per cent or five tenths of one per cent of proteid, and there is practically no fat at all there. So you see the banana is a carbohydrate. A little less than one fourth of its value is carbohydrate. So divide 116 by four, and that would xxx give you the calories per ounce of the banana. The banana, then, is a food which really is already predigested; the carbohydrate is not in the form of starch, but it is in the form of destrings. There is the apple --the same thing,--acids, sugars, and water with flavoring material; so fruits, you see, are predigested, cooked and digested in the sun, already for immediate absorption. That is the reason why they are so luscious; and why you seem to get so much benefit from the eating of these foods.

Professor Fisher has developed a marvelous little machine by which we can determine the values of these, by which we can balance up our various food-stuffs in combination. He has gotten up this device, the triangle, by which it can be divided up into two parts or three parts, as the case may be, and show us the real values of the different elements in the individual foodstuffs. For instance, here is protose. The whole triangle represents 100 calories. Two and one half ounces. These proportions represent the amount of protein, the amount of fat, and the amount of carbohydrate. In protose, there is a very large amount of protein, and the fats predominate over the carbohydrates, considerably more. Protein is the dominant element. Here is porterhouse steak. It has a little less protein than protose, has a little less fat than the protose, and has practically no carbohydrate at all. Chicken, you see, has less fat and more protein. So the protose is a better balanced article, you see, than porterhouse steak. You have more proteid, less fat, and some carbohydrate. Here is the walnut which has a large amount of fat, and a little carbohydrate, and a small amount of protein. It is not so well balanced as the protose.

Here is a ripe olive. You see it is nearly all fat, has very little protein and very little carbohydrate. Here is the yolk of an egg, some fat, mostly fat, and some proteid. Here is cream--most all fat, very little carbohydrate, and very little protein. Here is butter, which is all fat.

This graphic method enables us to see very clearly the relative values of the elements in different foodstuffs. Rice and corn flakes and biscuit, and wheat flakes. Rice and corn flakes are practically the same. There is a little protein, less fat, and some carbohydrate. The proteid is practically the right proportion. The protein found in wheat is nearly the right proportion. There is proteid enough in corn. There is not quite enough in rice unless we take the rough rice, the whole rice, the rice before it has been polished. Beans have more proteid, more fat, and less carbohydrate, so beans are very rich inproteid. If we had beefsteak here, we would see that beans contain really pretty nearly as much as the beefsteak does. Here is boiled rice. Here is boiled potato. You see they are very much alike. The amount of proteid in boiled rice and boiled potato are almost exactly the same. There is less fat in the potato than in the rice, but there is not enough of either one. They contain very little fat, but have a very good proportion of protein.

Grape-juice and malt honey are pure carbohydrates, you see. It is a very interesting thing that the proportion of the gluten or proteid in the potato is almost the same as in wheat. Of course, there is a large amount of water. Here we have some nuts for comparison. The chestnut has a large amount of carbohydrate, a little proteid and a small amount of fat. The almond, the pine nut, and the becan have different proportions,--a small amount of carbohydrate, a large amount of fat, and a comparatively small amount of proteids. The pecan particularly has very little proteid and very little carbohydrate, but a very large amount of fat. As a matter of fact, there is almost ~~less~~ as much fat in an ounce of pecans as there is in an ounce of butter--almost as much.

Here is the little diagram used in balancing up the bill of fare. You find them arranged on your bills of fare; you find some notes in small figures here ha right along beside the larger figures. These small figures are to be used with this balancing instrument, the mechanical diet balance, as Prof. Fisher calls it, that we have kept in readiness here. It is arranged in such a way that it is in a neutral balance, so it can be balanced at any point. There are little points that represent the articles you have eaten from the bills of fare. This represents flesh and cereals, you see, and shows how they are gathered together. For instance, here is macaroni, entire wheat, oatmeal, graham and white bread, corn flakes, hominy, cornmeal, Vienna rolls, brown bread, etc. These all come down here in this corner you see. Here is boiled rice, popcorn, various cereals here in this corner, you see. Notice that the meats are all arranged along this line here. Here is mackerel, ribs of beef, round pork, ham, and so on. These are all arranged along that line, while the cereals come down here to this corner, because they are carbohydrates. Here we have represented eggs and the meat substitutes. You see where they go. The proportions come in different parts of the triangle. Just take a glance at that inviting picture there--cool, pure, sweet.

When I was in Egypt some years ago, walking along the Nile, I constantly met people going into the country in dreadfully hot weather, in may, and the sun was pouring down very hot--one of the hottest months in Egypt, and it was a very common thing to see a boy or a girl or a mother with a baby in her arms eating cucumbers, and without the least bit of difficulty or embarrassment. The cucumbers inside are nearly all water, and perfectly harmless. It is not the cucumber itself that is damaging, but it is the salt, vinegar, pepper along with the cucumber that makes mischief, and swallowing the cucumber whole. When it is perfectly wholesome, it is perfectly wholesome.

Note this. This is the standard of the Japanese army. This represents the fats, this the carbohydrates, and this the proteins. You see there is a small amount of proteins, a small amount of fats, but a large amount of carbohydrates, because they live on rice, so they have a great deal of that element. Keep that in mind, and see what comes next. That is the ration of the Japanese army. Here is the ration of the Battle Creek Sanitarium nurses. You see it is almost exactly the same,--just a little more fat. It has practically the same amount of proteid and a little more fat, and the balance carbohydrates. Some years ago I carefully measured all food eaten by about 300 nurses for several weeks, and I made a very careful estimate of it, and the figures I obtained are s shown here, so tht is one reason, I think, why our nurses are so enduring, and out men about here are tough and hardy men. The Japanese soldiers are able to march on the double quick for fourteen hours steadily, consecutively. No other soldiers of the world can do it. They can march about twice as fast as other soldiers can. That is one reason they won in that great war in the East,--because they had more endurance than their antagonists.

Here are the vegetables--largely water, you see--95%,--nearly all water, almost no protein you see. The highest is three per cent. There are almost no fats,--practically no fats, but quite an amount of carbohydrates. Then vegetables contain another element which is important and available for human consumption when vegetables are well cooked, and that is the salts; but I will talk more about that another time.

In our bill of fare we consider only just the foodstuff ~~power~~ pure, after the water is taken out, because the water does not count in calories. It counts in weight, but not in calories; so, in the bill of fare, we are only interested in what is left after the water is taken out, because water taken with the food is just the same as water taken from a glass as eater; it does not count as foodstuff. This represents a potato, you see, with water 78%, and the starch is just a little less than 20%; almost no fat, and almost no fiber. The potato is one of the very best of all vegetables, and contains protein, as we have already seen, nearly protein enough.

Now comes wheat. One of the best of all cereals is the wheat. This shows you what I was telling you about a little while ago--the starch inside. Here are these cells outside, -those are gluten cells, which contain the protein. They are arranged in layers, you see. In taking off the bran these gluten cells are pulled off. On the outside, there is some very rough material which is rubbed off in the polishing machine, leaving the wheat in this form; but when you come to take off the rest of it, you carry off the very best of the gluten; and this interior here, which is practically nothing but starch, is very inferior in quality. It is carbohydrate.

Now the old fashioned way of milling, that you see in operation here in the oriental mill, these Indian mills, Syrian mills, and Mexican mills, in this log or stone mortar with a wooden pestle, the entire grain is pounded up. When the meal isprepared in this way, it contains all the elements of nutrition. We see here in this list cereals and legumes. If we study the proportions, we see the large amount of protein, 22/5. Here is a large amount of carbohydrates, and I mixght say the peas and beans of various kinds contain about 25% of proteins; even the sooy bean comes up as high as 34%, whereas the cereals, wheat and grains of various sorts, are about six or eight to fourteen or sixteen per cent; but the carbohydrate is a large element, 60% to 75%, and there is a very small proportion of fats in the cereals; so thx we eat the cereals for the purpose of getting the carbohydrates chiefly, and the proteins.

Here is a walnut--looks wonderfully like the brain, doesn't it? If you study the percentage of composition, it has very little water,--fifteen per cent protein, 62% fat, a large proportion of fat in the walnut; and this is true of all nuts;im and these are among the most nourishing of all foods.

Here is a list of nuts in general, and you see the amount of protein. It runs along just about alike. Pine nut a little less than ten, the chestnut ten, and the cocoanut five. The rest of them run along about 20%. The peanut is 25%. You see in a pound of pine nuts there is nearly fifty per cent more beefsteak than there is in a pound of beefsteak.

The chestnut has the least amount of fat. It is chiefly starch. The chestnut has the least, and the rest of them go along very close together. Almonds contain about fifty to sixty per cent fats. Chestnuts have only four per cent fats, you see; and here are peanuts with thirty-eight per cent. So you see the nuts run forty, fity, sixty, seventy percent; and the pecan has seventy per cent. The chestnut is seven, but the rest of them average pretty nearly sixty,--sixty to seventy per cent of fat. They are all about alike with the exception of the chestnut. That is more like an acorn than an ordinary nut.

Here are nuts and fruits. Here are the nuts, and the fruits down here. There is only one nut that comes over to this fruit corner, or the carbohydrate corner. The nuts are fats, and you see the nuts are all over here. With the exception of the chestnut, and the chestnut comes over here along with the fruits. They are very closely allied with fruits.

We don't have to resort to the killing of creatures to have things inviting. Our most dainty desserts are always prepared with fruits. The most attractive things to decorate the table--we don't put on these horribly bloody things that have such evil associations. Some of you perhaps remember Thanksgiving dinners when you were a small boy, gathering with the rest, and they were just about beginning to eat the turkey, to carve the turkey, when a little boy spoiled the appetite of everybody by piping out, "Say, Grandpa, was that the old sore-headed turkey?" You see, the grandfather had killed the least valuable oe one. Perhaps you know the story of the boy down South, where a teacher was teaching school and taking pay in board. A boy came to school one morning, and said to the teacher that his father was going to kill a pig, and he thought perhaps the teacher would like the shoulder. Yes, it would be very acceptable. She said to the boy a few weeks later, "How about that shoulder you were going to give me?" "Well," he said, "the pig got well, so we didn't kill it."

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v-2-7-10.

Feb. 1, 1906.

BLOOD-PRESSURE IN INTERNAL DISORDERS.

NEPHRITIS:

High pressure most important sympton of <u>contracted kidney</u>.

Amyloid cardiac hypertrophy generally follows, and blood-pressure is low.

Blood-pressure low also in <u>hemorrhagic form</u> of nephritis.

In <u>diffused</u>, <u>parenchymatous nephritis</u> pressure may be high or low.

In <u>contracted kidney</u> with <u>tuberculosis</u> pressure may be low.

UREMIA:

Blood-pressure always high, and rises with convulsions.

Rising pressure indicates that the patient is getting worse.

A rising pressure in <u>acute nephritis</u> indicates danger of uremia.

Thrombosis, aneurism, and compression may produce difference in pressure between the two radials.

In one case of mediastinal tumor, there was no difference in pressure between the two radials when patient was sitting up, but when he lay down on one side the difference was 60 to 90.

HEMAPLEGIA:

When due to profuse hemorrhage, pressure is very high from compression which causes anemia in the brain.

In <u>thrombosis</u> pressure is normal or slightly hyper; usually slightly hyper.

Acute, infectious disorders of childhood almost always attended by low pressure.

When acute nephritis occurs as a complication, pressure usually rises.

In TUBERCULOSIS pressure is usually low.

In cases in which hemorrhage occurs, there usually is high pressure before the hemorrhage.

In DIABETES, high pressure.

In ANEMIA, low pressure.

In CACHEXIA, especially GASTRIC CANCER, advanced TUBERCULOSIS, and other wasting, exhausting diseases,--low pressure.

In GOUT, high pressure.

In EMPHYSEMA, BRONCHITIS, ECZEMA, high pressure.

In PLEURAL, and ABDOMINAL DROPSY, high pressure.

In LOCOMOTOR ATAXIA, pressure low with lightning pains.

High pressure during GASTRIC and ABDOMINAL CRISES.

In GENERAL PARESIS, low pressure.

In MELANCHOLIA, high pressure.

In CHRONIC MELANCHOLIA, low pressure.

In MANIA, low pressure.

In EPILEPSY, high pressure during spasm.

In FACIAL NEURALGIA, TIC DOULOUREUX, high pressure during spasm; may be very high.

In INSOMNIA, may be high pressure or low pressure; usually high pressure.

Pressure falls during sleep; gradually begins to rise some hours later; rises until patient wakes.

INSOMNIA with low pressure is due to nerve irritants in the blood.

BLOOD-PRESSURE IN SURGERY.

ANESTHETIC:

Ether causes rise of tension, especially at first.

Chloroform causes low tension.

Gas produces high tension due to partial asphyxia.

If pressure falls from shock while giving ether, better continue ether if necessary than to stop and begin again.

To combat low pressure of CHLOROFORM, ice over chest and heart. Stimulates respiration, so brings blood out of the abdominal area.

When operating elsewhere than on the abdomen, apply abdominal compression with the compression bag.

In abdominal operation, pressure rises with skin incision, and still more with incision of the peritoneum.

Pressure falls with opening of the abdomen.

Manipulation of the intestines causes fall of pressure from shock. Sponging in particular has this effect.

GENITO-URINARY ORGANS:

Manipulations involving external or internal organs in women cause high pressure; in men, low pressure.

Contraction on spermatic cord causes fall of pressure.

In head injuries, high pressure indicates compression from depressed bone or clot.

High, rising pressure, are indications for operation. The same is true with apoplexy with large hemorrhage and very urgent symptoms. Operation is indicated.

OBSTETRICAL CASES:

Pressure raised during pregnancy, probably from increase of intra-abdominal pressure.

Pressure rises during labor.

Rise of pressure with each uterine contraction; even painless contractions.

Very high pressure, or rapidly rising pressure, indicates danger of eclampsia. This is an important reason for taking blood pressure at later stages of pregnancy.

After child-birth, pressure falls. If pressure does not fall, look out for convulsions.

The best thing for combating is sweating. This lowers pressure and eliminates poison.

SURGICAL SHOCK:

Produced by--

Chloroform,

Long operation,

Operations involving sensory nerves,

Manipulations of intestines,

Pulling of tissues,

Blunt dissection, and

Rough sponging.

Dr. Burton-Opitz has recently made experiments in the Columbian Laboratory, of the College of Physicians and Surgeons, of New York, on the effects of hot and cold baths on the viscosity of the blood.

He found that cold baths (71° to 73°) increase the viscosity of the blood 12%.

Hot baths (109° to 110°) diminish the viscosity 10%.

This has an evident effect upon blood-pressure.

Cold baths increase vessel tonus and viscosity both.

Iodid of potash diminishes viscosity 10%.

v-February 1, 1906.

Star.

The writer has for many years made a study of blood-pressure in connection with hydriatic treatment. The first attempts were made with the sphygmograph, but this was found to be altogether too uncertain an instrument to be of value for the study of blood-pressure. Basch's instrument was obtained, also Oliver's, and Mosso's, and in turn each of the various devices which have been brought forward for the determination of blood-pressure.

Gärtner's tonometer, Riva-Rocci's sphygmomanometer, and various modifications of the latter instrument which have appeared in this country, and finally Erlanger's beautiful instrument ha have made the accurate determination of the blood-pressure almost as simple as the taking of the temperature with the thermometer, and so have rendered possible an exact study of the influence of various hydriatic and other measures upon changes in the conditions of circulation which formerly could only be guessed at.

For several years I have had an accurate determination of blood-pressure made in the case of every patient received for treatment in the institution of which I have charge. The total number of observations recorded is more than 10,000. It may be stated to be an almost universal rule that the second examination shows a lowering of pressure in all cases in which the blood-pressure is above normal. This is the natural result of the change in the dietary, and the aplication of hydriatic and other physiologic measures the natural effect of which is to establish normal conditions and thereby to bring the blood-pressure, as well as other conditions, toward the normal standard.

The efficiency of the methods described above in lowering pressure in cases of extreme high-pressure might be illustrated by a very large number of cases. We cite two or three only. The instrument usually employed has been a modification of the Riva-Rocci type of sphygmomanometer with a ten cm. armlet.